

## MASTER

'Going without knowing?'

international distribution logistics : an integrated approach to production allocation decisions

Burgers, Paul

*Award date:*  
1990

[Link to publication](#)

### **Disclaimer**

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

**'GOING WITHOUT KNOWING?'**

---

**INTERNATIONAL DISTRIBUTION LOGISTICS:  
AN INTEGRATED APPROACH TO PRODUCTION ALLOCATION  
DECISIONS**

---

Coaches Technical University:

Ir. H. Cornelissen (TPS)  
Prof.dr. C.B. Tilanus (ORS)  
Dr.ir. A.D.M. van de Ven (TPS)

Coach Bensons International Systems Ltd.:

Drs. C. van Strien

Paul Burgers  
Utrecht, February 1990

## PREFACE

---

The report you are about to read, contains a case study of a company called Bensons International Systems, a world-wide producer of loose leaf mechanisms. The report is about International Industrial Production and Distribution Logistics and it describes Bensons' production and distribution activities. The company relocated most of its production facilities from England to Malaysia in 1987. This report describes how possibly extra advantages can be gained out of the relocation by reviewing the current distribution structure within Europe. After the current distribution structure has been reviewed, six alternative ways of distributing were set up. One alternative has been chosen and is now being implemented. The results are in this report.

With this report I hope to finish my thesis in Industrial Engineering at the Technical University of Eindhoven, the Netherlands. Without the help of certain people I would not have been able to finish this report in time.

Therefore, I would like to express my gratitude to the always travelling Drs. C. van Strien, my coach at Bensons, all the people of Bensons who were very helpful (thank you, Ben) and Ir. Huub Cornelissen, my first coach at the University, sacrificing (some of) his weekends to read my reports. Good luck in your new job, Huub!

I also would like to thank Prof.dr. C.B. Tilanus for his second opinion and Dr.ir. A.D.M. van de Ven for his third opinion in the commission of 'judgement' and for the nice times I had carrying out some of his assistantships during my time as a student.

Paul Burgers  
Utrecht, February 1990

## SUMMARY

---

The world is getting smaller. More and more companies develop international activities. These activities vary from export liaisons to subsidiaries or production plants abroad. Not only the multi-national companies (multi-nationals) are operating internationally, also the smaller firms are going 'inter national'.

This movement can be explained with the theories of International Trade and the Product Life Cycle concept. Companies sooner or later have to automate their production more making it less labour-intensive and therefore more competitive with producers in low(er) wage countries or start up own production facilities abroad. This is one of the developments leading to the theory of International Industrial Production, explaining why industries are located on a certain place.

Attempts have been made to translate theories in practical models. In the discussed theories the absolute numbers and costs are however lacking, which is the very reason why they are inadequate for discussions on international manufacturing. One of these models is presented by Van de Ven, in which he calculates the integral costs of the production system. Looking for the optimal manufacturing location one has to know the *total* costs per location. This includes the costs of material, costs of production and costs of transport. According to Van de Ven more emphasis should be placed on the costs of transport. In the decision making process new optimal production locations, the current costs of production are compared to the costs of production in alternative locations (i.e. in a developing country) plus the additional costs necessary for transport and transit times (pipelines). Based on Van de Ven's model, the cost of transport is one of the items possibly influencing an allocation decision. In these calculations it is always assumed that the product flows from the new production plant in a developing country, have to fit to the company's existing distribution structure.

Normally production relocation calculations do not take into account the possibilities of a new distribution structure. To determine the possibilities of a adapted distribution structure one has to know which activities are involved. This can be found in the theory of International Distribution Logistics which describes the broad range of activities concerned with the efficient movement of finished products from the end of the production line to the customer.

At a company called Bensons International Systems, a world-wide producer of loose leaf ring binder mechanisms, an assignment was carried out to examine these possibilities more carefully. A decision to relocate the production for the European markets from England to Malaysia was taken in 1987, after competition in the European markets from producers in Hong Kong became a serious threat.

When this was established, some people at Bensons were wondering if the old distribution structure in Europe was still the best structure, because after the

relocation most of the product flows were coming in from Malaysia. Their distribution structure within Europe could be perhaps reorganized, with cost reduction or delivery speed improvement as new objectives.

Bensons has four warehouses in Europe. The main distribution centre is located in England near the production plant. England and the 'outskirts' of Western Europe (Scandinavia, Spain and Portugal) are served from here. Another warehouse in Holland is supplying the rest of Europe including small warehouses in France and Italy, serving the local market.

After examining the current distribution structure, the product flows and the delivery speed requirements finally six alternative ways of distributing could be determined. For each of these alternatives small models for calculations were set up to make a comparison on a cost basis possible.

It was examined if product flows could go straight from the factory in Malaysia to one central warehouse or distribution point in Europe. This was not possible before, because of the high additional costs for bringing all the products from the English factory to a central warehouse in Europe. With the new product flows coming from Malaysia these extra costs would not have been necessary anymore.

However it was calculated that distributing from a central warehouse in Europe would be much more expensive than in the current distribution structure, because centralizing did not have much advantages. Reductions of 8% stock were possible, far outweighed by the extra costs of outgoing transport within Europe. Because the importance of English products was coming down very rapidly (from 75 to 25% in two years) it was perhaps possible to supply certain markets from the warehouse on the continent (Holland) instead of supplying them from the English warehouse, because products from Malaysia could go straight to the warehouse in Holland.

It was calculated that with the new product flows it was possible to supply the Scandinavian, Portuguese and Spanish market from a distribution point in Holland not only faster, but also cheaper than from the English warehouse. In the report this alternative is called the Markets Moved alternative.

Also the possibility of direct container transport from Malaysia to Italy containing products for the Italian market was examined. This alternative was added as a small variation of the Markets Moved alternative and is called the 50% to Italy alternative.

Also a sensitivity analysis was carried out, showing for which parameters the alternatives were 'sensitive'.

The alternatives were also compared on other criteria, like customer service, distribution speed and initial costs (new investments). Finally all the results were put together. The 50% to Italy alternative was chosen because of its fast delivery speed at the lowest costs. It is now being implemented.

TABLE OF CONTENTS	page
Preface	i
Summary	ii
<b>PART 1. DETERMINE TERMS of REFERENCE</b>	<b>1</b>
<hr/>	
1.0. Introduction	1
1.1. A situation in practice	1
1.2. A theoretical framework	4
1.3. Assignment, objectives and goals	7
<b>PART 2. DETERMINATION of ALTERNATIVES</b>	<b>9</b>
<hr/>	
2.1. Flows of products in Europe	9
2.2. Two separate distribution flows ?	11
2.3. The alternatives	13
<b>PART 3. COMPARISON of ALTERNATIVES</b>	<b>16</b>
<hr/>	
3.1. What, where and how ?	16
3.2. Costs of transport, outgoing	17
3.3. Costs of transport, incoming	20
3.4. Interest and inventory costs	22
3.5. Costs of warehousing	25
3.6. Costs of handling in/out	27
3.7. Final results, evaluation and conclusions	29
3.8. Sensitivity analysis	30
<b>PART 4. DECISION CRITERIA</b>	<b>35</b>
<hr/>	
4.1. Financial	35
4.2. Distribution speed, service	35
4.3. Customer service, a marketing approach	36
4.4. Other criteria	37
<b>PART 5. OVERALL CONCLUSIONS and RECOMMENDATIONS</b>	<b>40</b>
<hr/>	
5.1. Overall conclusions	40
5.2. Recommendations	41
5.3. Final remark	42
References	43
Appendices	

TABLE OF CONTENTS: FIGURES and TABLES page

**PART 1. DETERMINE TERMS of REFERENCE** 1

---

Figure 1.1 The current distribution structure in Europe 3

**PART 2. DETERMINATION of ALTERNATIVES**

---

Table 2.1. Distribution quantities, origins and destinations 10  
Table 2.2. Distribution destinations, frequencies and quantities 11  
Table 2.3. Mixed product origins per invoice 12  
Figure 2.1. Mixed product origins per shipment 12  
Table 2.4. The alternatives 15

**PART 3. COMPARISON of ALTERNATIVES**

---

Table 3.1. Relation between items of cost and their activities 17  
Table 3.2. Costs of transport outgoing in 1990 and 1992 18  
Table 3.3. Costs of transport incoming in 1990 and 1992 21  
Table 3.4. Interest (10%), stock and in transit 24  
Table 3.5. Costs of warehousing in 1990 26  
Table 3.6. Costs of handling in/out in 1990 28  
Table 3.7. Final results in 1990 29  
Table 3.8. Final results in 1992 30  
Table 3.9. Cost prices (1) 32  
Table 3.10. Cost prices (2) 32  
Table 3.11. Cost price differences, transport and pipelines included 32  
Table 3.12. Sensitivity analysis of the results in 1990, costs 33  
Table 3.13. Sensitivity analysis of the results in 1990, changes 33

**PART 4. DECISION CRITERIA**

---

Table 4.1. Extra or less days of transport required compared to the number of days of transport in the current situation 36  
Figure 4.1. Supplier choice criteria, results 38

**PART 5. OVERALL CONCLUSIONS and FINAL REMARKS**

---

Table 5.1. A scoring of all the result 40  
Figure 5.1. The new (recommended) distribution structure in Europe 41

## TABLE OF CONTENTS: APPENDICES

Appendix I	: Flows of products 1988 - 1992.
Appendix II	: Transport outgoing, projection 1988 - 1995.
Appendix III	: Transport outgoing, Current Situation (in ton-km)
Appendix IV	: Transport outgoing, Markets Moved (in ton-km)
Appendix V	: Transport outgoing, 50% to Italy (in ton-km)
Appendix VI	: Transport outgoing, Pas de Calais (in ton-km)
Appendix VII	: Transport outgoing, Felixstowe (in ton-km)
Appendix VIII	: Transport outgoing, Rotterdam (in ton-km)
Appendix IX	: Transport outgoing, Current Situation (in costs)
Appendix X	: Transport outgoing, Markets Moved (in costs)
Appendix XI	: Transport outgoing, 50% to Italy (in costs)
Appendix XII	: Transport outgoing, Pas de Calais (in costs)
Appendix XIII	: Transport outgoing, Felixstowe (in costs)
Appendix XIV	: Transport outgoing, Rotterdam (in costs)
Appendix XV	: Tariffs for container and trailer transport.
Appendix XVI	: Total of containers and trailers to various budget markets.
Appendix XVII	: Costs of containers, Current Situation
Appendix XVIII	: Costs of containers, Markets Moved
Appendix XIX	: Costs of containers, 50% to Italy
Appendix XX	: Costs of containers, Pas de Calais
Appendix XXI	: Costs of containers, Felixstowe
Appendix XXII	: Costs of containers, Rotterdam
Appendix XXIII	: Palletplaces required for safety stock.
Appendix XXIV	: Costs of warehousing in 1992.
Appendix XXV	: Costs of handling in/out in 1992.
Appendix XXVI	: Results sensitivity analysis (1).
Appendix XXVII	: Results sensitivity analysis (2).
Appendix XXVIII	: Distances to the various markets together.
Appendix XXIX	: A questionnaire, supplier choice criteria.



# **PART 1. DETERMINE TERMS of REFERENCE**

---

## **1.0. Introduction**

In this report the development of the production and export activities of a company called Bensons are described, using theories of international production and distribution logistics as an framework for this development. The development of international activities is causing specific problems and opportunities, like developing a new distribution structure or a new production location. To examine these opportunities more carefully an assignment was carried out by Bensons.

The theories of International Trade, International Industrial Production, Distribution Logistics and the determining of the terms of reference are described in part 1. In the first section (1.1.) a description and a small review of the company is given. Then, in the second section (1.2.) the company's history is placed in a theoretical framework. Finally in section three, an assignment is defined and the terms of reference are determined (1.3.).

In part 2, the flows of products are shown and the possible alternate ways of distributing are examined. This leads to the determination of six alternatives. In part 3, these alternatives are compared on a cost basis, dividing the different items of cost according to the theory of Ploos van Amstel's International Distribution Logistics. In part 4 other criteria are added to the financial results and evaluated. Finally, in part 5 all alternatives are evaluated on all criteria, conclusions are drawn and one alternative is chosen. Recommendations can be found at the end of part 5.

## **1.1. A situation in practice**

In this section a short history and description of the present situation of Bensons International Systems Ltd. is given.

### *1.1.1. What is Bensons?*

Bensons manufactures a very wide range of loose leaf ring binder mechanisms that are used in catalogues, business records and educational fields. Different areas of the world have different standards and a part of Bensons' strength is its capability of supplying all the major standards used in all regions of the world. This widespread product base enables Bensons to maintain a strong position in the face of heavy international competition, notably from the South East Asian sources.

### *1.1.2. History of Bensons*

Bensons commenced business as a small company located in the city of Birmingham, West Midlands in England. Initially, the company produced tools for local engineering works but progressed to the manufacture of ring mechanisms, following an enquiry from a customer. The first mechanism was made by hand in the early 20's and the customer then, is still a customer today. A price list of those days shows that a similar range of mechanisms had developed by 1925 to what is produced today. Even more interesting is the fact that the prices are still comparable. However in those days mechanisms were nearly all hand-made whereas today Bensons is much more automated.

Managed and owned by the Bennett family, the company adopted the name BEN-SONS, derived from Bennett and Sons. Bensons' international trading started before the Second World War and was almost entirely with the old British Empire

Countries, principally Australia but also Scandinavia and Holland. This however was brought to a standstill with the outbreak of the Second World War in 1939. This nearly stopped the production of ring mechanisms as Bensons swung its skill into the war effort by producing armourment and tooling for aero-engines. Some ring mechanisms were still made however and production re-established fairly quickly as peace returned.

Production had improved greatly during the war and it was again essential that exports should expand. To do this, emphasis was placed on competitive pricing and a range of mechanisms to suit a diverse series of markets including the U.K., Europe, U.S.A., Canada and Australia. Such was the success that new premises were needed to cope with the demand.

The company relocated to Brimscombe, Gloucestershire in 1949-1950 when permission to expand in Birmingham was refused. Exactly one hundred people were employed and Bensons was already the principal supplier of loose leaf mechanisms in the U.K. market

By 1953 the pace of expansion was increasing and a distributor was appointed in the U.S.A., to follow the successful activities in Canada. Around this time the E.E.C. was formed without Britain and Bensons needed the European market. So, in 1957, a subsidiary was set up in Holland which, although small, was so successful that premises were built at Kamerik (near Woerden) in 1964. Here rapid service could be given to most of Europe and in 1966 manufacturing was set up as well as warehousing.

All through the sixties and seventies things were moving rapidly, overseas sales grew and a wholly owned subsidiary was started in Australia. In the U.K. progress continued and it should be noted that all times Bensons developed and made its own tooling as it still does today.

In 1975 Bensons became part of the Esselte Group as they are today. Esselte, a Swedish multi-national, is currently rated amongst the largest 250 companies in Europe. Esselte has approximately 20,000 employees in 23 countries. Esselte is a very diversified multi-national group specialising in rational business systems, office supplies, price marking equipment, packaging, printing and publishing. The emphasis now is on the international office equipment market where Esselte is a leading supplier. Esselte is highly decentralized. Its main companies are grouped in eleven independent divisions each aimed at a specific market.

To further enhance their position in North America, Bensons started their own U.S. company in 1978. To complete the picture of penetrating the North American market Bensons had to have a source of low price Oriental mechanisms and thus, the first stage of an extensive cost reduction and expansion programme was initiated in 1978 when the company established a subsidiary in Singapore. By 1986, this unit was producing a million mechanisms a week.

As further production lines were transferred from the UK, and growth continued, Bensons established a production unit in Johore Bahru, Malaysia in June 1986. Within a year, production had reached a million mechanisms per week.

Encouraged by the success of the Johore Bahru plant, a further factory was opened in Kuala Lumpur (Malaysia) in July 1988 to enhance capacity for the European market. With this development, the focus of Bensons' manufacturing activity is centered in South East Asia. Bensons has also commenced the production of lever arch mechanisms in Kuala Lumpur.

Bensons International Systems has sales units in Australia, Canada, France, Holland, Italy and the United States with production units in Australia, Malaysia, Singapore and the United Kingdom. Bensons manufactures over 800 different types of ring mechanisms that conform to the many standards in use in different parts of the world.

Bensons International Systems is now the world's leading producer of mechanisms for loose leaf systems and employs over 1,900 people, 350 being in Brimscombe.

Turnover of Bensons in 1988 world-wide was f156,000,000.- (Dutch guilders) of which f62,000,000.- was achieved in the European markets. Operating income of Bensons in 1988 in Europe was f4,700,000.-, 7.6% of the turnover in Europe.

### 1.1.3. Bensons in Europe

Bensons separates markets geographically. Not only the administrative organisation is managed this way but it also implies that the distribution structure is country oriented.

In Europe, Bensons has four subsidiaries and warehouses where products are stored, in France, Italy, Holland and the U.K. Two smaller sales organizations are operating in Italy (Milan) and France (Paris) serving the local markets. In Italy five people are working and in France only three. For these two markets storage capacity is rented in a warehouse in the neighbourhood of Milan and Paris.

At the English plant in Brimscombe Bensons has also its main distribution centre for Europe located, serving the U.K., Ireland, Denmark, Scandinavia, Spain and Portugal. The French and Dutch warehouse are also supplied from here.

In Woerden, Holland another warehouse is located. The French and Italian warehouse are served from Holland, as well as the Austrian, Belgian, Danish, French, Swiss and other smaller markets.

Except for Denmark, France and Italy which are served from both Brimscombe and Woerden or the local warehouses (in France and Italy), every market in Europe is supplied by only one warehouse. Products produced in South East Asia are shipped to the English or Dutch warehouse only, from which the products are distributed to another Bensons warehouse or to a customer. Figure 1.1. illustrates this distribution structure.

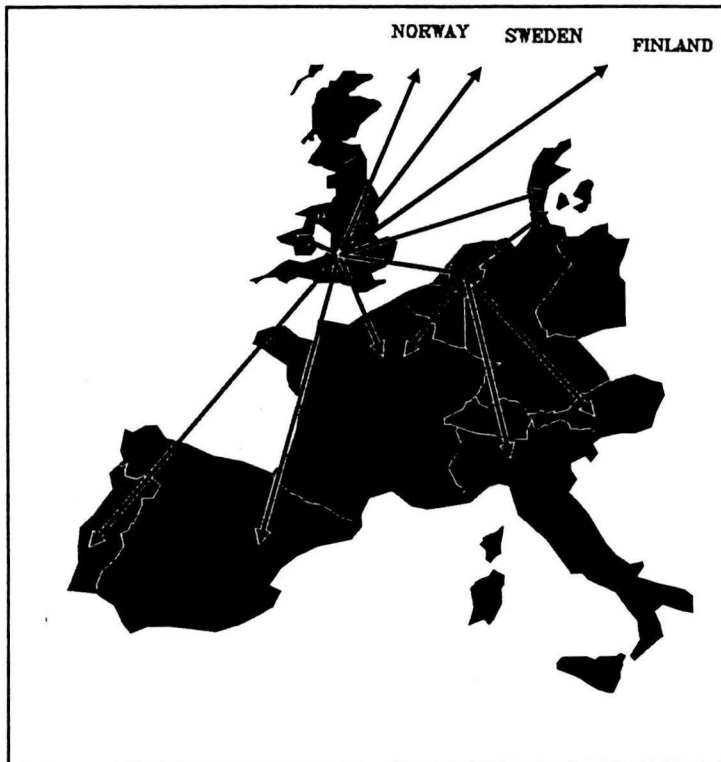


Figure 1.1. The current distribution structure in Europe

## 1.2. A theoretical framework

In this section the theoretical framework, in which the assignment takes place, is described. It contains background information and explains all the necessary definitions.

### 1.2.1. *International Trade theory*

Essentially, international trade theory seeks the answer to a few basic questions: Why do nations trade? What goods do they trade?

Nations trade for economic, political and cultural reasons, but the principal economic basis for international trade is a difference in price of products. The classical example is given by Ricardo [1]: In discussing the advantages to England in trading textiles for Portugal's wine, he noted that grapes could be grown "under glass" (in greenhouses) in England but that to do so would lead to England's having both less wine and fewer textiles than if it specialized in textiles. His conclusion is based on the number of working hours per product only. Portugal has an absolute advantage in producing wine as well as textiles, and a comparative advantage in wine. England has an absolute disadvantage in producing wine as well as textiles, but a comparative advantage (or least disadvantage) in textiles. From an international point of view this means export of textiles from England to Portugal and export of wine from Portugal to England.

One of the best known theories about international trade is from Heckscher (1919) and the Swedish economist B. Ohlin (1933) [2]. They developed the famous Heckscher-Ohlin theorem stating that every country (or part of a country) has an abundance of certain (production) factors like raw materials, sun, water, labour, capital or knowledge. Every country will start to produce those products or services using their factors of plenty, and they exchange them for the products they don't produce themselves. Thus, in reference to Ricardo's example, Portugal's wine would be cheaper than wine made in England because Portugal has a relatively better endowment of wine-making factors (i.e. land and climate) than England does.

Tinbergen translated this theorem in his theory on the international division of labour. His basic idea was to locate a certain industry where the necessary inputs of labour and capital correspond with the local availability of these inputs. Thus, labour-intensive industries should be placed in labour-abundant, low wage countries, and capital-intensive industries in capital-abundant countries [3]. In Tinbergen's theory as well as in the Heckscher-Ohlin theorem, no attention is given to transport costs, political constellations or the role of technical innovations.

These innovations are the centre of R. Vernon's theory [4], the *Product Life Cycle* theory. A refinement in trade theory made by Vernon and Wells is related to the product life cycle concept [5]. The product life cycle in marketing refers to the consumption pattern for a product. When applied to international trade theory, it refers primarily to international trade and production patterns. According to his theory, many products go through a trade cycle in which one nation is initially an exporter, then loses its export markets, and finally may become an importer of the product.

These are the different phases:

- Phase 1. Export strenght
- Phase 2. Foreign production starts
- Phase 3. Foreign production becomes competitive in export markets
- Phase 4. Import competition begins

In Phase 1, according to the theory, a product is launched (and produced) by a company in the home market with a strong buyer's potential and where the product-development activities took place. The new product will be produced in the home

market because it will have a comparative advantage, not for the reason traditionally posited, Ohlin's superior factor endowment, but rather because of the production learning curve on the new product, the need for communication with suppliers and customers, and the lack of customer concern with price on new products.

In Phase 2, product familiarity in other countries increases. As foreign markets expand, manufacturers in wealthy countries begin producing for their own markets.

In Phase 3, foreign producers gain production experience. Because their labour costs are lower, their products become competitive with the company's export in third countries: international competition for this product comes up. The company will decide whether or not to start production abroad to protect their export market.

In Phase 4, the foreign producer has cost savings and economies of scale sufficient to allow him to export to the country where the company's product originated. To meet the competition, plant facilities can be built by the company in developing countries to achieve the most cost efficient production and economies of scale or the production process has to be highly automated making it less labour-intensive.

Finally, these developing countries will start to export the products back to the developed countries, if production techniques and technologies are handed over completely. The production will go entirely to the developing countries.

This view of the theory of comparative advantage and the Product Life Cycle concept, provides further insight into patterns of international trade and production and helps the international company plan logistics.

The export and production activities of the Bensons company where the assignment took place, developed according to the theory of Vernon's and Wells' Product Life Cycle and International Trade. First production started in England and export began. Then other producers started to sell in Bensons' export markets. At that time also new producers in South East Asia started up production. Bensons decided to bring (most of) its production facilities to South East Asia. Bensons' product is in the last phase of Vernon's and Wells' model, now relocating most of the production from England to Malaysia.

### *1.2.2. What is International Industrial Production ?*

According to Van de Ven [6]: "International industrial production is a comparative study of how industrial production is carried out in different countries."

Nowadays many companies have developed international trade liaisons, like export activities or even international industrial production. Several people have discussed the issue of (international) production allocation. More and more companies are going "abroad" and are getting involved in international relocation decisions [7,8].

Relocation decisions are not only made on the criterium: "Where is the most cost effective place to produce my products ?", but concerns also things like political stability, tax system (tax holidays), labour force and living conditions and investment. Unfortunately, most models have been set up to calculate the optimal location on a basis of total costs only. One of these models is presented by Van de Ven [6], in which he calculates the integral costs of the production system. This includes the costs of material, costs of production and costs of transport. Van de Ven says that in the discussed theories the absolute numbers and costs are however lacking, which is the very reason why they are inadequate for discussions on international manufacturing. In looking for the optimum manufacturing location one has to know the *total* costs per location.

### *1.2.3. Consequences for production relocation decisions*

In the decision making process of production relocation the current costs of production are compared to the costs of production in the new location plus the additional costs necessary for transport and transit times (pipelines). The new flows of products now coming from the developing country to the developed country have to fit to the company's existing distribution structure. Possible changes in the

company's distribution system for the existing export markets are *overlooked* this way. I.e. at Bensons first a decision was taken to relocate the production for the European market from England to Malaysia. Now they are wondering if the current distribution structure in Europe is the best structure, because the flows of products are coming in from a different location. The distribution structure in Europe can be reorganized, with cost reduction or delivery speed improvement as new objectives. Normally a production relocation decision does not take this possibility into account. This is exactly why the main title of this report is called "Going without knowing?"

It would be much better to consider these 'side-effects' even before a new production location is chosen. To determine the possibilities of a adapted distribution structure one has to know all the activities involved. The activities concerning the review of the existing distribution structure can be summarized in the term Physical Distribution.

#### *1.2.4. What is Physical Distribution?*

The National Council of Physical Distribution Management (NCPDM) in Chicago (1968) defines Physical Distribution as follows: "Physical Distribution Management is a term employed in manufacturing and commerce to describe the broad range of activities concerned with the efficient movement of finished products from the end of the production line to the customer [9]. These activities include:

- \* freight transportation;
- \* warehousing;
- \* materials handling;
- \* protective packaging;
- \* inventory control;
- \* plant and warehouse site selection;
- \* order processing;
- \* market forecasting;
- \* customer service."

To determine a (new) distribution structure, one of the most important activities is the warehouse location selection. A method used very often is the method of Plant Location International [9]. It consists of three steps:

- \* First step is a physical technical analysis. Examined will be the physical and technical possibilities, like transport facilities.
- \* The second step is the calculation of investment and operational costs, the financial accounting analysis.
- \* Normally, there remain four or five alternatives. A checklist is set up which contains also other decision criteria like the initial costs, customer service and delivery speed.

To determine the first and second step, this method will be applied to the structure of a cost control system for physical distribution. This system is an administrative system with the purpose of determining the flows of cost in the distribution system. It needs logical and precise input of process definitions and responsibilities. Systematic cost control in the physical distribution helps to analyse the possible distribution structures (alternatives) on a financial basis. More about this cost control system will be said in part 3, where the different alternatives will be compared.

### 1.3. Assignment, objectives and goals.

#### 1.3.1. Assignment

Bensons now has chosen for production in cheap labour countries. Two of its European competitors however are producing on automated machines in Europe, according to Tinbergen's capital intensive way (section 1.2.1.). The other main competitors have production located in Asia. Increasing competition from both Europe and South East Asia forced Bensons to start up a plant for the European market in a cheap labour country. Bensons wanted (and still wants) to remain among the most cost efficient producers in the world. Economies of scale could be gained at the new plant in Kuala Lumpur for raw materials and tooling because Bensons had already another plant located in Malaysia.

As it was stated in subsection 1.2.3. production plant relocations may have consequences for the company's distribution system. Though good results in production were achieved at the new plant in Kuala Lumpur, one had this 'feeling' at Bensons that the current structure in Europe could be improved. They believed that the current distribution structure (fig. 1.2.) was not the cheapest, most logical and direct way of distributing.

An assignment was defined to examine this feeling more carefully with the following terms of reference:

*"Analyse the distribution logistics of Bensons International Systems in Europe and come up with proposals to improve the company's distribution structure."*

#### 1.3.2. Objectives and goals

The main objective for this assignment is creating a more efficient distribution network from the factories to the customers in Europe after reviewing and possibly reorganizing the distribution activities.

The main goal for Bensons is to have a measurable cheaper and faster distribution system maintaining (at least) the current service level. If no improvement is possible, better insight in the distribution's cost structure has to show that the present situation is the best situation.

#### 1.3.3. Structure of the report and approach of the assignment

First an orientation inside the organization, its units and activities has to make clear how Bensons is organized and how it functions. Then in part 2, the production system and the product flows will be analysed determining the history and the future of the product flows, their origins and destinations (section 2.1.). Next is the determination of the possible alternatives (section 2.3.) and how to compare them financially (part 3) or in another way (part 4).

This means that one should know how to calculate the cost of logistics. Which items of cost are possible and where? This will be determined in part 3. Activity levels per location have to be analysed and parameters have to be set up to make a comparison of the different items of cost in the various locations possible. Rates have to be calculated and tariffs have to be collected whenever and wherever necessary. They will be used to translated the activity levels in the various locations into costs. In subsection 3.1.1. the calculation of the cost of logistics will be described and explained more profoundly. A sensitivity analysis is carried out in section 3.8.

Not only from a cost point of view a decision has to be taken, also other criteria have to be taken into account. In part 4 the most important criteria are discussed and used in another comparison of the alternatives.

Finally general conclusions have to be drawn. They are described in part 5. In this part a selection and evaluation of one alternative is made (section 5.1.). Some recommendations are given in section 5.2.

This assignment started almost nine months ago, in June 1989. Especially the calculations in part 3 were very time consuming. In October an interim presentation was held at the University in Eindhoven and it was decided to make some refinements in the calculations taking other decision criteria into account as well. Also three presentations were given at the plant in Brimscombe, England during the time-span of the assignment.

The reporting period started at the end of December last year and it took one month and a half to finish.



## PART 2. DETERMINATION of ALTERNATIVES

---

In this part it is tried to explain the logical sequence that leads to the description and definition of alternatives. In section 2.1. the flows of products are determined showing the most important markets. In section 2.2. a small exercise is carried out examining the possibility of two separate distribution flows, one from England and one from South East Asia. The results of these two sections have been put together in section 2.3., in which the alternatives to be further considered, are defined.

### 2.1. Flows of products in Europe

#### 2.1.1. *Bensons mechanisms*

Effects of the production relocation from the UK to South East Asia have to be made clear first. Many of the same types of mechanisms are produced in England as well as in Malaysia or Singapore at this very moment. Assumed is that those products now made in both England and Malaysia, will be produced in Malaysia only, in the near future. The low labour costs in Malaysia are reducing the cost prices of the products giving Bensons the possibility of making better margins on its products. Also the factory in Singapore will stop to exist in the near future and will be transferred to Malaysia for the same reason. In section 3.8. an example of difference in cost price for a comparable product produced in England and Malaysia is given. The difference in cost price can be more than 40% in favour of Malaysia (transport and pipelines included).

A distinction between 'popular' or 'common products' and 'special products' has to be made. Around 700 of the 800 different types of products Bensons produces are marked as special products and only 100 types of products are popular products.

The English plant will be used as extra production capacity if quick deliveries or large orders are required, or for the production of the special products. Around 100 different types of products will be produced at the Bensons' plants in Malaysia, Kuala Lumpur and Johore Bahru, all the popular types. However, three automated production machines remain in England. They produce two popular types of mechanisms (codes: ER 148-2-25 and ER 297-4-25) and will remain in England. Together these automated machines produce five million mechanisms a year.

To make a distinction between the different flows of products, statistics have to be used. The statistics have to show the amount of products to each of the markets. The years after 1987 are used in this assignment because the relocation of the production started by then. The statistics of 1988 and 1989 are representative years for the near future, also because the budget for 1990 and the strategic plan (untill 1992) are based on these figures.

In Europe, Bensons distinguishes eight different budget and strategic markets. The two main administrative organizations in England and Holland are each responsible for certain budget markets. The difference between a market and a budget market is that in certain budget markets, some markets (or countries) have been put together.

Table 2.1. shows the different budget markets. For the Dutch organization these are the Benelux, France, Italy and Holland export which contains also Austria, Switzerland and Israel (NLEXP in table 2.1.). For the English part there are the UK, DYMO (a big customer in the UK which belongs to the Esselte concern as well), UK export which contains also Spain and Portugal (UKEXP in table 2.1.) and Dymo Export (DYMOEXP in table 2.1.), in Scandinavia.

In 1990 Bensons will commence production of Lever Arch mechanisms in Kuala Lumpur for the European market. In table 2.1. only the years 1988, 1989 and 1990 are shown. In appendix I also the years 1991 and 1992 can be found. Each row in the table shows the number of products, in a specific year, to a certain budget market with a certain origin of production.

The major impact of the shift to the South East Asian production on the number of English originated products can be seen quite easily. In 1988 the number of mechanisms produced in England was 57.5 million. In 1989 it goes down from 30.3 million mechanisms, to 21.8 million mechanisms in 1990. Especially the production in Kuala Lumpur will rise, from 17.2 million mechanisms in 1989 to 31.9 million mechanisms in 1990, the Lever Arch excluded. After 1990 the relocation will slow down, because the production of the popular types will be done entirely in South East Asia.

Table 2.1. Distribution quantities, origins and destinations (in millions of mechanisms).

Distribution quantities to :	BENELUX	FRANCE	ITALY	NLEXP	UK	DYMO	UKEXP	DYMOEXP	TOTAL
	<i>from W O E R D E N</i>				<i>from B R I M S C O M B E</i>				
1988 ***** ORIGINS + TOTALS *****	10.3	3.2	7.3	4.8	29.8	8.8	4.7	4.8	76.8 100%
** TOTAL from ENGLAND **	9.0	.3	3.2	1.7	25.0	6.2	4.5	4.6	57.5 75%
** TOTAL from SINGAPORE **	1.1	2.8	3.6	2.9	4.0	.1	.2	.2	15.0 20%
** TOTAL from KUALA LUMPUR **	.2	.1	.5	.2	0	0	0	0	1.0 1%
** TOTAL from JOHOR BAHRU **	0	0	0	0	.9	2.5	0	0	3.3 4%
1989 ***** ORIGINS + TOTALS *****	10.3	5.0	7.8	3.5	24.4	9.1	4.3	6.1	70.4 100%
** TOTAL from ENGLAND **	2.8	1.1	.7	.9	15.2	2.7	2.6	4.2	30.3 43%
** TOTAL from SINGAPORE **	.2	.5	.8	.7	3.0	.2	.8	0	6.1 9%
** TOTAL from KUALA LUMPUR **	6.8	1.6	2.7	.5	3.8	.6	.7	.5	17.2 24%
** TOTAL from JOHOR BAHRU **	.6	1.8	3.7	1.4	2.4	5.5	.2	1.4	16.9 24%
1990 ***** ORIGINS + TOTALS *****	12.1	9.6	10.8	5.4	28.9	9.3	6.9	5.1	88.1 100%
** TOTAL from ENGLAND **	2.3	1.0	.9	1.0	10.2	2.1	2.1	2.1	21.8 25%
** TOTAL from SINGAPORE **	.2	.5	.5	.4	1.5	.2	.9	0	4.2 5%
** TOTAL from KUALA LUMPUR **	7.5	2.1	3.5	.7	12.7	1.2	2.7	1.4	31.9 36%
** TOTAL from JOHOR BAHRU **	1.1	5.4	4.9	2.7	2.5	5.8	.2	1.6	24.2 27%
** TOTAL LEVER ARCH MECHS **	1.0	.5	1.0	.5	2.0	0	1.0	0	6.0 7%
MOST IMPORTANT BUDGET MARKETS :	14%	11%	12%	6%	33%	10%	8%	6%	(in 1990)

### 2.1.2. Mechanisms and non-Bensons items

Bensons not only sells its own mechanisms, but also mechanisms and related products produced by others. These products can be clips or other binder products. In some markets these non-Bensons items make up 25% of total sales and therefore have to be taken into account. For this assignment a separation per budget market is too rough, therefore in table 2.2. total sales are presented per market. Not in quantity of mechanisms, but in weight, because from a distribution point of view this parameter is the correct parameter to work with. Table 2.2. includes the sales of Bensons mechanisms and the non-Bensons items. Assumed is that growth (in percentage) of Bensons mechanisms is equal to non-Bensons items after 1990.

The frequency value gives an indication of the number of shipments that are made to each of the markets every year from the Dutch or the English warehouse. For France and Denmark the total of shipments from both the Dutch and the

English warehouses are given. The daily shipments from the French and Italian warehouse to their local markets are not included. Table 2.2. shows the results.

Table 2.2. Distribution quantities per market (in tons) and shipment frequencies (per year).

DESTINATION	1988	1989	1990	1991	1992	FREQUENCY	1988	1990	1992
AUSTRIA	72	41	62	82	103	52	1.1%	0.9%	1.1%
BELGIUM	432	423	431	471	520	130	6.3%	6.2%	5.4%
DENMARK	374	285	327	356	392	130	5.5%	4.7%	4.0%
ENGLAND	3,163	2,562	2,945	3,290	3,677	255	46.4%	42.1%	37.8%
FINLAND	40	23	22	24	27	24	0.6%	0.3%	0.3%
FRANCE	639	445	692	808	945	130	9.4%	9.9%	9.7%
HOLLAND	791	774	902	1,063	1,237	255	11.6%	12.9%	12.7%
IRELAND	34	31	49	64	81	36	0.5%	0.7%	0.8%
ISRAEL	56	32	48	64	80	24	0.8%	0.7%	0.8%
ITALY	871	777	1,053	1,367	1,728	130	12.8%	15.0%	17.8%
NORWAY	23	20	27	30	33	24	0.3%	0.4%	0.3%
PORTUGAL	80	72	114	151	190	12	1.2%	1.6%	2.0%
SPAIN	148	134	211	373	563	24	2.2%	3.0%	5.8%
SWEDEN	99	86	116	126	139	52	1.5%	1.7%	1.4%
** TOTAL **	6,822	5,705	6,999	8,269	9,716		100%	100%	100%

As table 2.2. shows the importance of the English market is enormous, 46.4% of sales (tonnage) in 1988. However, it is coming down, although slowly, to 37.8% in 1992. Other important markets are Italy, Holland, France, Belgium and Denmark. Spain is growing very fast and is planned to become a significant market in 1992. In appendix II a projection is made until 1995 assuming Bensons' market share in all markets remains the same.

## 2.2. Two separate distribution flows?

If European customers order English products only or Malaysian products only, a separated type of distribution channels may be possible. A distribution structure (i.e. the location of a warehouse) has to be organized in a different way if two (or more) product origins are found in every order or shipment. Therefore, it is important to know how often the two product origins (English and South East Asian) are together in one truck (or shipment) on their way to the customer.

Due to the results shown in table 2.1. it was expected to have a lot of shipments containing South East Asian products only and just a small proportion of shipments with English products only in the near future.

The effect of relocation has to be taken into account here as well. This means that adjustments have to be made for those invoices containing English products which will be produced in South East Asia in the near future.

Table 2.3. shows the results.

### 2.2.1. Results

The number of invoices with only English products drops enormously (from 60% to only 19%). Although the number of invoices containing only products from South East Asia increases very strongly (from 7% to 34%), the number of invoices containing both origins increases as well (from 9% to 23%), after relocation adjustments. According to this result one can say that only in 23% of the cases an invoice with both origins is found and therefore a separate distribution flow is a possibility.

Table 2.3. Mixed product origins per invoice.

ORIGINS in 1988	ONLY UK		ONLY ASIAN		BOTH ORIGINS		NON-BENSONS	
	No.	%	No.	%	No.	%	No.	%
	3313	60	413	7	505	9	1315	24
<i>after relocation adjustments</i>								
ORIGINS in 1988	ONLY UK		ONLY ASIAN		BOTH ORIGINS		NON-BENSONS	
	No.	%	No.	%	No.	%	No.	%
	1055	19	1893	34	1283	23	1315	24

However, normally a shipment contains more invoices than just one and therefore the results have to be further elaborated. With an average of three invoices per shipment, which in fact is not valid for all markets because some markets have even more than three invoices per shipment (i.e. Holland and Belgium have an average of 9 invoices per shipment), the chance that a shipment contains three invoices with both English and South East Asian products are together in one shipment is already 0.74. This chance is calculated as follows: the chance that an invoice does contain two products origins is equal to 1 minus the chance that it does not. This is equal to the chance that a shipment contains Asian products only with or without non-Bensons items, or English products only with or without non-Bensons items or non-Bensons items only. Figure 2.1. shows the chance a shipment contains English and South East Asian products with a certain number of invoices per shipment before and after relocation adjustments.

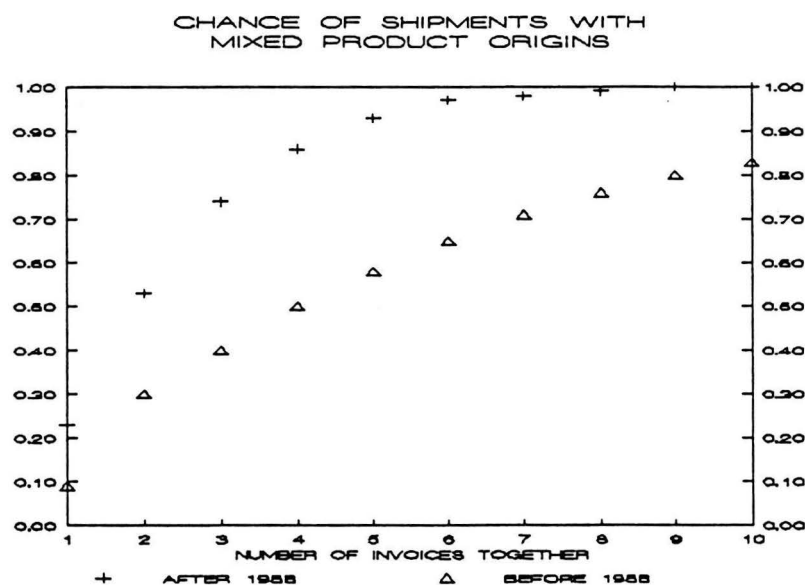


Figure 2.1. Mixed product origins per shipment.

The result in figure 2.1. implies that in the future it is even more difficult (or more expensive) to use two separated distribution channels, compared to the situation in 1988.

### 2.2.2. Conclusion

General conclusion of this exercise is that separate distribution structures for South East Asian products and English products are not a good alternative to examine more carefully, because there will always be a high percentage of shipments containing English as well as South East Asian products in one shipment. This means that the products of both origins should be in the warehouse at the same time before the final distribution to the customer takes place.

If the products are not in the same warehouse at the same time, the additional costs of transport and handling are likely to exceed the cost of the present situation. This is because the average shipment quantities are getting smaller (small quantities are more expensive to transport per kilogram than large ones) and they occur at an increasing frequency, if the same service degree has to be maintained.

Also from a organizational point of view a separate distribution structure is much more complex to work with. Now each organization is responsible for its own markets with its customers. With separate distribution flows this is much more complex. I.e. if a customer orders an English product he is in principal helped by the English organization, but if he orders an Asian product the Dutch organization is responsible. It means that two administrative organizations are responsible for one customer, depending on the origin of the product. This is not very easy to work with especially if you know that in 23% of the cases this happens.

### 2.3. The alternatives

The results of section 2.2. eliminate the possibility of two separate distribution structures. Some restrictions for this assignment were given by Bensons concerning handling and warehouse aspects. Warehouses have to be rented or owned by Bensons, but handling capacity (i.e. workers and equipment) has to be Bensons' own.

Now we take the first step in the method of Plant Location International in which a physical technical analysis is carried out to determine the possible alternatives.

According to the results of table 2.2. the most important markets are England, Italy, France and Holland. In each of these markets Bensons already has a warehouse. The other European markets are too small and too unimportant (no daily service required) to justify new warehouses, but Spain is planned to become another important market.

A possibility is to put the warehouses of i.e. England, France and Holland together, also called centralization. Thinking about centralizing, this scenario leaves only a few alternatives: a central warehouse either in England, in Holland or in France. Because of the daily service to the local market (subsection 2.1.2.) the warehouse in Italy has to remain, but because of the same daily service requirements in England, France and Holland it is not realistic to locate the central warehouse in Italy.

For the same reason the central warehouse in either England, France or Holland has to be located near a (big) port at the Channel to make the daily service to England, France and Holland possible. For England Felixstowe was chosen because of its big container port (alternative 5). Pas de Calais was chosen for France because new activities are developing there with the construction of the 'Chunnel'. Holland, England and France can be reached within a day from here (alternative 4). Rotterdam or the surroundings of Rotterdam is chosen as a location for a central warehouse in Holland. France (Paris) and Holland can be served within one day from here, although the question is if England can be really served in one day from here (alternative 6).

In the beginning of the assignment also other locations for a central warehouse were taken to see their effect on the different cost items (section 3.1.) : a central warehouse in Brimscombe where the English plant is located. But this scenario is

not taken into account in the final calculations of the alternatives, because the current service level can not be maintained in this alternative. Its main purpose was only to view the relations between the different items of cost. Also a central warehouse in Antwerp was a possibility, but Antwerp is not so far from Rotterdam. Therefore Rotterdam was taken as an alternative, because in this alternative the Dutch organization could go to the new warehouse location without the troubles and initial costs for building up a new organization (which can be very expensive).

Besides a central warehouse a few other combinations are also possible. One is the existing structure in which England serves, besides the UK and Ireland, also Scandinavia and the Iberian peninsula. The rest is served from Woerden in Holland (alternative 1).

Another possibility is to serve also Scandinavia, Spain and Portugal from Holland (alternative 2). This alternative is called the **Markets Moved** alternative. The size of the organization and the warehouse in France, at this moment, is too small and it would ask too much investment to have these markets served from France, unless the prices for transport, handling and warehousing in France are much lower than in Holland, of course. But if the prices are really lower in France, this has to become clear in the Pas de Calais alternative.

Because of the size and expected rapid growth of the Italian market the possibility of direct container shipments from Malaysia to Italy are coming up. Just like containers from South East Asia go to England and Holland directly it must be possible to send them directly to Italy, if the market is big enough. The Italian school-market makes up a large amount of the total mechanisms sold in Italy and especially these types of mechanisms are sold in large quantities per order and can make up a full container. No data are yet available, but in this alternative it is assumed that 50% of the containers from South East Asia for the Italian market go directly to Italy. This alternative was added as a small variation of the Markets Moved alternative and is called the **50% to Italy** alternative. A sensitivity analysis in section 3.8. will calculate the effect if more or less containers can go directly to Italy (alternative 3). Table 2.4. shows the alternatives.

This assignment looks into the distribution structure with a general view only. It means no detailed information about the optimal warehouse locations within a country is given, only the number of warehouses and a rough location (in which country or part of the country) is indicated, but not on a "zip-code level".

The alternatives will be compared in part 3, according to the second step in the International Plant Location method. Finally all the alternatives will be evaluated on a financial basis at the end of part 3, and on other criteria in part 4. Overall conclusions and recommendations can be found in part 5, the final step in the International Plant Location method.

Table 2.4. The alternatives.

Alternative number and name :		Markets in Europe served from :	To which markets :
1] Current Situation	-->	Brimscombe  Paris Milan Woerden	Scandinavia Spain Portugal <u>Ireland + UK</u> France Italy rest of the European markets
2] Markets Moved	-->	Brimscombe Paris Milan Woerden	Ireland + UK France Italy rest of the European markets
3] 50% to Italy		like alternative 2, + 50% of the containers from South East Asia for the Italian market go directly to Italy	
4] Pas de Calais	-->	Milan Pas de Calais	Italy All markets in Europe
5] Felixstowe	-->	Milan Felixstowe	Italy All markets in Europe
6] Rotterdam	-->	Milan Rotterdam	Italy All markets in Europe

## PART 3. COMPARISON of ALTERNATIVES

---

### 3.1. Where, what and how ?

In subsection 1.2.4. it is said that the calculation of the alternatives will be done according to the development of a cost control system for the physical distribution function. In this section it will be explained what is meant by this development.

#### 3.1.1. Systematic cost control in the physical distribution: cost centres

From a cost point of view it is indispensable defining first all the centres of activities to describe the physical distribution function as cost centres. The most important activities in physical distribution are:

- \* transport;
- \* groupage (collecting and combining cargo with various destinations);
- \* degroupage (splitting up the cargo for shipments to various destinations);
- \* trans-shipment (collecting and shipping of a complete cargo);
- \* warehousing, handling (handling, warehousing and reconditioning of cargo).

For every alternative it is necessary to make unambiguous definitions for each of these activities. It is not always easy to make a clear distinction between certain activities, but it is of great importance to do so, allocating the activities to the right cost centres. The definitions should give a clear picture of where different distribution activities are taken place, or in which cost centre.

#### 3.1.2. Systematical cost control: items of cost

Next step is to determine the items of cost. After answering the "Where ?" question one should know what kind of activities are taken place there. All activities can be located to five different items of cost. Those are the items that can be influenced with decisions concerning the distribution logistics.

These five items are :	1] costs of transport, outgoing;	in section	3.2.
	2] costs of transport, incoming;	"	3.3.
	3] interest and inventory costs;	"	3.4.
	4] costs of warehousing;	"	3.5.
	5] costs of handling in / out.	"	3.6.

The items of cost will be discussed each in a separate section. In every section a workable definition and description per item is given first. Secondly, the approach per item is described. Every alternative will affect the items of cost in its own way and therefore results and conclusions per item can be found at the end of each section for all alternatives.

#### 3.1.3 Relation between cost centres and cost items.

In calculating the costs of logistics one does not only want to know the total costs, but also the costs per cost centre (per activity) and the costs per cost item. Table 3.1. shows the relation.

While calculating the total costs for the alternatives with their different structure table 3.1. is of great help in keeping an overview.



Table 3.1. Relation between the items of cost and their activities.

Cost item: Activity:	Transport outgoing	Transport incoming	Interest	Ware- housing	handling in/out
Transport	*	*	*		*
Groupage			*		*
Degroupage			*		*
Trans-shipment			*		*
Warehousing/ handling			*	*	*

\* = most common cost item per activity

Source: International Distribution Logistics [9].

#### 3.1.4. Systematic cost control: parameters, tariffs and rates.

It is important to find out which parameters represent the physical distribution activities in the most reliable way and how. For each item of cost this can be another parameter. I.e. in transport the kilogram or volume is often used as parameter, but for the calculation of interest the value of a product is used as parameter. Rates are calculated and tariffs are collected, where and whenever necessary. In each of the sections this will be indicated.

All findings will be put together in section 3.7., where overall conclusions with regard to the total costs are made. In the last section (3.8.), a sensitivity analysis is carried out, concerning the influence of changes of certain parameters on costs of the distribution logistics.

## 3.2. Costs of transport, outgoing

### 3.2.1. Definition

Costs of transport outgoing for Bensons are defined as: all costs paid for the transport of goods from warehouse to warehouse (intra-firm) or from the warehouse to the customer. Costs for transport movements from the English factory to the Dutch warehouse in Woerden or to the French warehouse in Paris are considered as costs of transport incoming (section 3.3.).

The alternatives will affect only a part of the outgoing transport costs (i.e. serving the Italian warehouse from France or Holland doesn't affect the costs for outgoing transport within Italy). To distinguish the affected costs from the non-affected costs two types of transport outgoing are defined: 'national' and 'international'. 'National' means transport activities within a country and 'international' includes transport from one country to another.

For the English and Dutch market the costs of national transport are calculated while for the other markets only costs for international transport are taken into account. Only for France we use the national transport costs as well as the international transport costs (from Holland). Costs for documentation, clearance and customs are not used in the calculation for the costs of transport outgoing, because for movements within the European Community these costs do not have much

influence on the overall costs. These costs are temporarily as the European markets are getting more and more united.

### 3.2.2. Two approaches

This subsection shows two approaches to calculate the costs for transport outgoing. One is using the existing tariffs, the number of shipments and the average shipment weight. It calculates the costs as they will be in the near future (called: short term) assumed no changes of tariffs are taken place. The other approach (called: middle-long term) calculates the total ton-kilometres (weight \* distance) for all alternatives. It gives an indication of the distribution performance of an alternative.

The difference in approaches is made, because cost calculations using tariffs only is short sighted. Tariffs can change, especially now the E.C. is growing more and more towards one united market in which the transport companies also have to compete each other both nationally and internationally. Now some transport markets i.e. in France, are regulated giving foreign transporters no or little chance to make transports within France. Therefore tariffs on the domestic markets are different from most international tariffs. As the E.C. is heading towards deregulation these tariffs are likely to come down in the middle-long term [10,11,12,13,14].

#### 3.2.2.1. Approach middle-long term

One way to compare performances instead of tariffs is a fixed ton-kilometer rate. This parameter is often used in budgets to determine the costs of transport over the next few years. It simply multiplies the total tonnage that has to be transported to a certain country (or place) with the distance between the warehouse and the customer. While budgetting, rates of f0.20 per ton-kilometer for full truck loads and f0.50 per ton-kilometer for groupage (not a full truck load) are often used [9]. In section 3.8. a sensitivity analysis is carried out using a fixed ton-kilometer rate to see its effect on the overall costs.

### 3.2.3. Results

The year 1988 is used to determine the transport frequencies (see table 2.2.). Assumed is that these frequencies remain the same over the next five years. Tariffs for transport costs per kilogram are collected for all the transport movements in the different alternatives. Together with the results in table 2.2. (quantities in tons to each market) and the determined frequencies it is then possible to estimate the cost of transport in the near future for all the alternatives. From a performance point of view, the calculation is based on the total ton-kilometers made in each alternative. Table 3.2. gives a summary of the results: the total of ton-kilometers and total cost for transport outgoing. The results in ton-kilometers for each alternative per country (untill 1995) can be found in appendices III, IV, V, VI, VII and VIII. For more detailed information about the costs per country untill 1995, see the appendices IX, X, XI, XII, XIII and XIV.

Table 3.2. Total costs of transport outgoing in 1990 and 1992.

Alternatives	Tons*kilometers*1000			Dutch guilders*1000		
	1990	1992	%	1990	1992	%
1] Current Situation	3,623	5,779	0	1,360	1,866	0
2] Markets Moved -->	3,486	5,634	- 3	1,345	1,849	- 1
3] 50% to Italy -->	2,979	4,785	-17	1,314	1,796	- 4
4] Pas de Calais -->	4,014	6,323	+ 9	2,146	2,903	+56
5] Felixstowe -->	4,356	6,912	+20	1,744	2,405	+29
6] Rotterdam -->	4,716	7,184	+24	1,732	2,334	+25

Because of the daily shipments from the Dutch, French and English warehouse to respectively the Dutch, French and English market most of the costs for transport are made here. In fact only 25% of all transport costs outgoing are made on international transport. About 70% of all costs is made on national transport in England, Holland and France. This means that in those alternatives where no warehouse is located in one of these markets, enormous efforts have to be made to get products to England or Holland day by day. Then the consequences for distribution from a central warehouse are obvious, it is always much more expensive to do it that way.

**1] Current Situation (appendices III and IX)**

As the results show, the differences with the cheapest solution (alternative 3) are very small.

**2] Markets Moved (appendices IV and X)**

The difference with the present situation is that the Scandinavian markets, Spain and Portugal will be served from Woerden instead of Brimscombe. Compared to the current situation this alternative is slightly cheaper, f 15,000.- in 1990 (table 3.1.), but the main advantage will be the improvement of the transport times to serve these markets (see section 4.2.).

**3] 50% to Italy (appendices V and XI)**

The cheapest alternative of all six. Especially in ton-kilometers high savings (17%) are possible, but because of the cheap transport rates to Italy, the short term savings are relatively low.

**4] Pas de Calais, France (appendices VI and XII)**

The very high costs for serving the English market daily, and the high costs for distributing to the Dutch market make this alternative the most expensive of all. However small savings can be obtained for distribution to the French, Spanish and Portuguese market. The difference in performance of the Pas de Calais alternative middle-long term and short term is obvious. In ton-kilometers (middle-long term) this alternative is the fourth most expensive alternative, but in guilders (short term) it is the most expensive alternative of all. This can only be explained by the relatively high transport costs in France at this moment.

**5] Felixstowe, England (appendices VII and XIII)**

High costs have to be made for the channel crossing to the Dutch market, for a daily service f180,000.- a year (in 1990, national transport excluded and f338,000.- if national transport is included), and to the Belgian, French and Italian market. For a Felixstowe location no savings are taken into account concerning the costs of national distribution, because most of the English customers are located near London, which is almost the same distance from Felixstowe as from Brimscombe. But transport prices are not only related to distance, therefore small differences can appear in favour of Felixstowe, because the route Felixstowe - London is more frequently used as the route Brimscombe - London.

**6] Rotterdam, Holland (appendices VIII and XIV)**

Very high costs have to be made for the channel crossing to the English market every day, f 383,000.- a year (in 1990, national transport excluded and f986,000.- if national transport is included), small savings are possible for the Scandinavian, French and Belgian market.

### 3.2.4. Conclusion

So far it is assumed that the costs of national transport (England, France and Holland) remain the same. For England this assumption might be too rough, because of the great importance of the English markets and the expenses made for it.

What is obvious is the big difference in centralized and decentralized warehouses. Therefore the best solution for this item of cost, is not a central warehouse, but alternative 3], a refinement of the present situation (f 1,314,000.- in 1990) with 50% of the container transport for the Italian market going straight to Italy.

Also the difference in performance of the Pas de Calais alternative middle-long term and short term is obvious. In ton-kilometers (middle-long term) this alternative leaves Felixstowe and Rotterdam behind, but in guilders (short term) it is the most expensive alternative of all, due to the relatively high transport costs in France at this moment. In section 3.8. a sensitivity analysis is carried out to see the effect on the transport costs if a fixed ton-kilometer rate is used. This is what can happen in a deregulated transport market. A different location however, also influences the flow and costs of transport incoming, handling and interest.

## 3.3. Costs of transport, incoming

### 3.3.1. Definition

Costs of incoming transport are defined as: all costs made for transport of mechanisms from the Bensons factories to one of Bensons' warehouses.

Costs of incoming transport are made for the shipments of mechanisms from Malaysia to the warehouses in England and Holland, but also for the transport of English mechanisms from England to France and Holland, by truck. For France, all English products are shipped from England directly and all South East Asian products are coming through the Dutch warehouse. In this approach the non-Bensons products (i.e. clips) are not taken into account for the calculation of incoming transport costs. In allocation decisions the non-Bensons items do not influence these cost items, because this transport is paid for by Bensons' supplier or otherwise by Bensons' customer.

### 3.3.2 Approach

This exercise calculates the number of containers coming in and the costs involved. This includes container freight from South East Asia, but also trailer freights from the UK. Transittimes from South East Asia take about 4 till 5 weeks. Mid 1989 costs of transport of one 20-foot container from South East Asia to Europe were about US.\$ 1,250.-, but are about US.\$ 1,000.- at the beginning of 1990. This last figure is used in the calculations.

Appendix XV shows the tariffs for container transport from South East Asia to the various destinations and also the tariffs for channel crossings with full trailers. Therefore it is assumed that all the channel crossings will be done with full trailer loads (17.5 ton). For the different alternatives the costs of transport incoming with regard to the costs of seafreight, harbour handling, clearance, customs and haulage can differ a lot from one country to another. Also the prices of channel crossings depending on which direction to go. Because of the imbalance of the English trade balance, transporting a trailer or container from Rotterdam to England is twice the price of the return tariff [15].

The weight of the full trailer loads from the UK (17.5 ton) and the containers from Kuala Lumpur (14.0 ton), Johor Bahru (9.8 ton) and Singapore (12.8 ton) appears to be very constant throughout the whole year (1988/1989). Assuming that this situation remains the same, one can calculate the number of trailers and containers involved if the total tonnage of the origins England, Kuala Lumpur, Johore Bahru and Singapore is known. Appendix XVI is derived from the table of

quantities, origins and destinations (table 2.1.). It shows the the number of containers from the place of origin to one of the budget markets after the number of mechanisms are calculated into tons (weight), and finally translated in number of containers (using the constant weight per container).

### 3.3.3. Results

Multiplying the total number of containers or trailers with the cost per container (or trailer) gives the total costs for transport incoming. For all six alternatives the total costs of transport incoming per budgetmarket can be found in the appendices (appendices XVII till XXII).

Costs of incoming transport are likely to rise dramatically in the UK market because of the increasing number of containers from South East Asia after the production relocation and the relative high costs involved in getting them to the warehouse in Brimscombe. On the other hand, cost prices for mechanisms produced in Malaysia plus the additional costs for transport and interest must be lower than cost prices in England at this moment, otherwise Bensons would not have started up production in Asia. But these differences can change, therefore in section 3.8. a sensitivity analysis has to show when it is preferable to produce either in England or in Asia. Table 3.3. shows the results for 1990 and 1992. For the results of 1988 until 1992 see the appendices (XVII till XXII).

Table 3.3. Total costs of transport incoming in 1990 and 1992.

Alternatives	Costs in Dutch guilders			
	1990	%	1992	%
1] Current Situation	1,151,000	0	1,645,000	0
2] Markets Moved -->	1,142,000	- 1	1,626,000	- 1
3] Italy direct -->	1,165,000	+ 1	1,660,000	+ 1
4] Pas de Calais -->	1,409,000	+22	2,000,000	+22
5] Felixstowe -->	1,202,000	+ 4	1,717,000	+ 4
6] Rotterdam -->	1,097,000	- 5	1,552,000	- 6

#### 1] Current situation (appendix XVII)

High costs have to be made to get the containers from Malaysia into Brimscombe (1990: f632,000.). Especially costs for haulage and customs increase the costs of incoming transport compared with the present situation. Costs in 1990 for import of products from South East Asia and England in Holland are f519,000.-. Total costs are f1,151,000.- in 1990 for this alternative.

#### 2] Markets moved (appendix XVIII)

In general we can say that the costs of clearance and customs are higher in England than in Holland. Therefore it is more expensive to bring Asian products into England than into Holland. If certain markets are going to be supplied from Holland instead of England more English products have to cross the Channel to the Dutch warehouse.

Despite these extra costs the total costs for transport incoming in 1990 will be f1,142,000.-; f9,000.- less compared with the current situation.

#### 3] 50% to Italy (appendix XIX)

Internal transport costs in Italy are very high as are the port charges. To transport containers from the port of Genova to the warehouse in Milan is expensive. This is the reason why total cost are higher as in alternative 1] or 2] : f1,165,000.-.

#### 4] Pas de Calais (appendix XX)

Yet, no ships can go directly from South East Asia to Dunkirque (Pas de Calais). Therefore additional costs have to be made from Antwerp to (Pas de) Calais. This situation can change, new plans for expansion of the port of Dunkirque are ready, but it is unlikely that the port will be realised within the next three years. Trailers can go directly from Felixstowe to Calais. Total costs in 1990 : f1,409,000.- .

#### 5] Felixstowe (appendix XXI)

Total costs in 1990 : f1,202,000.- if all products are collected in and distributed from Felixstowe.

#### 6] Rotterdam (appendix XXII)

While the costs for incoming transport are higher in 1989 compared to the alternative current situation (f64,000 higher), they will be lower if we compare them in 1990 : f1,097,000.- vs f1,151,000.- . This is because in 1990 more products are coming from South East Asia (and less from England) than in 1989, and England is more expensive in imports from Asia than Holland.

#### 3.3.4. Conclusion

Locations near a port have small advantages in costs on haulage compared to locations further inland. Big differences however, are found in costs of haulage, customs and clearance between the countries (appendix XV). Here Rotterdam is the cheapest alternative for transport from South East Asia plus England, despite the additional costs for the extra 'imports' of all the English products.

### 3.4. Interest and inventory costs

#### 3.4.1. Definition

Interest is defined as: all cost involving interest on capital of the products in the warehouses as well as on the products in transit. This includes the non-Bensons items if they are stored in or are on their way to one of Bensons warehouses.

#### 3.4.2. Approach

A spreadsheet was built to calculate the space and money involved with minimum stocklevels. This database will be used to see the effect of warehouse centralizing or decentralizing in regard to stock levels. Normally centralizing implies reduction of safety stock levels, but by what percentage? And how much is the reduction in money?

General rules for the safety stock and minimum stock levels have been set up very recently. At Bensons, the current safety stock information in the computer-system of the two biggest administrative organizations (Holland and England) is not very accurate, because the values for safety stocks have not all been inserted or do not have the correct value.

#### **New safety stocks rules determined by Bensons.**

##### UK-products and non-Bensons items from Europe

Only for items which are sold in 6 or more different months a year, safety stock is kept. If they are sold in 6 or more months the stock should be total year sales divided by 12.

##### South East Asian products

Total year sales divided by 8. This includes transit. No condition on total number of months.

### Non-Bensons items from South East Asia

Total year sales divided by 6, this includes transit. No conditions on total of months either.

At Bensons one does not know what the actual service performance is, what it should be or what it is going to be with the new safety stocks. It can be very dangerous changing the safety stock rules without knowing the effects. In section 5.2. recommendations are given for better stock and service controlling.

Also for this assignment it is essential that rules are going to be set up to compare the service performance for the different alternatives. This shows perhaps that the new levels for the safety stocks are much too high or low. Service and stock levels are very important items and much related to one another, but at Bensons neither of them is looked after very well.

Bensons has always been a sales organization, but a small attempt is carried out in part 4.3, in which the customers' wishes are the main thought, to arrive at Kotler's so called "marketing approach" [16].

#### *3.4.3. Results*

The results can be divided in two parts (subsubsections). First the current costs of stock and safety stock are calculated and secondly, the stock reduction in a central warehouse situation is calculated.

##### *3.4.3.1. Interest rates and (safety) stock values*

There are two reasons that bring down the relative importance of costs of interest in the future. First, the value of the products per cubic meter goes down, because of the lower cost-prices in Malaysia (transport and transit times included). According to the theory of Ploos van Amstel, the relative costs of logistics of products will be less influenced by costs of interest if the value of 1 cubic meter of products gets lower [9]. Secondly, there are the new safety stock rules shown above, which have been set up to lower the stocks levels.

The value of Bensons' products in stock, transit times included, was more or less 8 million Dutch guilders in 1989. This makes the cost of interest about 800,000.- guilders at 10% interest a year. This percentage is a rough average of the Dutch and English interest rates. If an agreement is made for one European currency (ECU) in a monetary union, an interest rate of 10% is assumed. In section 3.8. a sensitivity analysis has to show the effect on the total costs if different interest values are used.

The value of Bensons' old safety stock was about 5.2 million Dutch guilders in 1989, but with the new rules the new safety stock will have a value of 3.8 million guilders, about 27% lower than the old safety stock levels. Therefore also effects on the utilization degree of the warehouses and capital are to be expected. Obviously the new rules will have an effect on the size of the warehouses as well, because an average of only two weeks of sales will be in the warehouse for South East Asian products (four weeks in the old situation), while the amount of four weeks of sales is in transit.

If the gap between actual stock and safety stock remains the same, the new actual stock value will be  $8.0 - 5.2 + 3.8$  million = 6.6 million guilders. At 10% interest this will cost Bensons f660,000.- interest in 1990. Assumed that growth of stock (safety stock included) is equal to growth in sales (in percentage), stock values will rise to the amount of 8 million guilders in 1992.

##### *3.4.3.2. Centralization*

The individual variances of sales of products in separate warehouses are likely to be relatively higher than the variance of sales of products in a central warehouse. This is the saving you can reach in a central warehouse compared to separate ones.

The literature about statistics states the following about two different variances [17]:  $\text{var}(a) + \text{var}(b) = \text{var}(a+b) + 2*\text{covar}(a,b)$ . 'Var' stands for variance and it is a measure of the degree to which individual values in a list vary from the mean (average) of all values in the list. The lower the variance, the less individual values vary from the mean, and thus the more reliable the mean. A variance of 0 indicates that all values in the list are equal. 'Covar' stands for covariance and it is a measure of the degree to which the two variances have a mutual influence. In this case however the 'covar' is assumed zero, because the variance of sales from one warehouse doesn't affect the sales from the other. Translated now it means: 'The sum of the variances is equal to the variance of the sum'.

Based on this statistical formula, an exercise was carried out to determine the percentage of stock reduction possible in a central warehouse situation. To determine this percentage, one should know the sales per product per month. In this exercise the variances of the sales per product per month are calculated for all markets served from the warehouses in England and Holland. It is also calculated for the situation in which the markets would have been distributed from a central warehouse.

According to the calculations 8% stock reduction is possible in a central warehouse, either in England, France or Holland. This means that the costs for interest in a central warehouse in 1990 would be  $(1-0.08) * f660,000.- = f607,000.-$ . Table 3.4. shows the results.

Table 3.4. Interest (10%) on products in stock and in transit.

Alternatives	Costs in Dutch guilders			
	1990	%	1992	%
1] Current Situation -->	660,000	0	800,000	0
2] Markets Moved -->	660,000	0	800,000	0
3] 50% to Italy -->	660,000	0	800,000	0
4] Pas de Calais -->	607,000	-8	736,000	-8
5] Felixstowe -->	607,000	-8	736,000	-8
6] Rotterdam -->	607,000	-8	736,000	-8

#### 3.4.4. Conclusion

##### Dual warehouses, alternatives 1, 2 and 3.

Values are equal for all three. However, in reality small differences may occur, it depends how well the stock for a certain market 'fits' in the rest of the stock. I.e. if the Portugese market is going to be delivered from the Dutch warehouse, the stock for this market may 'fit' better in the stock of the Dutch warehouse because of the types of the mechanisms, but also because it may neutralize the 'peaks' in the sales of a certain product in a certain month. Of course, also the opposite can happen, but differences in both sites will be minimal because of the relative (un)importance of those markets that will be delivered from Holland. But, of course, also the interest rates can be different from the 10% assumed. In section 3.8. an analysis using different interest rates is carried out.

##### Central warehouse, alternatives 4, 5 and 6.

Relative small savings (only 8%) are possible although they may be a bit different (higher or lower) in reality. This exercise is carried out for the first eight months of 1989 only, because data from England of sales per product per month were only available for that period.



### 3.5. Costs of warehousing

#### 3.5.1. Definition

Costs of warehousing are defined as: all costs involved in the warehouse itself and the additional costs to keep good conditions for the stored products and the people working in it. This consists of space, insurance, water, gas and electra. Costs directly and indirectly related to the despatch function (the people and their equipment) were separated from the costs of the buildings and they are called handling costs (section 3.6.).

#### 3.5.2. Approach

In the first subsection the costs in the current situation are calculated and in the second the capacity for a situation with a central warehouse is calculated.

##### 3.5.2.1. Warehouse capacities and rates

Costs of warehousing and their capacity are collected from the French, English and Dutch administrative organization. The costs per palletplace are used as a parameter to make the costs comparable for the different locations, although tariffs are often given per square meter. This dimension makes it very difficult to compare warehouses because of their different heights. Therefore a relation is used to translate square meters into palletplaces. As an average is taken 1 palletplace to 1 square meter in a standard warehouse (4 palletplaces high, administrative space plus space for loading, reconditioning and unloading included).

For England and Holland the costs of the buildings (depreciation, gas, electra and insurance) and the normative capacity were taken to calculate the costs of warehousing per palletplace. Assumed is a utilization degree of 100% not in volume, but in number of palletplaces occupied.

In Brimscombe warehousing costs are f53.80 per palletplace per year with a capacity of 1,409 palletplaces (the rest is used for the American and Canadian market) and in Holland the costs are f54.14 per palletplace per year with a capacity of 1,136 palletplaces.

In Paris, Bensons has to pay about 30,000 French Francs for an average of 450 palletplaces per month. This includes the preparing of the orders (which should belong to the costs of handling out). Costs per palletplace are f280.- a year. Just outside Paris and in the environment of Calais the prices per palletplace are about f70.- per year.

The problem in this approach is the big difference in prices per square meter between rates using depreciation and replacement values. Rates using depreciation are much lower compared to rates using replacement values. In Holland rented (replacement) space per year is almost two times higher than the actual costs in Woerden (f90.- per square meter) and in England it is almost four times higher (f198.-/square meter) than the calculated rate using depreciation values, in Bensons' own warehouse in Brimscombe.

In this exercise however, only rented prices will be compared. Existing property can always be rented or sold out and therefore it is not of importance in decision making concerning a (new) distribution structure.

##### 3.5.2.2. Centralization

The same spreadsheet as in section 3.4. (interest) is used to calculate the space required for safety stock with the new safety stock rules. Besides an 8 percent reduction in stock, centralizing also improves warehouse utilization. It was calculated that another 4 percent improvement can be obtained in a central warehouse compared to separate warehouses. Together this makes a saving of 12 percent. Appendix XXIII shows the number of palletplaces required for the safety stocks in the warehouses in England, France, Holland and Italy with the new safety stock

rules. It also shows the space required if the French, Dutch and English safety stock would be stored in one warehouse. The difference of the total palletplaces required and the sum of the palletplaces in separate warehouses is the advantage of a better warehouse utilization achieved in a central warehouse (4%).

To estimate the size of a central warehouse in 1988, 12% of the total present palletplaces is taken  $0.88 * (1,409 + 1,136 + 450) = 2,635$  pp. Assumed is that all costs are 100% variable. The costs per palletplace will rise if the capacity utilization (calculated as the number of palletplaces occupied) is less than 100%. If its more than 100%, extra capacity has to be rented normally at a much higher rate.

If the safety stock really gets down, according to the calculations with 27% (value), in the future even a smaller (central) warehouse is possible.

### 3.5.3. Results

The results of the costs of warehousing in 1990 are shown in table 3.5. On the right side of the table a the differences in cost with the current situation is given in percentage. In the appendix XXIV the calculations for the costs of warehousing in 1992 are shown.

Table 3.5. Costs of warehousing in 1990 (in Dutch guilders).

Alternatives		No. of palletplaces	* Rate =	Costs	%
1] Current Situation -->	UK	1,409	* 198 =	279,000	
	NL	1,136	* 90 =	102,000	
	FR	450	* 70 =	+ 32,000	
		-----		-----	
		2,995		413,000	0
2] Markets Moved -->	UK	1,072	* 198 =	212,000	
	NL	1,473	* 90 =	132,000	
	FR	450	* 70 =	32,000	
		-----		-----	
		2,995		376,000	-9
3] 50% to Italy >	UK	1,072	* 198 =	212,000	
	NL	1,398	* 90 =	126,000	
	FR	450	* 70 =	32,000	
	IT	+ 75	* 140 =	+ 11,000	
		-----		-----	
		2,995		381,000	-8
4] Pas de Calais	FR	2,635	* 70 =	184,000	-55
5] Felixstowe -->	UK	2,635	* 226 =	596,000	+44
6] Rotterdam -->	NL	2,635	* 90 =	237,000	-43

### England, Brimscombe and Felixstowe

With a capacity of 1,984 palletplaces, of which 1,409 are used for the European markets and total costs of f107,000.- a year Brimscombe has the cheapest storage facilities of all three. It occurs that mainly because of the use of depreciation values, this place is the cheapest one. The rented square meter (feet !) prices in England normally, are much higher as they are in France or in Holland. It is more realistic to work with the cost of rented capacity instead of a depreciation value, because it makes locations comparable. Own property can always be, as said before, sold or rented out for realistic rental prices.

At Brimscombe, Bensons can rent its storage capacity at 5.25 pounds per square feet. This is f198.- per palletplace a year. Costs in England at this moment are f279,000.-. Total costs are f413,000.- in 1990 with the present structure.

Rented capacity in Felixstowe will cost about f226.- per palletplace a year. Total costs for warehousing in a central warehouse over there will be very expensive compared to the other locations: f596,000.-.

#### **Holland, Woerden and Rotterdam**

In the calculations a general rental price in Holland is used: f90.- per palletplace per year.

#### **France and Italy**

Prices for storage facilities in France can differ a lot per location. The prices in Paris are not representative for those in Calais. In general the prices of sites, compared to Holland, will cost less in France, although the prices for rented capacity can be different. Costs of f70.- per palletplace are used in the calculations.

In the third alternative 50% to Italy, the Italian warehouse will grow with 75 palletplaces in 1990. The rental rate in Italy (Milan) is f140.- per palletplace per year.

#### *3.5.4. Conclusion*

England is a very expensive place to locate stock. Compared to warehousing costs in France, England (Felixstowe) is more than three times more expensive (f184,000.- vs. f596,000.-). This makes the fourth alternative, Pas de Calais by all means the cheapest alternative of all.

### **3.6. Costs of handling in/out**

#### *3.6.1. Definition*

Costs of handling are defined as: all costs involved in handling products in the warehouse (consists of costs for people and equipment), their temporary storage (racking), reconditioning and handling out.

#### *3.6.2. Approach*

Costs of handling and reconditioning are collected from the French, English and Dutch organization. A parameter of costs per 1,000 kg handled (in or out) is used to make the costs of handling comparable.

Assumed is that the amount of kilogram products sold is equal to the amount of kilogram products handled in or out. This is to leave the effects of stock-building or stock-reduction out of consideration.

##### **3.6.2.1. Rates**

In the calculation of the rates no differences in efficiency are taken into account for locations in the various countries, although there are differences in production efficiency for France (less 10-15%) compared to Holland [6]. But it is not said that these differences in efficiency will occur in handling activities as well.

#### **Holland**

There are two people working full-time in the warehouse in Holland. Wages are responsible for 40% of all handling costs. Total costs for handling in the warehouse in Woerden are f78.83 per 1000 kg handled.

## England

Mainly because of the low labour costs in England (76% of those in Holland, according to own calculations) and partly because of the relative high volumes (and weights) per shipment in England, the costs of handling per 1000 kg are lower in England compared to Holland, f62.28 in England versus f78.83 in Holland.

## France

The costs of labour are cheaper in France, 88% of those in Holland, and slightly more expensive in Belgium (104%)[6]. The Dutch rate for handling is used for the French alternative, with a correction for the labour costs, which are about 40% of the total handling costs in Holland.

### 3.6.2.2. Centralization

For handling costs of a central warehouse is assumed that the calculated rates are 100% variable and that the current warehouse capacity is sufficient. To calculate the costs for handling the rates from the existing places are multiplied with the number of kilograms to be handled as is shown in table 3.6. for 1990. Appendix XXV shows the costs of handling in 1992.

The utilization degree of the people and their machines should be better with one central warehouse compared to two or three separate ones. However, it is not said that the assumption made concerning centralization of the stock (12% saving), is valid here as well. Better research has to be done on this capacity issue. So far it is assumed that 90% of the current handling capacity (and costs) is required in a central warehouse.

In the alternatives 4, 5 and 6 all the English products have to be handled twice, first in England then in the central warehouse. Therefore the total of tons handled are the highest in these alternatives. Table 3.6. shows the results, with the percentage of difference from the current situation on the right side of the table.

Table 3.6. Costs of handling in/out in 1990 (in Dutch guilders).

Alternatives	No. of tons handled	* Rate =	Costs	%	
1] Current Situation -->	UK	4,346	* 62 =	269,000	
	NL	3,188	* 79 =	+ 252,000	
		7,534		521,000	0
2] Markets Moved -->	UK	3,741	* 62 =	232,000	
	NL	4,111	* 79 =	+ 325,000	
		7,852		557,000	+7
3] 50% to Italy >	UK	3,741	* 62 =	232,000	
	NL	3,651	* 79 =	+ 288,000	
		7,392		520,000	0
4] Pas de Calais	FR	0.9*8,911	* 75 =	601,000	+15
5] Felixstowe -->	UK	0.9*8,911	* 62 =	499,000	+ 4
6] Rotterdam -->	NL	0.9*8,911	* 79 =	632,000	+21

### 3.6.4. Conclusion

The fifth alternative, a central warehouse in Felixstowe is the cheapest alternative because of the low rates for handling in England. The third alternative, 50% to Italy, is the second cheapest, because 460 tons go directly to Italy in 1990 and therefore will be handled only once (in Italy). For the results in 1992, see appendix XXV.

## 3.7 Final results, evaluation and conclusions.

In this section the results of the calculations have been put together and will be evaluated. The total costs are shown per alternative, divided for each item of cost. General conclusions are drawn comparing the total costs of the alternatives in 1990 and 1992.

### 3.7.1. Results

Costs can be influenced with different distribution strategies. Savings on interest costs will not be that high if a central warehouse is the alternative, but relative high variations can be found in transport incoming, outgoing and warehousing. Two of these are the most important financial decision criteria, the costs of transport outgoing and incoming. Table 3.7. shows the results for the alternatives of 1990.

Table 3.7. Final results in 1990 (all costs in Dutch guilders \* 1000)

1990 Items: Alternatives:	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS	%
1] Current Situation	1,360	1,151	660	413	522	4,106	0
2] Markets Moved	1,345	1,142	660	376	557	4,080	- 0.6
3] 50% to Italy	1,314	1,165	660	381	520	4,040	- 1.6
4] Pas de Calais	2,146	1,409	607	184	601	4,947	+20.5
5] Felixstowe	1,744	1,202	607	596	499	4,648	+13.2
6] Rotterdam	1,732	1,097	607	237	632	4,305	+ 4.8
Importance:	33-43%	25-28%	12-16%	4-13%	11-15%		

### 3.7.2. General conclusions, financially

In each of the items of cost a different alternative was the cheapest alternative. Having put them together, the cheapest alternative overall is the third alternative, 50% to Italy. It must be said that if less than 50% of the containers from South East Asia for the Italian market can go directly to Italy, this alternative is going to be equal (at 0%) to the second alternative, Markets Moved. However this is the second cheapest alternative. In section 3.8. (sensitivity analysis) the relation between these two alternatives will be discussed more profoundly.

The main advantage of these two alternatives over the current situation, is their relatively low costs for transport outgoing. Especially if the middle-long term expectations of a deregulated transport market in the E.C. becomes true, the 50% to Italy alternative is even cheaper (using ton-kilometers). The differences in total costs between the alternatives will grow absolutely in the near future as the results of 1992 show in table 3.8. The more expensive central warehouse alternatives will become relatively cheaper in the future, though very slightly.

What is obvious are the differences between the alternatives 1, 2 and 3 on one hand and a central warehouse (alternatives 4, 5 and 6) on the other. The item of cost transport outgoing is the main item causing these differences. Centralizations are a too ambitious plan, because of the high additional costs for transport outgoing and the small benefits for the reduction of the costs for warehousing and interest. If

centralization means a reorganization, other aspects, like administrative and organizational costs, have to be quantified as well.

The option with lesser risk is the present situation in which some adjustments will be made. A better geographical separation of markets results in lower costs for transport outgoing. Also, the markets can be delivered faster, this can mean a better service, but not necessarily! This will be discussed in the sections 4.2. and 4.3.

Table 3.8. Final results in 1992 (all costs in Dutch guilders \* 1000)

1992 Items: Alternatives:	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS	%
1] Current Situation	1,866	1,645	800	541	723	5,575	0
2] Markets Moved	1,849	1,626	800	485	778	5,538	- 0.7
3] 50% to Italy	1,796	1,660	800	492	714	5,462	- 2.0
4] Pas de Calais	2,903	2,000	736	252	818	6,709	+20.3
5] Felixstowe	2,405	1,717	736	712	679	6,249	+12.1
6] Rotterdam	2,334	1,552	736	324	859	5,805	+ 4.1
Importance:	33-43%	27-30%	11-15%	4-11%	11-15%		

Overall one can conclude that small changes of the current distribution structure can lead to a saving of 2.0% on the costs of distribution logistics in 1992. These savings will only increase in the future, not only absolutely, but also relatively. As the production relocation continues (although more slowly) and the European transport market gets deregulated, these savings will be even higher as the results in section 3.8. (sensitivity analysis) will show. But compared to the increase of the total costs of distribution, which is almost 36% from 1990 to 1992, a saving of only 2.0% is very small.

Compared to Bensons' operating income of f4,700,000.- in 1988 however, a saving of f113,000.- in 1992 means an increase in operating income of 2.4%.

The differences between the alternatives are not really big (+/- 20% difference between the cheapest and the most expensive one). Therefore other, more qualitative issues like economic indicators can give additional information in favour of a certain alternative in a certain country. This will be described in part 4, but first a sensitivity analysis is carried out.

### 3.8 Sensitivity analysis

In this sensitivity analysis it is tried to calculate the effects on the overall costs of distribution logistics if certain parameters are changed. Some costs items are more 'sensitive' for one parameter than for another. It will also depend of the alternative on which this analysis is carried out. The purpose of this analysis is to show for which parameters certain alternatives are more sensitive. In the analysis the following parameters will be changed, because these are the parameters most likely to change in the near future with a significant effect on the overall results:

- a] product origin;
- b] currencies;
- c] interest rate;
- d] ton-kilometer, transport tariffs;
- e] container transport to Italy.

In subsection 3.8.3. cost prices are compared for a few types of mechanisms now made in both England and Malaysia.

### 3.8.1. Approach

Each of these parameters affects an item of cost or all items of cost, one alternative or all alternatives. Some parameters are changed by 10%, others with 50%, depending on the parameter's importance and their sense of reality.

- a) *product origin* Now 75% of the products for Europe are coming from South East Asia. What effect will it have if all (100%) of the products are coming from South East Asia? And what will the effect be if only 50% is coming from Asia? It depends of the production advantages if the number of mechanisms from Asia will increase of decrease. And these advantages are much related to exchange rate of the two currencies in England and Malaysia.
- b) *currency* In the calculations currencies for the US dollar, English pound, Malaysian ringit, French franc and the Dutch guilder are used. The English pound will be used in the sensitivity analysis, changed by + 10% and -10% against all other currencies. The influence of the Malaysian ringit, its relation to the American dollar and the consequences of a changing exchange rate of the pound to the ringit will be discussed in the next subsection (cost prices).
- c) *interest rate* An interest rate of 10% is assumed. What if it goes up to 15% ? It is not very likely that interest rates will fall below 10%, therefore only one calculation is made for this parameter.
- d) *ton-kilometer* In the cost item "transport outgoing" two approaches were given to calculate the costs. One with the current transport rates and one with a fixed ton-kilo-meter rate. A fixed ton-kilometer rate of f0.375 for 1 ton\*km will be used in the calculation. With this rate the costs in the current distribution structure are equal to the costs if ton-kilometers were used.
- e) *containers* Assumed is that 50% of the containers for the Italian market can go directly to Italy. If none of the containers can come in directly this alternative is equal to the second alternative, **Markets Moved**. But what is the effect if all the containers for the Italian market go there directly?

In total seven calculations are made. Two for the parameter which contains the percentage of mechanisms from South East Asia, two for the exchange rate of the English pound, one calculation for changes in costs using an interest rate of 15%, one for a fixed ton-kilometer rate and one calculation for the number of containers to Italy.

But first differences in cost prices of mechanisms produced in England and Malaysia are compared, because it explains the relation between the number of products coming from Asia and the exchange rate of the English pound to the Malaysian ringit.

### 3.8.2. Cost prices

The first parameter to be changed in the sensitivity analysis is called 'product origin'. The second parameter is the value of the English pound. The exchange rate between the English pound and the Malaysian ringit can be of great importance in production allocation decisions, and this has consequences for the number of mechanisms coming

from South East Asia. Therefore some cost prices are compared in this subsection for a few popular mechanisms produced in both England and Malaysia. Table 3.9. shows the cost prices for two types of products (ER 148-2-25 and CD 297-4-40) of which the ER 148-2-25 is produced in England on an automated machine. Table 3.10. shows two different products (ER 148-2-30 and CD 148-2-20) which are made in the same way either in Malaysia or in England. The production of the components is mechanised and most of the assembly is still a hand job.

Bensons started to relocate its production when compared to the Dutch guilder the English pound was 10% higher (1£=f3,55) and the Malaysian ringit 5% lower compared to the current exchange rates. It is obvious that these differences have a great impact if the margins of the cost prices in Malaysia are not big enough to overcome these differences.

Table 3.9. Cost prices (in Dutch guilders)

Code: ER 148-2-25				Code: CD 297-4-40					
Malaysia		England			Malaysia		England		
0.084	43%	0.082	36%	material	0.329	64%	0.304	41%	
0.013	7%	0.033	15%	labour	0.024	5%	0.038	18%	
0.097	50%	0.111	49%	overhead	0.159	31%	0.306	41%	
0.194	100%	0.226	100%	TOTAL	0.512	100%	0.648	100%	
14%		<i>Advantage producing in Malaysia</i>				21%			

Table 3.10. Cost prices (in Dutch guilders)

Code: ER 148-2-30				Code: CD 148-2-20					
Malaysia		England			Malaysia		England		
0.096	45%	0.098	29%	material	0.086	42%	0.089	27%	
0.014	7%	0.070	21%	labour	0.015	7%	0.077	23%	
0.104	48%	0.172	50%	overhead	0.106	51%	0.166	50%	
0.214	100%	0.340	100%	TOTAL	0.207	100%	0.332	100%	
37%		<i>Advantage producing in Malaysia</i>				38%			

The costs of transport and pipelines have to be added to the Malaysian mechanisms. Transport takes about five weeks by ship. The interest rate in this calculation is 10%. Table 3.11. shows the results.

Table 3.11. Cost price differences, transport and pipelines included.

Code:	(Costs + Transport)	* Interest	= Total	Advantage
ER 148-2-25	(0.194 + 0.007)	* 1.0096	= 0.203	10%
CD 297-4-40	(0.512 + 0.029)	* 1.0096	= 0.546	16%
ER 148-2-30	(0.214 + 0.009)	* 1.0096	= 0.225	34%
CD 148-2-20	(0.207 + 0.007)	* 1.0096	= 0.216	35%



Although the margins for the products assembled by hand are still in favour of Malaysia, the margin on the mechanism produced on the automated machine and the more expensive CD 297-4-40 are becoming very small especially if you remember the decrease of the value of the English pound and the increase of the Malaysian ringgit. The ringgit is still much related to the value of the American dollar like most currencies in South East Asia [18], though it has a tendency of getting more expensive independent of the American dollar compared to the Dutch guilder and certainly compared to the English pound.

### 3.8.3. Results and conclusions

Table 3.12. and table 3.13. show the results of the sensitivity analysis. Appendices XXVI and XXVII show the results of the calculations per cost item.

Table 3.12. Sensitivity analysis of the results in 1990, costs in Dutch guilders.

Distribution costs	Current Situation	2] Markets Moved	3] 50% to Italy	4] Pas de Calais	5] Felixstowe	6] Rotterdam
a1 50% S.E. Asian	3,752	3,787	3,743	4,730	4,370	4,193
a2 100% S.E. Asian	4,495	4,401	4,373	5,194	4,947	4,443
b1 Currency 1£ -10%	3,944	3,952	3,910	4,828	4,322	4,227
b2 Currency 1£ +10%	4,267	4,211	4,168	5,066	5,086	4,384
c Interest 15%	4,436	4,410	4,370	5,251	4,952	4,609
d Fixed ton*km rate	4,136	4,042	3,843	4,306	4,537	4,342
e 100% to Italy	4,106	4,080	3,992	4,947	4,648	4,305

Table 3.13. Sensitivity analysis of the results in 1990, changes in percentage.

% difference with results table 3.7.	Current Situation	2] Markets Moved	3] 50% to Italy	4] Pas de Calais	5] Felixstowe	6] Rotterdam
a1 50% S.E. Asian	- 8	- 7	- 7	- 4	- 6	- 3
a2 100% S.E. Asian	+ 9	+ 8	+ 8	+ 5	+ 6	+ 3
b1 Currency 1£ -10%	- 4	- 4	- 3	- 2	- 7	- 2
b2 Currency 1£ +10%	+ 4	+ 3	+ 3	+ 2	+ 9	+ 2
c Interest 15%	+ 8	+ 8	+ 8	+ 6	+ 7	+ 7
d Fixed ton*km rate	0	- 1	- 5	-13	- 2	+ 1
e 100% to Italy	0	0	- 1	0	0	0

Sensitivity analyses are important and helpful in determining the parameters for which some alternatives are more 'sensitive' than others.

Changes in product origin do have an effect on the different alternatives, especially on the alternatives 1, 2 and 3. This means that if 100% is coming from Asia, in absolute values the Rotterdam alternative is even less expensive than the current situation.

For changes in the currency of the English pound most of the alternatives (except for Pas de Calais) are sensitive. An decrease of 10% (from f3.50 to f3.15) can give a decrease in costs of 7% maximum in the Felixstowe alternative. As the financial results of the alternatives (table 3.7.) are relatively close together, especially for alternative 1, 2, 3 and also 6 (Rotterdam), the second best alternative, Markets Moved, is not always the second best option as table 3.9. shows. Of course, not all the percentages used in the sensitivity analysis are very realistic, they were only used to determine the sensitivity for a certain parameter. But in analysis b2, in which the English pound has a value of f3.15 instead of the f3.50 used in the calculations, a value of f3.15 is closer to reality at this very moment of writing (1£=f3.20) than one pound to f3.50.

The alternatives are not very sensitive for changes of interest rates. An increase in interest of 50% gives an increase in costs of 8% maximum.

Using a fixed ton-kilometer rate table 3.9. shows that especially in France the costs of transport would decrease with 13%, a very sharp decrease compared to the increase of 1% in the Rotterdam alternative! It confirms that the transport costs in France are too high at this moment and very low in Holland.

In container transport to Italy not much advantages can be gained if more than 50% of the containers for the Italian market go there directly. The main reason for this result is explained by the increased costs for transport to Italy. The truck loads are not as full as they used to be and therefore the price per 100kg transported to Italy increases.

Overall one may say that the Markets Moved, the 50% to Italy and the Rotterdam alternative are less sensitive for changes than the Felixstowe alternative and less sensitive for changes compared to the current situation. The Pas de Calais alternative is even the alternative most insensible to changes of the parameters.

## PART 4. OTHER DECISION CRITERIA

---

### 4.1. Introduction

The financial analysis in part 3 shows that decentralized warehouses are a better option than a central warehouse. Within the structure of decentralized warehouses some adaptations to the current situation are possible reducing the total cost for distribution logistics with 2.0% in 1992. However, compared to the increase of the total costs of logistics, almost 36%, these savings are very small. But other decision criteria are of importance as well. In section 4.2. the alternatives are compared on the criterium of delivery speed. In section 4.3. an marketing approach is discussed, which can be used to determine the customers' wishes concerning i.e. delivery aspects, but also other aspects are involved.

### 4.2. Distribution speed, service.

In the objectives (section 1.3.) it is stated that the present service levels have (at least) to be maintained. At Bensons service is translated in distribution speed, in other words, the number of days required to supply a certain market. However, distribution speed is only a part of the service aspect, though it is probably an important one.

In section 4.3. an example is given of how to measure the company's present service level and how to estimate the required service level. In this section the alternatives are compared to one another concerning the distribution speed. Appendix XXVIII shows the distances to each of the markets for all the alternatives. If the distances are multiplied with the number of transport frequencies in one year, the total of kilometers a year required to serve all markets comes out. With a total of 807,540 km a year, alternative 2 and 3 have the lowest value.

However in these appendices differences in transport, whether a truck or a ferry is used or both are not shown. A more accurate comparison is the days of transport required to supply each of the markets (countries).

From a 'distribution speed' point of view, alternative 2 and 3 (again) are the best options. A reduction of the total days of transport, without any losses of transport times compared with the present situation is possible in six of the fourteen most important markets in Europe (Israel included). None of the central warehouse alternatives are capable of improving the transport times to that extend. Distribution from a central warehouse located in Pas de Calais to Scandanavia, would take more time than in the **Markets Moved** alternative but is in favour of Spain and Portugal, which could be served a few days faster even compared with the best option now.

The cheapest solution, the **50% to Italy** alternative (section 3.7.), is also the fastest solution. Normally, the extra service (or a faster service) and the extra costs to achieve it, have to be weighed against one another. This extra service has to earn itself back within a certain period by increased sales (and profit, hopefully) or goodwill, which is difficult to calculate. But it is because of the low transport rates in Holland that this alternative is not only the cheapest but also the fastest alternative.

Table 4.1. shows the results of the extra or less days of transport required to serve all markets, compared with the current situation.

Table 4.1. Extra or less days of transport required compared to the number of days of transport in the current situation.

Transports to: Country City	Current Situation	Markets Moved	50% to Italy	Pas de Calais	Felix- stowe	Rotter- dam
AUSTRIA (Linz)	3	.	.	.	+1	.
BELGIUM (Brussels)	2	.	.	.	.	.
DENMARK (Copenhagen)	3	-1	-1	.	.	-1
ENGLAND (London)	1	.	.	.	.	.
FINLAND (Helsinki)	7	-3	-3	-2	.	-3
FRANCE (Paris)	1	.	.	.	.	.
HOLLAND (Breda)	1	.	.	.	.	.
IRELAND (Dublin)	2	.	.	+1	.	+1
ISRAEL (Tel Aviv)	-	-	-	-	-	-
ITALY (Milan)	3	.	.	.	+1	.
NORWAY (Oslo)	4	-1	-1	.	.	-1
PORTUGAL (Lisbon)	7	-3	-1	-4	.	-3
SPAIN (Barcelona)	4	-1	-1	-2	.	-1
SWEDEN (Malmö)	4	-1	-1	.	.	-1

. = no changes in days of required transport.

However, a faster distribution network is just one item from the marketing mix that can increase net sales and profit. Is fast delivery really one of the most important decision criteria for choosing a certain supplier? Or are other criteria more important? For answering these questions for Bensons, it is necessary to collect and interpret specific market information first.

#### 4.3 Customer service, a marketing approach.

In this section the service aspect will be discussed as well as other criteria that may influence the overall service performance of Bensons.

##### 4.3.1. What is 'customer service'?

One important aspect in the entire assignment is customer service, so far hardly discussed. The best customer service can be defined as: "to satisfy the customer's needs". At Bensons one does not know exactly what that should be and what costs are involved.

As it comes to customer service it is essential that a service strategy is set up as an integral part of the strategic plan. This includes a system to measure the service performance of Bensons in its different markets. In general we can say that for all the alternatives above, the present service level (in days of transport) can be maintained or even improved. But what for and at what price?

In decisions concerning the distribution logistics, one has to know first the customers' needs and how this can be achieved (called external logistics). At the same time, one tries to achieve this at the lowest costs (called internal logistics). It is wise to fight this 'struggle' first before a distribution structure is chosen.

##### 4.3.2. A small inquiry

For the Dutch and Belgian market a small attempt was made to make a picture of Bensons' performance (external logistics) in these two countries, compared with the customers' wishes (What do they really want?) and the competitors' performances. A questionnaire was set up for this purpose, which is shown in appendix XXIX. Because of time limits only nine customers in the two countries (of which six located in the Netherlands) were visited.

It was tried to keep the group of customers interviewed as diverse as possible. This means that some of the customers interviewed did not buy anything from Bensons (no real customers yet), while others bought the special mechanisms only. Another group of customers interviewed used only mechanisms from Bensons.

The customers were asked to fill in the questionnaire containing questions not only about Bensons' performance on certain criteria, but also about competitors' performances. The answers were scored between 1 (which means "very bad" or "unimportant") and 5 ("very good" or "very important"). The questions also involved price, delivery, quality, image and other aspects.

Although the validity of this small market analysis can be discussed (only nine customers were questioned) it shows that in price and quality aspects Bensons is lagging behind its most important competitor Koloman-Handler from Austria (he has his production plant and main distribution centre located there). In delivery and image aspects Bensons is doing very well though image aspects are not considered as very important according to the customers.

This little inquiry also shows that delivery aspects is a very important criterium for a suppliers choice (figure 4.1.). The validity of the results can be improved if a larger and/or better sample is taken. On the other hand it is just as interesting and important to take a sample outside the Netherlands and Belgium. It could prove that delivery aspects are important in other markets as well. This explains perhaps why Bensons is doing so well in the Benelux and England compared to the other European markets. Unfortunately, this questionnaire has not been carried out outside Holland and Belgium so far. The results are shown in figure 4.1. The questionnaire can be found in appendix XXIX.

#### 4.4 Other criteria

Economic indicators like the number of days of strike, efficiency differences in labour, economic growth, market growth, economic development etc. can be in favour of one of the alternatives. In general one can say that with decentralized warehouses the chance that the business as a whole gets affected due to strikes, is smaller. The days of strike vary per country (relatively low in Holland) but it would go too far to make a decision only on these statistics.

According to Van de Ven [6], efficiency factors can play a major role in production allocation decisions, to which the distribution logistics belongs, but no real evidence is found in differences in handling and warehouse activity level between France, England and Holland. In Bensons' structure the warehouse sizes and handling activities are too different to make comparisons possible, otherwise the number of tons handled per employee could give an indication of efficiency differences. The warehouse in France handles only very small quantities while in England complete pallets of one type of product are handled in and out very often.

Economic growth has advantages because more business gets concentrated in a developing area like in Calais, in the Pas de Calais alternative. The tunnel under the Channel, the Chunnel, already attracts a lot of companies to that area. Labour is still cheap over there as are the land and other facilities, but for how long? And how much time will it take to get this area developed? I.e. no boats with containers can come into Calais or Dunkirque directly from Malaysia at this moment because the port is too small. In France they are making plans, however in regard to the horizon of the new distribution structure (valid for three years) no real improvements are expected within that period.

Local policies in England, France or Holland can always disturb the financial results (section 4.1.) easily, with tax advantages, low local labour costs or low prices for local land. But it is difficult to take these (often temporary!) circumstances into account.

**RESULTS INVESTIGATION SUPPLIER CHOICE CRITERIA**

Which criteria are important for you to take a certain brand in your assortment ?

	not very important  or bad	more or less im- tant or reason- able	conside- rable im- portant or good	very im- portant  or very good
<b>Price aspects</b> . bruto margin . price . quantumprices			B B B B	x K Kx K x
<b>Image</b> . knownness			x	K B
<b>Distribution</b> . supply from stock . deelivery speed . deelivery in time . deelivery according to the order . no damage deelivery . information			K K	Bx Bx K B x K B x B K x xK B
<b>Payment conditions</b> . credit facilities				x B K
<b>Sales support</b> . promotional mat. . sales material (displays) . advise . customer service			K B x x KB K B	x KB x
<b>Product</b> . quality . completeness product range				B K x K B x
<b>Supplier is only an agent</b>		x		

x = importance according to the customer  
B = how Bensons matches the criteria  
K = how Koloman Handler matches the criteria

Figure 4.1. Supplier choice criteria

No big changes in the current distribution structure can be recommended, but the best change is to move the distribution point of the Scandinavian markets (Finland, Norway, Sweden and Denmark), the Portuguese and the Spanish market from England to Holland. All the containers from Malaysia or Singapore with the Italian market as a final destination have to be brought straight into Italy, without passing through the Dutch warehouse. It is cheaper and faster.

There is another reason. Normally full trailer loads are sent from England to Holland. Orders are collected and combined until they make up a full truck load. Nowadays less products are coming in from England and therefore the time needed to make up a full load increases. The delivery service decreases, from once a week to once a fortnight because more shipments with smaller quantities will cost (too) much more. By moving some of the markets' distribution points to Holland the amount of English products coming into Holland rises as does the number of full trailer loads. It takes less time to wait for another full trailer load. The frequency of shipments increases again as does the delivery service. The extra costs for the extra trailers are already calculated and included in the alternative's final result (section 3.3.).

With these changes no big investments (initial costs) are needed. Not much people will be affected. In Holland a sales manager plus assistant have to be added to the current organization and in England these jobs can disappear.

The current warehouse capacity in Holland is not sufficient to make the changes possible. However, the warehouse in Holland is shared with another Esselte company, Esselte Dymo, not in a very ideal situation. Esselte Dymo is short of space and would like to use the entire warehouse. Therefore Bensons is looking for another warehouse location in the neighbourhood. In the calculations the prices for a new location are already included. The set up costs however are considered as unimportant for this distribution structure decision because the warehouse situation has to change anyway. Assumed is that the Esselte company will take care of it.

In part 5 all the result will be put together, general conclusions are drawn and an alternative will be selected.

## PART 5. OVERALL CONCLUSIONS + RECOMMENDATIONS

### 5.1. Overall conclusions

In this assignment some alternative ways of distributing were generated to improve the current distribution structure by cost reduction with at least maintaining the current service level. The main conclusion of this report may be that a central warehouse serving all European markets is not a good alternative. Neither from a cost point of view (table 3.7.), nor from a distribution speed of view (table 4.1.) a central warehouse has advantages.

The small benefits of centralizing products, people and equipment are outweighed by the additional costs of transport, without any improvements of service. Therefore no further attention to the central warehouse alternatives has to be given anymore. The cheapest and fastest way of distributing is the alternative called **50% to Italy**.

The financial advantage of this alternative compared to the current situation is very small and the sensitivity for changes in product origins, currencies and transport tariffs (section 3.8.) can turn it even into a slightly more expensive alternative.

As the markets are growing and more products are coming in from Malaysia the financial advantage will increase. The main advantage of distributing this way however, is the increased delivery speed especially for the 'outskirts' of Western Europe: Scandanavia, Spain and Portugal. This must be the main reason for doing so.

Table 5.1. gives a scoring of all the results.

Table 5.1. A scoring of all the results

Criteria: Alternatives:	Financial	Sensitiv. analysis	Delivery speed	Customer service	Other criteria	Initial costs	Ranking number
1] Current Situation	0	0	0	0	0	0	3
2] Markets Moved	+/0	+/0	++	+	+	-	2
3] 50% to Italy	+	+/0	++	+	+	-	1
4] Pas de Calais	---	+	+	-	-	---	5/6
5] Felixstowe	--	0/-	--	--	-	---	5/6
6] Rotterdam	-	+/0	+	-	-	---	4

- = very bad compared to the current situation
- = much worse than the current situation
- = worse than the current situation
- 0 = equal to the current situation
- + = better than the current situation
- ++ = much better than the current situation

Major changes in the current distribution structure can not be recommended, but the best option is to move the distribution point of the Scandinavian markets (Norway, Finland, Sweden and Denmark), the Portugese and the Spanish market from England to Holland. All the containers from Malaysia or Singapore with the Italian market as a final destination have to be brought straight into Italy, without passing through the Dutch warehouse. This alternative is called the **50% to Italy** alternative.

Implementing this alternative no big investments are needed. Only a few people will be affected. In Holland a sales manager plus assistant have to be added to the current organization and in England these jobs can disappear.

By moving the supply of certain markets from England to Holland a better delivery speed performance can be reached, as is shown in table 4.1. The savings or



increase of sales possibly gained with this improvement are difficult to predict, but they do have a positive effect.

Finally it is concluded that the small financial savings in the 50% to Italy alternative still make an increase of operating income of 2.4% compared to the operating income of Bensons achieved in Europe in 1988.

Figure 5.1. gives a picture of the new (recommended) distribution flows.

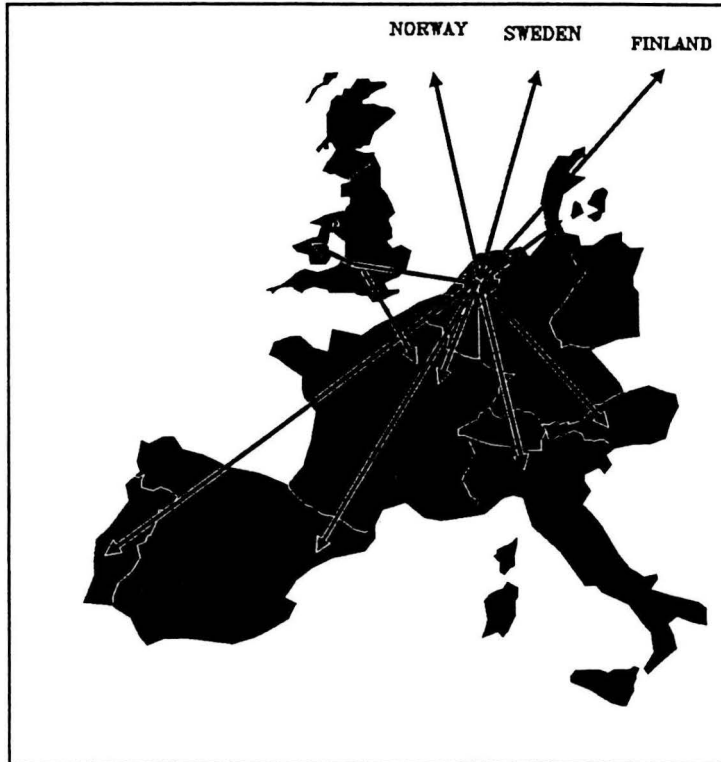


Figure 5.1. The new (recommended) distribution structure in Europe

## 5.2. Recommendations

While working on this assignment some problems directly or indirectly related to the assignment came up. In this section some of these problems are discussed. Wherever possible recommendations are given to improve the situations in which they occur.

### 5.2.1. Computer support

The biggest problem faced with, while carrying out this assignment was the lack of information for distribution logistics purposes. Sales per product, per customer, per country, per period, in number of mechanisms and/or in value are known in both computer systems (England and Holland) but not in weight or volume. These items are essential and excellent parameters for decision making in the logistics area. The items are both available in the English and Dutch computer system but no sales printout in weight or volume is possible. Therefore, efforts have to be made to trace the flows of products in tonnage.

### 5.2.2. Dual responsibilities

Another problem is the separation of the English and Dutch administrative organizations. In a number of occasions it is not clear who is responsible for certain activities, i.e. in generating new product codes. If a new type of product is launched

it will get a code in the Dutch computer system different from the code in the English system. Because of the variety of products (about 800) it is virtually impossible to check and connect both systems without big efforts. From a stock (reducing) point of view these two systems should be linked together but now two (or sometimes even more) product codes have to be checked before an answer to the "What do we have in stock?" question can be given. I would recommend to make a clear picture for each of the organization's responsibilities.

#### *5.2.3. Sales driven*

Bensons is still a sales driven organisation, according to Kotler's classification [16]. Bensons has no real marketing department and no logistics manager. However, in the last few years some changes have been taken place in the market. First the 'Boys from Hongkong' with their price battles and very recently a small change in the outlook of the product with the new good looking mechanisms from Koloman-Handler (Prisma series). This implies that in the marketing field still new actions are possible and taken. For Bensons it is important that they remain aware of these changes. Bensons still has a very good and solid image and reputation, though the quality aspect is slipping away and price technically Bensons is certainly not the best. Its strong point are in fast deliveries and supplies from stock. Therefore, actions being taken to reduce stock levels (as described in subsection 3.5.2.) can have negative effects.

#### *5.2.4. Stock control*

Better stock control is necessary and possible. The (new) safety stocks are too rough. More attention has to be given to the importance of historical sales statistics, their seasonal movements and tendencies. Not all the products have the same lead times in coming in and going out of the warehouse. A small distinction between slow and fast moving products is already made but another separation for the fast moving products into fast and very fast moving makes a better stock control possible.

### **5.3. Final remark**

I would like to end this report with a small rhyme, which expresses the situation I was in while finishing my assignment at Bensons.

Dedicated to C. van Strien:

"Decision making with a measure,  
is not always just a pleasure.  
It can help you to blow,  
as hard figures clearly show,  
a bright idea, oh Lord...straight overboard!"

## REFERENCES

---

- 1 Vern Terpstra,  
*International Marketing.*  
The Dryden Press, New York, 4th ed., 1987.
- 2 Ohlin, Hesselborn & Wijkman,  
*The International allocation of economic activity.*  
Proceedings of a Nobel symposium held at Stockholm.  
Holmes & Meier Publishers Inc., New York 1977, pag.80.
- 3 Tinbergen. J.,  
*The Design of Development.* Baltimore 1958.
- 4 Vernon, Raymond,  
'International Investment and International Trade in the Product Cycle.'  
*Quarterly Journal of Economics* , May 1966, pp.190-207.
- 5 Wells, Louis T. Jr.,  
'A product Life Cycle for International Trade?'  
*Journal of Marketing*, July 1968, pp.1-6.
- 6 Dr.Ir. A.D.M. van de Ven,  
*Internationale Industriële Productie*, Ph.D Thesis. Eindhoven  
ISBN 90-900 1201 X, Eindhoven University of Technology, 1986.  
and 'International manufacturing: an analysis on factory level of the centre-  
periphery relations.'  
*Engineering Costs and Production Economics*, 16 (1989), pp.11-33.
- 7 Peter Dicken,  
*Global Shift, industrial change in a turbulent world*,  
Harper & Row, Publishers, London, 2nd ed., 1987.
- 8 J.C.P.A. van Esch,  
*Internationale economische betrekkingen in hoofdlijnen.*  
H.E. Stenfert Kroese-B.V., Leiden / Antwerpen, 3de, herziene druk, 1985.
- 9 Prof. Jhr. Drs. M.J. Ploos van Amstel,  
*Internationale distributielogistiek.*  
Technische Universiteit Eindhoven, dictaat nr. 1.319, januari 1989.
- 10 Ernst & Whinney,  
*The "Cost of non-Europe": Border-related controls and administrative formalities;  
An illustration in the road haulage sector; volume 4.*  
Office for Official Publications of the European Communities,  
Brussels/Luxembourg, 1988.
- 11 Meeus D.C.,  
'Méér en hardere concurrentie'  
*Nederlands Transport*, 12 (1988), pp.4-5.

- 12 Spalding, L.,  
'Trucking Deregulation Equals Logistics Revolution'  
*Commerce in Belgium*, July 1989, pp.3-5.
- 13 Dr.Mr. J.G.W. Simons,  
'Interne Vervoersmarkt 1992'  
*Tijdschrift voor vervoerswetenschap*, maart 1988, pp.189-282.
- 14 Jos Poels & Kars Jol,  
*Holland controls transport*,  
Stichting Vervoersdagen Venlo, 1989
- 15 Edmund J. Gubbins & Peter Hancox,  
'Cabotage in Road Haulage and the Single European Market Proposals'  
*Physical Distribution & Materials Management*, 19,6 pp.16-25.
- 16 Philip Kotler,  
*Marketing Management; analysis, planning, implementation and control*.  
Prentice-Hall International, Inc., New Jersey, 6th ed., 1988.
- 17 Prof.dr. P.C. Sander,  
*Meten*,  
Technische Hogeschool Eindhoven, dictaat nr. 1.230, september 1984.
- 18 Industria, Fakuliteit der Bedrijfskunde, TUE  
*Korea, Emerging from the Morning Calm*,  
Verslag studiereis Zuid-Korea. 2-21 april 1988.

*'GOING WITHOUT KNOWING?'*

---

**INTERNATIONAL DISTRIBUTION LOGISTICS:  
AN INTEGRATED APPROACH TO PRODUCTION ALLOCATION  
DECISIONS**

---

*APPENDICES*

## Appendix I, Flows of products 1988 - 1992

DISTRIBUTION QUANTITIES TO: --> ORIGIN/YEAR:	BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUBTT	UK	DYMO	UKEXP	DYMOEXP
1988											
***** T O T A L *****	10,351	6,261	7,296	4,873	28,781	76,832	48,051	29,809	8,733	4,663	4,846
** TOTAL from ENGLAND **	8,977	3,280	3,215	1,712	17,184	57,462	40,278	24,950	6,213	4,459	4,656
** TOTAL from SINGAPORE **	1,147	2,858	3,578	2,934	10,517	14,969	4,452	3,995	63	204	190
** TOTAL from KUALA LUMPUR **	227	123	503	227	1,080	1,080	0	0	0	0	0
** TOTAL from JOHOR BAIRU **	0	0	0	0	0	3,321	3,321	864	2,457	0	0
1989											
***** T O T A L *****	10,336	4,954	7,803	3,461	26,554	70,440	43,886	24,414	9,057	4,284	6,131
** TOTAL from ENGLAND **	2,807	1,099	682	924	5,512	30,278	24,766	15,183	2,715	2,619	4,249
** TOTAL from SINGAPORE **	220	502	771	661	2,154	6,129	3,975	3,031	159	777	8
** TOTAL from KUALA LUMPUR **	6,751	1,562	2,671	522	11,506	17,167	5,661	3,844	645	681	491
** TOTAL from JOHOR BAIRU **	558	1,791	3,679	1,354	7,382	16,866	9,484	2,356	5,538	207	1,383
1990											
***** T O T A L *****	12,119	9,635	10,753	5,375	37,882	88,108	50,226	28,922	9,287	6,885	5,132
** TOTAL from ENGLAND **	2,279	1,020	864	1,027	5,190	21,756	16,566	10,242	2,127	2,072	2,125
** TOTAL from SINGAPORE **	189	548	523	434	1,694	4,200	2,506	1,475	167	855	9
** TOTAL from KUALA LUMPUR **	7,532	2,149	3,489	737	13,907	31,914	18,007	12,724	1,162	2,730	1,391
** TOTAL from JOHOR BAIRU **	1,119	5,418	4,877	2,677	14,091	24,238	10,147	2,481	5,831	228	1,607
** TOTAL LEVER ARCH MECHSM **	1,000	500	1,000	500	3,000	6,000	3,000	2,000	0	1,000	0
1991											
***** T O T A L *****	13,925	11,070	13,873	7,310	46,178	103,316	57,138	32,145	9,881	9,518	5,594
** TOTAL from ENGLAND **	2,496	1,138	1,074	1,356	6,063	24,275	18,212	10,897	2,263	2,735	2,316
** TOTAL from SINGAPORE **	207	612	650	573	2,041	4,927	2,885	1,569	178	1,129	10
** TOTAL from KUALA LUMPUR **	8,248	2,398	4,337	973	15,955	35,850	19,894	13,538	1,236	3,604	1,516
** TOTAL from JOHOR BAIRU **	1,225	6,046	6,062	3,534	16,868	27,764	10,897	2,640	6,204	301	1,752
** TOTAL LEVER ARCH MECHSM **	1,750	875	1,750	875	5,250	10,500	5,250	3,500	0	1,750	0
1992											
***** T O T A L *****	15,930	12,599	17,497	9,346	55,372	120,221	64,849	35,795	10,622	12,273	6,159
** TOTAL from ENGLAND **	2,753	1,267	1,328	1,705	7,054	27,192	20,139	11,715	2,433	3,441	2,550
** TOTAL from SINGAPORE **	228	681	804	721	2,434	5,743	3,309	1,687	191	1,420	11
** TOTAL from KUALA LUMPUR **	9,097	2,670	5,365	1,224	18,355	40,441	22,085	14,554	1,329	4,533	1,669
** TOTAL from JOHOR BAIRU **	1,352	6,731	7,499	4,445	20,027	31,841	11,814	2,838	6,669	379	1,929
** TOTAL LEVER ARCH MECHSM **	2,501	1,250	2,501	1,250	7,502	15,005	7,502	5,002	0	2,501	0

Number of mechanisms \* 1000

Appendix II : Transport outgoing, projection 1988 - 1995.

Appendix II, TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY

DISTRIBUTION QUANTITIES TO:	1988 TONS	1989 TONS	1990 TONS	1991 TONS	1992 TONS	1993 TONS	1994 TONS	1995 TONS
AUSTRIA (Linz)	72	41	62	82	103	109	115	121
BELGIUM (Brussel)	432	423	431	471	520	554	590	628
DENMARK (K'hagen)	374	285	327	356	392	432	476	524
ENGLAND (London)	3,163	2,562	2,945	3,290	3,677	3,910	4,161	4,430
FINLAND (H'sinki)	40	23	22	24	27	30	33	36
FRANCE (Paris)	639	445	692	808	945	983	1,022	1,063
HOLLAND (Breda)	791	774	902	1,063	1,237	1,299	1,365	1,435
IRELAND (Dublin)	34	31	49	64	81	85	89	94
ISRAEL	56	32	48	64	80	85	89	94
ITALY (Milano)	871	777	1,053	1,367	1,728	1,846	1,974	2,113
NORWAY (Oslo)	23	20	27	30	33	36	40	44
P'TUGAL (Lisboa)	80	72	114	151	190	200	210	221
SPAIN (B'lona)	148	134	211	373	563	606	651	700
SWEDEN (Malmö)	99	86	116	126	139	153	168	185
<b>T O T A L :</b>	<b>6,822</b>	<b>5,705 *</b>	<b>6,999 *</b>	<b>8,270 *</b>	<b>9,716 *</b>	<b>10,327 *</b>	<b>10,983 *</b>	<b>11,689</b>
<b>UK IMPORTANCE %</b>	<b>46 *</b>	<b>45 *</b>	<b>42 *</b>	<b>40 *</b>	<b>38 *</b>	<b>38 *</b>	<b>38 *</b>	<b>38</b>

Appendix III : Transport outgoing, Current Situation (in ton-km)

Appendix III, alternative 1J Current Situation  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	75	43	65	86	108	114	120	126	1044
BELGIUM (Brussel)	86	85	86	94	104	111	118	126	200
DENMARK (K'hagen)	390	298	341	372	410	451	496	547	1044
ENGLAND (London)	316	256	294	329	368	391	416	443	100
FINLAND (H'sinki)	86	49	48	53	58	64	70	77	2150
FRANCE (Paris)	265	185	287	335	392	408	424	441	415
HOLLAND (Breda)	79	77	90	106	124	130	136	144	100
IRELAND (Dublin)	18	17	26	35	44	46	48	51	540
ISRAEL	356	204	308	407	512	539	568	598	6364
ITALY (Milano)	1,097	979	1,326	1,722	2,177	2,327	2,488	2,662	1260
NORWAY (Oslo)	37	33	44	48	53	59	65	71	1620
P'TUGAL (Lisboa)	179	162	256	338	425	447	471	496	2240
SPAIN (B'lona)	222	201	317	560	845	909	977	1,050	1500
SWEDEN (Malmö)	114	99	133	145	160	176	194	213	1150
T O T A L :	3,323	2,687 *	3,623 *	4,630 *	5,779 *	6,170 *	6,591 *	7,045	
UK IMPORTANCE %	10 *	10 *	8 *	7 *	6 *	6 *	6 *	6	



Appendix IV : Transport outgoing, Markets Moved (in ton-km)

Appendix IV, alternative 2] Markets Moved  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	75	43	65	86	108	114	120	126	1044
BELGIUM (Brussel)	86	85	86	94	104	111	118	126	200
DENMARK (K'hagen)	272	207	237	259	285	314	345	380	726
ENGLAND (London)	316	256	294	329	368	391	416	443	100
FINLAND (H'sinki)	71	41	40	43	48	53	58	64	1772
FRANCE (Paris)	265	185	287	335	392	408	424	441	415
HOLLAND (Breda)	79	77	90	106	124	130	136	144	100
IRELAND (Dublin)	18	17	26	35	44	46	48	51	540
ISRAEL	356	204	308	407	512	539	568	598	6364
ITALY (Milano)	1,097	979	1,326	1,722	2,177	2,327	2,488	2,662	1260
NORWAY (Oslo)	32	28	38	41	45	50	55	60	1374
P'TUGAL (Lisboa)	186	168	265	350	440	463	488	514	2320
SPAIN (B'lona)	229	208	328	579	873	939	1,009	1,085	1550
SWEDEN (Malmö)	82	71	96	104	115	126	139	153	826
TOTAL :	3,165	2,568 *	3,486 *	4,490 *	5,634 *	6,009 *	6,412 *	6,846	
UK IMPORTANCE %	10 *	10 *	8 *	7 *	7 *	7 *	6 *	6	

Appendix V : Transport outgoing, 50% to Italy (in ton-km)

Appendix V, alternative 3] 50% to Italy  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	75	43	65	86	108	114	120	126	1044
BELGIUM (Brussel)	86	85	86	94	104	111	118	126	200
DENMARK (K'hagen)	272	207	237	259	285	314	345	380	726
ENGLAND (London)	316	256	294	329	368	391	416	443	100
FINLAND (H'sinki)	71	41	40	43	48	53	58	64	1772
FRANCE (Paris)	265	185	287	335	392	408	424	441	415
HOLLAND (Breda)	79	77	90	106	124	130	136	144	100
IRELAND (Dublin)	18	17	26	35	44	46	48	51	540
ISRAEL	356	204	308	407	512	539	568	598	6364
ITALY (Milano)	1,097	979	819	1,055	1,328	1,477	1,639	1,813	1260
NORWAY (Oslo)	32	28	38	41	45	50	55	60	1374
P'TUGAL (Lisboa)	186	168	265	350	440	463	488	514	2320
SPAIN (B'lona)	229	208	328	579	873	939	1,009	1,085	1550
SWEDEN (Malmö)	82	71	96	104	115	126	139	153	826
T O T A L :	3,165	2,568 *	2,979 *	3,823 *	4,785 *	5,160 *	5,563 *	5,997	
UK IMPORTANCE %	10 *	10 *	10 *	9 *	8 *	8 *	7 *	7	

Appendix VI : Transport outgoing, Pas de Calais (in ton-km)

Appendix VI, alternative 4] Pas de Calais  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	94	54	81	107	134	142	149	157	1300
BELGIUM (Brussel)	92	90	92	100	111	118	126	134	213
DENMARK (K'hagen)	411	314	360	392	431	475	523	576	1100
ENGLAND (London)	411	333	383	428	478	508	541	576	130
FINLAND (H'sinki)	86	49	48	53	58	64	70	77	2150
FRANCE (Paris)	160	111	173	202	236	246	255	266	250
HOLLAND (Breda)	209	204	238	281	327	343	360	379	264
IRELAND (Dublin)	23	21	33	43	54	57	60	63	670
ISRAEL	336	193	291	384	483	508	535	563	6000
ITALY (Milano)	1,336	1,192	1,615	2,096	2,651	2,832	3,029	3,241	1534
NORWAY (Oslo)	39	35	47	51	56	62	68	75	1700
P' TUGAL (Lisboa)	174	157	248	327	412	433	456	481	2170
SPAIN (B'lona)	192	174	275	485	733	787	847	910	1300
SWEDEN (Malmö)	114	99	133	145	160	176	194	213	1150
<b>T O T A L :</b>	<b>3,677</b>	<b>3,025 *</b>	<b>4,014 *</b>	<b>5,094 *</b>	<b>6,323 *</b>	<b>6,751 *</b>	<b>7,213 *</b>	<b>7,711</b>	
<b>UK IMPORTANCE %</b>	<b>11 *</b>	<b>11 *</b>	<b>10 *</b>	<b>8 *</b>	<b>8 *</b>	<b>8 *</b>	<b>7 *</b>	<b>7</b>	

Appendix VII : Transport outgoing, Felixstowe (in ton-km)

Appendix VII, alternative 5J Felixstowe  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	108	62	93	123	155	163	172	181	1500
BELGIUM (Brussel)	130	127	129	141	156	166	177	188	300
DENMARK (K'hagen)	430	328	376	410	451	497	547	602	1150
ENGLAND (London)	316	256	294	329	368	391	416	443	100
FINLAND (H'sinki)	86	49	48	53	58	64	70	77	2150
FRANCE (Paris)	224	156	242	283	331	344	358	372	350
HOLLAND (Breda)	237	232	271	319	371	390	409	431	300
IRELAND (Dublin)	18	17	26	35	44	46	48	51	540
ISRAEL	347	199	300	396	499	525	553	582	6200
ITALY (Milano)	1,510	1,347	1,825	2,370	2,997	3,202	3,424	3,664	1734
NORWAY (Oslo)	37	33	44	48	53	59	65	71	1620
P'TUGAL (Lisboa)	179	162	256	338	425	447	471	496	2240
SPAIN (B'lona)	222	201	317	560	845	909	977	1,050	1500
SWEDEN (Malmö)	114	99	133	145	160	176	194	213	1150
TOTAL :	3,959	3,268 *	4,356 *	5,550 *	6,912 *	7,378 *	7,880 *	8,422	
UK IMPORTANCE %	8 *	8 *	7 *	6 *	5 *	5 *	5 *	5	

Appendix VIII : Transport outgoing, Rotterdam (in ton-km)

Appendix VIII, alternative 6J Rotterdam  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (IN TON-KILOMETRES \* 1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	KILOMETRE DISTANCES
AUSTRIA (Linz)	75	43	65	86	108	114	120	126	1044
BELGIUM (Brussel)	86	85	86	94	104	111	118	126	200
DENMARK (K'hagen)	272	207	237	259	285	314	345	380	726
ENGLAND (London)	1,563	1,266	1,455	1,625	1,817	1,932	2,056	2,189	494
FINLAND (H'sinki)	71	41	40	43	48	53	58	64	1772
FRANCE (Paris)	307	214	332	388	454	472	491	510	480
HOLLAND (Breda)	79	77	90	106	124	130	136	144	100
IRELAND (Dublin)	35	32	50	66	83	88	92	97	1034
ISRAEL	356	204	308	407	512	539	568	598	6364
ITALY (Milano)	1,097	979	1,326	1,722	2,177	2,327	2,488	2,662	1260
NORWAY (Oslo)	32	28	38	41	45	50	55	60	1374
P'TUGAL (Lisboa)	186	168	265	350	440	463	488	514	2320
SPAIN (B'lona)	229	208	328	579	873	939	1,009	1,085	1550
SWEDEN (Malmö)	82	71	96	104	115	126	139	153	826
<b>T O T A L :</b>	<b>4,470</b>	<b>3,621 *</b>	<b>4,716 *</b>	<b>5,870 *</b>	<b>7,184 *</b>	<b>7,655 *</b>	<b>8,162 *</b>	<b>8,708</b>	
UK IMPORTANCE %	35 *	35 *	31 *	28 *	25 *	25 *	25 *	25	

Appendix IX : Transport outgoing, Current Situation (in costs)

Appendix IX, alternative 1], Current Situation  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GUILDERS \*1000)

DISTRIBUTION COSTS TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	17	10	15	20	25	26	28	29	24.3
BELGIUM	30	30	30	33	36	39	41	44	7.0
DENMARK	59	45	52	56	62	68	75	83	15.8
ENGLAND	648	525	604	674	754	802	853	908	20.5
FINLAND	20	12	11	12	14	15	17	18	50.8
FRANCE	177	123	192	224	262	272	283	294	27.7
HOLLAND	158	155	180	213	247	260	273	287	20.0
IRELAND	8	7	11	15	18	19	20	21	22.8
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	96	85	116	150	190	203	217	232	11.0
NORWAY	14	13	17	19	21	23	25	28	63.0
PORTUGAL	22	20	32	42	53	56	59	62	28.0
SPAIN	23	21	33	59	89	96	103	111	15.8
SWEDEN	28	24	32	35	39	43	47	52	28.0
<b>T O T A L :</b>	<b>1,341</b>	<b>1,093 *</b>	<b>1,360 *</b>	<b>1,597 *</b>	<b>1,866 *</b>	<b>1,981 *</b>	<b>2,103 *</b>	<b>2,235</b>	
<b>UK IMPORTANCE %</b>	<b>48 *</b>	<b>48 *</b>	<b>44 *</b>	<b>42 *</b>	<b>40 *</b>	<b>40 *</b>	<b>41 *</b>	<b>41</b>	

Appendix X : Transport outgoing, Markets Moved (in costs)

Appendix X, alternative 2] Markets Moved  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GUILDERS \* 1000)

DISTRIBUTION QUANTITIES TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	17	10	15	20	25	26	28	29	24.3
BELGIUM	30	30	30	33	36	39	41	44	7.0
DENMARK	60	46	52	57	63	69	76	84	16.0
ENGLAND	648	525	604	674	754	802	853	908	20.5
FINLAND	17	10	9	10	11	12	14	15	42.0
FRANCE	177	123	191	223	261	272	282	294	27.7
HOLLAND	158	155	180	213	247	260	273	287	20.0
IRELAND	8	8	12	16	20	21	22	23	24.5
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	96	85	116	150	190	203	217	232	11.0
NORWAY	10	9	12	13	14	16	18	19	44.0
PORTUGAL	19	18	28	37	46	49	51	54	24.3
SPAIN	24	22	34	61	92	99	106	114	16.3
SWEDEN	23	20	27	30	33	36	40	44	23.5
T O T A L :	1,328	1,082 *	1,345 *	1,581 *	1,849 *	1,962 *	2,083 *	2,213	
UK IMPORTANCE %	49 *	49 *	45 *	43 *	41 *	41 *	41 *	41	

Appendix XI : Transport outgoing, 50% to Italy (in costs)

Appendix XI, alternative 3] 50% to Italy  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GUILDERS \* 1000)

DISTRIBUTION QUANTITIES TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	17	10	15	20	25	26	28	29	24.3
BELGIUM	30	30	30	33	36	39	41	44	7.0
DENMARK	60	46	52	57	63	69	76	84	16.0
ENGLAND	648	525	604	674	754	802	853	908	20.5
FINLAND	17	10	9	10	11	12	14	15	42.0
FRANCE	177	123	191	223	261	272	282	294	27.7
HOLLAND	158	155	180	213	247	260	273	287	20.0
IRELAND	8	8	12	16	20	21	22	23	24.5
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	113	101	85	109	137	152	169	100	13.0
NORWAY	10	9	12	13	14	16	18	19	44.0
PORTUGAL	19	18	28	37	46	49	51	54	24.3
SPAIN	24	22	34	61	92	99	106	114	16.3
SWEDEN	23	20	27	30	33	36	40	44	23.5
TOTAL :	1,345	1,097 *	1,314 *	1,540 *	1,796 *	1,911 *	2,035 *	2,080	
UK IMPORTANCE %	48 *	48 *	46 *	44 *	42 *	42 *	42 *	44	



Appendix XII : Transport outgoing, Pas de Calais (in costs)

Appendix XII, alternative 4] Pas de Calais  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GUILDERS)

DISTRIBUTION QUANTITIES TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	32	18	28	37	46	48	51	54	44.5
BELGIUM	45	44	45	50	55	58	62	66	10.5
DENMARK	178	136	156	170	187	206	226	249	47.6
ENGLAND	1,091	884	1,016	1,135	1,269	1,349	1,436	1,529	34.5
FINLAND	24	14	14	15	16	18	20	22	60.2
FRANCE	164	114	177	207	242	251	262	272	25.6
HOLLAND	263	258	300	354	412	433	455	478	33.3
IRELAND	12	11	17	23	29	31	32	34	36.0
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	183	163	221	287	363	388	415	444	21.0
NORWAY	12	10	14	15	17	19	21	23	51.5
PORTUGAL	13	11	18	24	30	32	33	35	15.8
SPAIN	26	23	37	65	99	106	114	123	17.5
SWEDEN	60	52	70	76	84	92	101	112	60.2
<b>T O T A L :</b>	<b>2,142</b>	<b>1,761 *</b>	<b>2,146 *</b>	<b>2,501 *</b>	<b>2,903 *</b>	<b>3,089 *</b>	<b>3,288 *</b>	<b>3,504</b>	
<b>UK IMPORTANCE %</b>	<b>51 *</b>	<b>50 *</b>	<b>47 *</b>	<b>45 *</b>	<b>44 *</b>	<b>44 *</b>	<b>44 *</b>	<b>44</b>	

Appendix XIII : Transport outgoing, Felixstowe (in costs)

Appendix XIII, alternative 5] Felixstowe  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GUILDERS \* 1000)

DISTRIBUTION QUANTITIES TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	46	26	40	52	66	69	73	77	63.5
BELGIUM	76	74	75	83	91	97	103	110	17.5
DENMARK	59	45	52	56	62	68	75	83	15.8
ENGLAND	648	525	604	674	754	802	853	908	20.5
FINLAND	20	12	11	12	14	15	17	18	50.8
FRANCE	277	193	300	351	410	426	443	461	43.4
HOLLAND	297	290	338	399	464	487	512	538	37.5
IRELAND	6	5	8	11	14	15	16	16	17.5
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	138	125	166	216	273	292	312	334	15.8
NORWAY	14	13	17	19	21	23	25	28	63.0
PORTUGAL	22	20	32	42	53	56	59	62	28.0
SPAIN	23	21	33	59	89	96	103	111	15.8
SWEDEN	28	24	32	35	39	43	47	52	28.0
T O T A L :	1,694	1,394 *	1,744 *	2,054 *	2,405 *	2,547 *	2,700 *	2,863	
UK IMPORTANCE %	38 *	38 *	35 *	33 *	31 *	31 *	32 *	32	

Appendix XIV : Transport outgoing, Rotterdam (in costs)

Appendix XIV, alternative 6] Rotterdam  
 TRANSPORT OUTGOING, PROJECTION 1988-1995, MOST LIKELY (COSTS IN DUTCH GULDERS \* 1000)

DISTRIBUTION QUANTITIES TO:	1988	1989	1990	1991	1992	1993	1994	1995	PRICES P 100KG
AUSTRIA	17	10	15	20	25	26	28	29	24.3
BELGIUM	30	30	30	33	36	39	41	44	7.0
DENMARK	60	46	52	57	63	69	76	84	16.0
ENGLAND	1,060	858	986	1,102	1,232	1,310	1,394	1,484	33.5
FINLAND	17	10	9	10	11	12	14	15	42.0
FRANCE	177	123	191	223	261	272	282	294	27.7
HOLLAND	158	155	180	213	247	260	273	287	20.0
IRELAND	11	10	16	21	27	28	29	31	33.0
ISRAEL	39	22	34	44	56	59	62	65	69.5
ITALY	96	85	116	150	190	203	217	232	11.0
NORWAY	10	9	12	13	14	16	18	19	44.0
PORTUGAL	19	18	28	37	46	49	51	54	24.3
SPAIN	24	22	34	61	92	99	106	114	16.3
SWEDEN	23	20	27	30	33	36	40	44	23.5
<b>T O T A L :</b>	<b>1,742</b>	<b>1,417 *</b>	<b>1,732 *</b>	<b>2,014 *</b>	<b>2,334 *</b>	<b>2,477 *</b>	<b>2,631 *</b>	<b>2,797</b>	
<b>UK IMPORTANCE %</b>	<b>61 *</b>	<b>61 *</b>	<b>57 *</b>	<b>55 *</b>	<b>53 *</b>	<b>53 *</b>	<b>53 *</b>	<b>53</b>	

Appendix XV : Tariffs for container and trailer transport.

APPENDIX XV, tariffs for container and trailer transport  
 COSTS OF TRANSPORT, INCOMING (IN DUTCH GUILDERS)  
 WORKSHEET

Exchange rates ---->	1 pound =	3.50 guilders
	1 \$ U.S. =	2.10 guilders
	1 FF =	0.35 guilders
From Singapore and Malaysia to :	100 BF =	5.50 guilders

Charges FULL containers	Seafreight	Customs	Clearance	Port charge	Haulage	TOTAL
England, Brimscombe	2100	123	105	140	875	3343
England, Felixstowe	2100	123	105	140	613	3080
Holland, Woerden	2100	0	35	0	500	2635
Holland, Rotterdam	2100	0	35	0	448	2583
Belgium, Antwerp	2100	0	35	0	448	2583
France, Dunkirque (via)	2100	0	35	0	1288	3423
Italy, Genua	2100	0	135	400	800	3435

From England, Brimscombe to :

Charges TRAILER	Seafreight	Customs	Clearance	Port charge	Haulage	TOTAL
England, Felixstowe	0	0	0	0	525	525
Holland, Woerden	1278	0	35	0	0	1313
Holland, Rotterdam	1278	0	35	0	0	1313
Belgium, Antwerp	1260	0	35	0	0	1295
France, Dunkirque	1260	0	35	0	0	1295

From England, Felixstowe to :

Charges TRAILER	Seafreight	Customs	Clearance	Port charge	Haulage	TOTAL
Holland, Woerden	1225	0	35	0	0	1260
Holland, Rotterdam	1225	0	35	0	0	1260
Belgium, Antwerp	1208	0	35	0	0	1243
France, Dunkirque	1208	0	35	0	0	1243

To England, Felixstowe from :

Charges TRAILER	Seafreight	Customs	Clearance	Port charge	Haulage	TOTAL
Holland, Woerden	2538	0	105	0	0	2643
Holland, Rotterdam	2538	0	105	0	0	2643
Belgium, Antwerp	2538	0	105	0	0	2643
France, Dunkirque	2538	0	105	0	0	2643

To England, Brimscombe from :

Charges TRAILER	Seafreight	Customs	Clearance	Port charge	Haulage	TOTAL
Holland, Woerden	2625	0	105	0	0	2730
Holland, Rotterdam	2625	0	105	0	0	2730
Belgium, Antwerp	2625	0	105	0	0	2730
France, Dunkirque	2625	0	105	0	0	2730

Appendix XVI : Total of containers and trailers to various budget markets.

Appendix XVI, total of containers and trailers to the various budget markets.

NUMBER OF CONTAINERS TO: --> BENELUX FRANCE ITALIA NLEXP SUBTT TOTAL SUB UK DYMO UKEXP DYMOEXP  
ORIGIN/YEAR:

		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP
1989												
*****	T O T A L *****	59	31	51	16	158	367	209	129	37	25	18
**	TOTAL from ENGLAND **	14	7	4	4	29	140	111	75	12	14	9
**	TOTAL from SINGAPORE **	1	3	6	5	15	48	33	26	1	6	0
**	TOTAL from KUALA LUMPUR **	42	12	22	3	79	110	31	19	4	4	4
**	TOTAL from JOHOR BAHRU **	2	9	19	5	35	70	35	9	19	2	5
1990												
*****	T O T A L *****	70	53	70	26	219	484	265	163	37	42	23
**	TOTAL from ENGLAND **	12	7	5	3	27	103	76	49	9	11	7
**	TOTAL from SINGAPORE **	1	3	4	3	11	30	19	12	1	7	0
**	TOTAL from KUALA LUMPUR **	44	13	30	4	90	197	107	77	7	14	9
**	TOTAL from JOHOR BAHRU **	4	26	23	12	66	103	37	9	21	2	6
**	TOTAL LEVER ARCH MECHSM **	9	4	0	4	26	51	26	17	0	9	0
1991												
*****	T O T A L *****	82	62	91	36	272	580	309	185	40	59	25
**	TOTAL from ENGLAND **	14	7	6	4	32	115	84	52	10	14	8
**	TOTAL from SINGAPORE **	1	3	4	4	13	35	22	12	1	9	0
**	TOTAL from KUALA LUMPUR **	48	14	37	5	104	222	118	82	7	19	10
**	TOTAL from JOHOR BAHRU **	5	29	28	16	78	119	40	10	22	2	6
**	TOTAL LEVER ARCH MECHSM **	15	7	0	7	45	89	45	30	0	15	0
1992												
*****	T O T A L *****	96	71	116	47	330	686	356	210	42	77	27
**	TOTAL from ENGLAND **	15	8	8	6	36	129	93	55	11	18	9
**	TOTAL from SINGAPORE **	1	4	6	5	16	41	26	13	1	11	0
**	TOTAL from KUALA LUMPUR **	53	16	46	6	121	251	130	88	8	24	11
**	TOTAL from JOHOR BAHRU **	5	33	35	20	93	137	44	11	23	3	7
**	TOTAL LEVER ARCH MECHSM **	21	11	0	11	64	128	64	43	0	21	0

Appendix XIX : Costs of containers, 50% to Italy

Appendix XIX, alternative 3] 50% TO ITALY

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	EXPORT	SUBTT	TOTAL	SUBTT	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from W O E R D E N							from B'COMBE		from WOERDEN		
1989													
*****	T O T A L	*****	138	72	148	38	396	741	345	180	81	48	36
**	TOTAL from ENGLAND	**	18	9	5	5	38	68	30	0	0	18	12
**	TOTAL from SINGAPORE	**	3	8	18	12	41	148	107	88	3	16	0
**	TOTAL from KUALA LUMPUR	**	110	31	68	7	217	314	97	63	14	9	11
**	TOTAL from JOHOR BAHRU	**	6	24	57	14	100	211	111	29	65	4	13
1990													
*****	T O T A L	*****	168	131	178	64	542	1,165	623	384	93	96	50
**	TOTAL from ENGLAND	**	16	9	7	4	36	60	24	0	0	14	10
**	TOTAL from SINGAPORE	**	3	8	11	8	30	90	60	39	3	18	0
**	TOTAL from KUALA LUMPUR	**	115	34	91	9	249	590	341	257	22	37	25
**	TOTAL from JOHOR BAHRU	**	12	69	69	32	182	301	119	31	69	5	15
**	TOTAL LEVER ARCH MECHSM	**	22	11	0	11	45	124	79	57	0	22	0
1991													
*****	T O T A L	*****	199	153	221	90	663	1,401	738	447	99	137	54
**	TOTAL from ENGLAND	**	18	10	8	6	41	71	29	0	0	19	11
**	TOTAL from SINGAPORE	**	3	9	14	10	36	105	68	41	3	24	0
**	TOTAL from KUALA LUMPUR	**	126	37	114	12	289	663	373	274	23	49	27
**	TOTAL from JOHOR BAHRU	**	13	77	86	42	218	346	128	33	73	6	16
**	TOTAL LEVER ARCH MECHSM	**	39	20	0	20	78	217	139	100	0	39	0
1992													
*****	T O T A L	*****	232	177	274	116	799	1,660	861	516	107	179	60
**	TOTAL from ENGLAND	**	20	11	10	7	48	83	35	0	0	23	12
**	TOTAL from SINGAPORE	**	4	10	17	13	43	121	78	45	3	30	0
**	TOTAL from KUALA LUMPUR	**	139	42	141	16	337	748	411	294	25	62	30
**	TOTAL from JOHOR BAHRU	**	14	86	106	53	259	399	139	35	78	8	18
**	TOTAL LEVER ARCH MECHSM	**	56	28	0	28	112	310	198	142	0	56	0

Appendix XX : Costs of containers, Pas de Calais

Appendix XX, alternative 4] PAS DE CALAIS

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from C A L A I S							from C A L A I S				
1989													
*****	T O T A L	*****	173	91	166	48	478	959	481	282	99	56	43
**	TOTAL from ENGLAND	**	18	9	5	5	37	181	144	98	16	18	12
**	TOTAL from SINGAPORE	**	5	10	20	16	50	164	114	90	3	21	0
**	TOTAL from KUALA LUMPUR	**	144	41	77	10	271	375	104	65	14	12	14
**	TOTAL from JOHOR BAHRU	**	7	31	64	18	120	239	119	30	67	6	17
1990													
*****	T O T A L	*****	214	168	200	82	663	1,409	746	456	108	121	62
**	TOTAL from ENGLAND	**	16	9	6	4	35	134	98	63	12	14	10
**	TOTAL from SINGAPORE	**	4	11	12	10	37	103	66	40	3	23	0
**	TOTAL from KUALA LUMPUR	**	149	44	103	12	308	674	366	263	22	49	32
**	TOTAL from JOHOR BAHRU	**	15	90	78	41	225	352	127	31	70	6	20
**	TOTAL LEVER ARCH MECHSM	**	29	15	0	15	58	146	87	58	0	29	0
1991													
*****	T O T A L	*****	253	196	248	115	812	1,690	878	525	114	172	67
**	TOTAL from ENGLAND	**	18	10	8	6	41	149	108	67	13	18	11
**	TOTAL from SINGAPORE	**	4	12	15	13	45	121	77	42	3	31	0
**	TOTAL from KUALA LUMPUR	**	163	49	128	16	356	759	403	280	24	64	35
**	TOTAL from JOHOR BAHRU	**	17	101	97	54	269	406	137	33	75	8	21
**	TOTAL LEVER ARCH MECHSM	**	51	25	0	25	102	255	153	102	0	51	0
1992													
*****	T O T A L	*****	296	226	307	149	978	2,000	1,022	600	123	225	74
**	TOTAL from ENGLAND	**	19	11	10	7	47	167	120	72	14	23	12
**	TOTAL from SINGAPORE	**	5	13	19	16	53	141	88	46	3	39	0
**	TOTAL from KUALA LUMPUR	**	180	54	159	20	413	859	446	301	26	81	38
**	TOTAL from JOHOR BAHRU	**	19	112	120	68	319	468	150	36	80	10	23
**	TOTAL LEVER ARCH MECHSM	**	73	36	0	36	146	364	218	146	0	73	0

Appendix XXI : Costs of containers, Felixstowe

Appendix XXI, alternative 5] FELIXSTOWE

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from F E L I X S T O W E							from	F E L I X S T O W E			
1989													
*****	T O T A L	*****	147	77	147	40	412	773	362	205	81	42	33
**	TOTAL from ENGLAND	**	7	4	2	2	15	73	58	40	7	7	5
**	TOTAL from SINGAPORE	**	4	9	18	14	45	148	103	81	2	19	0
**	TOTAL from KUALA LUMPUR	**	129	37	69	9	244	337	94	58	13	11	13
**	TOTAL from JOHOR BAHRU	**	7	28	58	16	108	215	107	27	60	5	15
1990													
*****	T O T A L	*****	184	146	177	72	579	1,202	622	379	91	102	51
**	TOTAL from ENGLAND	**	6	4	3	2	14	54	40	25	5	6	4
**	TOTAL from SINGAPORE	**	4	10	11	9	33	93	60	36	3	21	0
**	TOTAL from KUALA LUMPUR	**	134	39	93	11	277	607	330	237	20	44	29
**	TOTAL from JOHOR BAHRU	**	14	81	70	37	202	316	114	28	63	5	18
**	TOTAL LEVER ARCH MECHSM	**	26	13	0	13	52	131	79	52	0	26	0
1991													
*****	T O T A L	*****	219	172	220	100	711	1,447	737	439	97	146	55
**	TOTAL from ENGLAND	**	7	4	3	2	17	60	44	27	5	7	4
**	TOTAL from SINGAPORE	**	4	11	14	12	40	109	69	38	3	28	0
**	TOTAL from KUALA LUMPUR	**	147	44	115	15	321	683	363	252	22	58	31
**	TOTAL from JOHOR BAHRU	**	15	90	87	49	242	365	124	30	67	7	19
**	TOTAL LEVER ARCH MECHSM	**	46	23	0	23	92	229	138	92	0	46	0
1992													
*****	T O T A L	*****	256	198	272	130	857	1,717	860	505	104	191	61
**	TOTAL from ENGLAND	**	8	4	4	3	19	68	49	29	6	9	5
**	TOTAL from SINGAPORE	**	4	12	17	15	48	127	79	41	3	35	0
**	TOTAL from KUALA LUMPUR	**	162	49	143	18	372	773	401	271	23	73	35
**	TOTAL from JOHOR BAHRU	**	17	101	108	62	287	421	135	32	72	9	21
**	TOTAL LEVER ARCH MECHSM	**	66	33	0	33	131	328	197	131	0	66	0



Appendix XVII : Costs of containers, Current Situation

Appendix XVII, alternative 1] Current Situation

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from W O E R D E N							from	B R I M S C O M B E			
1989													
*****	T O T A L	*****	138	72	129	38	377	706	329	180	81	38	30
**	TOTAL from ENGLAND	**	18	9	5	5	38	38	0	0	0	0	0
**	TOTAL from SINGAPORE	**	3	8	16	12	39	150	111	88	3	21	0
**	TOTAL from KUALA LUMPUR	**	110	31	59	7	208	310	102	63	14	12	14
**	TOTAL from JOHOR BAHRU	**	6	24	49	14	92	208	116	29	65	5	16
1990													
*****	T O T A L	*****	168	131	155	64	519	1,151	632	384	93	104	51
**	TOTAL from ENGLAND	**	16	9	7	4	36	36	0	0	0	0	0
**	TOTAL from SINGAPORE	**	3	8	9	8	28	93	65	39	3	23	0
**	TOTAL from KUALA LUMPUR	**	115	34	79	9	237	595	358	257	22	48	31
**	TOTAL from JOHOR BAHRU	**	12	69	60	32	173	297	124	31	69	6	19
**	TOTAL LEVER ARCH MECHSM	**	22	11	0	11	45	130	85	57	0	28	0
1991													
*****	T O T A L	*****	199	153	193	90	635	1,387	752	447	99	150	55
**	TOTAL from ENGLAND	**	18	10	8	6	41	41	0	0	0	0	0
**	TOTAL from SINGAPORE	**	3	9	12	10	34	109	75	41	3	30	0
**	TOTAL from KUALA LUMPUR	**	126	37	99	12	274	668	394	274	23	63	34
**	TOTAL from JOHOR BAHRU	**	13	77	75	42	207	341	134	33	73	8	21
**	TOTAL LEVER ARCH MECHSM	**	39	20	0	20	78	228	149	100	0	50	0
1992													
*****	T O T A L	*****	232	177	239	116	764	1,645	881	516	107	197	61
**	TOTAL from ENGLAND	**	20	11	10	7	48	48	0	0	0	0	0
**	TOTAL from SINGAPORE	**	4	10	15	13	41	127	86	45	3	38	0
**	TOTAL from KUALA LUMPUR	**	139	42	122	16	318	754	436	294	25	79	38
**	TOTAL from JOHOR BAHRU	**	14	86	92	53	245	391	146	35	78	10	23
**	TOTAL LEVER ARCH MECHSM	**	56	28	0	28	112	325	213	142	0	71	0

Appendix XVIII : Costs of containers, Markets Moved

Appendix XVIII, alternative 2], Markets Moved

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from W O E R D E N							from B' COMBE		from WOERDEN		
1989													
*****	T O T A L	*****	138	72	129	38	377	722	345	180	81	48	36
**	TOTAL from ENGLAND	**	18	9	5	5	38	68	30	0	0	18	12
**	TOTAL from SINGAPORE	**	3	8	16	12	39	146	107	88	3	16	0
**	TOTAL from KUALA LUMPUR	**	110	31	59	7	208	305	97	63	14	9	11
**	TOTAL from JOHOR BAHRU	**	6	24	49	14	92	204	111	29	65	4	13
1990													
*****	T O T A L	*****	168	131	155	64	519	1,142	623	384	93	96	50
**	TOTAL from ENGLAND	**	16	9	7	4	36	60	24	0	0	14	10
**	TOTAL from SINGAPORE	**	3	8	9	8	28	88	60	39	3	18	0
**	TOTAL from KUALA LUMPUR	**	115	34	79	9	237	578	341	257	22	37	25
**	TOTAL from JOHOR BAHRU	**	12	69	60	32	173	292	119	31	69	5	15
**	TOTAL LEVER ARCH MECHSM	**	22	11	0	11	45	124	79	57	0	22	0
1991													
*****	T O T A L	*****	199	153	193	90	635	1,373	738	447	99	137	54
**	TOTAL from ENGLAND	**	18	10	8	6	41	71	29	0	0	19	11
**	TOTAL from SINGAPORE	**	3	9	12	10	34	103	68	41	3	24	0
**	TOTAL from KUALA LUMPUR	**	126	37	99	12	274	648	373	274	23	49	27
**	TOTAL from JOHOR BAHRU	**	13	77	75	42	207	335	128	33	73	6	16
**	TOTAL LEVER ARCH MECHSM	**	39	20	0	20	78	217	139	100	0	39	0
1992													
*****	T O T A L	*****	232	177	239	116	764	1,626	861	516	107	179	60
**	TOTAL from ENGLAND	**	20	11	10	7	48	83	35	0	0	23	12
**	TOTAL from SINGAPORE	**	4	10	15	13	41	119	78	45	3	30	0
**	TOTAL from KUALA LUMPUR	**	139	42	122	16	318	729	411	294	25	62	30
**	TOTAL from JOHOR BAHRU	**	14	86	92	53	245	385	139	35	78	8	18
**	TOTAL LEVER ARCH MECHSM	**	56	28	0	28	112	310	198	142	0	56	0

Appendix XXII : Costs of containers, Rotterdam

Appendix XXII, alternative 6] ROTTERDAM

COSTS OF CONTAINERS TO: -->		BENELUX	FRANCE	ITALIA	NLEXP	SUBTT	TOTAL	SUB	UK	DYMO	UKEXP	DYMOEXP	
(in Dutch guilders * 1000)		from R O T T E R D A M						from R O T T E R D A M					
1989													
*****	T O T A L	*****	136	71	127	37	370	770	400	238	79	47	36
**	TOTAL from ENGLAND	**	18	9	5	5	38	183	146	99	16	18	12
**	TOTAL from SINGAPORE	**	3	7	15	12	38	124	86	68	2	16	0
**	TOTAL from KUALA LUMPUR	**	108	31	58	7	204	283	79	49	11	9	11
**	TOTAL from JOHOR BAHRU	**	6	23	48	13	91	180	90	22	50	4	13
1990													
*****	T O T A L	*****	165	129	152	63	510	1,097	588	360	84	95	49
**	TOTAL from ENGLAND	**	16	9	7	4	36	135	100	64	12	14	10
**	TOTAL from SINGAPORE	**	3	8	9	7	28	78	50	30	2	18	0
**	TOTAL from KUALA LUMPUR	**	113	33	78	9	232	509	277	199	17	37	24
**	TOTAL from JOHOR BAHRU	**	12	68	59	31	169	265	96	24	53	4	15
**	TOTAL LEVER ARCH MECHSM	**	22	11	0	11	44	110	66	44	0	22	0
1991													
*****	T O T A L	*****	195	151	189	88	623	1,314	691	413	90	134	53
**	TOTAL from ENGLAND	**	18	10	8	6	41	151	110	68	13	19	11
**	TOTAL from SINGAPORE	**	3	9	12	10	34	91	58	32	2	23	0
**	TOTAL from KUALA LUMPUR	**	123	37	97	12	269	573	304	211	18	48	26
**	TOTAL from JOHOR BAHRU	**	13	76	73	41	203	306	104	25	56	6	16
**	TOTAL LEVER ARCH MECHSM	**	38	19	0	19	77	192	115	77	0	38	0
1992													
*****	T O T A L	*****	228	174	234	114	750	1,552	802	471	96	176	59
**	TOTAL from ENGLAND	**	20	11	10	7	48	169	122	73	14	23	12
**	TOTAL from SINGAPORE	**	4	10	14	12	40	107	66	34	3	29	0
**	TOTAL from KUALA LUMPUR	**	136	41	120	15	312	648	337	227	19	61	29
**	TOTAL from JOHOR BAHRU	**	14	84	90	52	240	353	113	27	61	7	18
**	TOTAL LEVER ARCH MECHSM	**	55	27	0	27	110	275	165	110	0	55	0

Appendix XXIII : Palletplaces required for safety stock.

Palletplaces required for safety stock.

RES3 till RES70= Products produced in England  
 RES85 = Products produced in Singapore and Malaysia

NUMBER OF PALLET PLACES REQUIRED FOR SAFETY STOCK IN THE DIFFERENT WAREHOUSES AND COMBINATIONS OF WAREHOUSES FOR CERTAIN PRODUCT GROUPS (RES 3,15,20,70,85), ROUNDED ON 0.5 PALLETPLACES

STOCK IN:	ENGLAND	HOLLAND	FRANCE	ITALY	UK/NL	UK/NL/FR	UK/NL/F/I	CAPITAL IN POUNDS
RES3	91.0	28.5	20.0	7.5	111.5	121.5	147.0	117,575
RES15	83.5	33.5	16.0	12.0	113.5	127.5	145.0	84,813
RES20	76.0	45.0	29.0	23.5	117.5	143.5	173.5	99,379
RES70	12.5	2.0	10.0	3.0	14.0	22.5	27.5	19,962
RES85	327.5	580.5	92.5	130.5	895.5	974.0	1131.0	754,378
<b>T O T A L</b>	<b>590.5</b>	<b>689.5</b>	<b>167.5</b>	<b>176.5</b>	<b>1,252.0</b>	<b>1,389.0</b>	<b>1,624.0</b>	<b>1,076,107</b> <b>3,766,374 IN GUILDERS</b> <b>CURRENCY 1 £ = f 3,50</b>

NUMBER OF PALLET PLACES REQUIRED FOR SAFETY STOCK IN THE DIFFERENT WAREHOUSES AND COMBINATIONS OF WAREHOUSES FOR CERTAIN PRODUCT GROUPS (RES 3,15,20,70,85), ROUNDED ON 1.0 PALLETPLACES

STOCK IN:	ENGLAND	HOLLAND	FRANCE	ITALY	UK/NL	UK/NL/FR	UK/NL/F/I	CAPITAL IN POUNDS
RES3	110.0	43.0	34.0	14.0	134.0	141.0	201.0	117,575
RES15	98.0	42.0	18.0	17.0	132.0	146.0	175.0	84,813
RES20	86.0	54.0	31.0	33.0	130.0	157.0	204.0	99,379
RES70	17.0	2.0	17.0	4.0	18.0	32.0	40.0	19,962
RES85	339.0	604.0	110.0	149.0	921.0	1,000.0	1202.0	754,378
<b>T O T A L</b>	<b>650.0</b>	<b>745.0</b>	<b>210.0</b>	<b>217.0</b>	<b>1,335.0</b>	<b>1,476.0</b>	<b>1,822.0</b>	<b>1,076,107</b> <b>3,766,374 IN GUILDERS</b> <b>CURRENCY 1 £ = f 3,50</b>

Appendix XXIV : Costs of warehousing in 1992.

COSTS OF WAREHOUSING					
Alternatives Most likely		No. of palletplaces 1992		Costs (guilders) * 1000	
1] Current Situation	-->	UK	1818	* 198 =	360
		NL	1661	* 90	149
		FR	450	* 70	32
			-----		-----
			3929		541
2] Markets Moved	-->	UK	1301		
		NL	2178		
		FR	450		
			-----		-----
			3929		485
3] Pas de Calais	-->	FR	3595	* 70	252
4] Felixstowe	-->	UK	3595	* 198	712
5] Rotterdam	-->	NL	3595	* 90	324
6] Italy direct >		UK	1301	* 198	258
		NL	2048	* 90	184
		FR	450	* 70	32
		IT	+ 130	* 140	+ 18
			-----		-----
			3929		492

Appendix XXV : Costs of handling in/out in 1992.

COSTS OF HANDLING IN / OUT				
Alternatives Most likely		No. of tons handled 1992 * RATE		Costs (* 1000) in guilders
1] Current Situation	--> UK	5795 * 62		359
	NL	4613 * 79		364
		-----		-----
		10408		723
2] Markets Moved	--> UK	4781 * 62		296
	NL	6095 * 79		482
		-----		-----
		10876		778
3] Pas de Calais	--> FR .9*	12113 * 75		818
4] Felixstowe	--> UK .9*	12113 * 62		679
5] Rotterdam	--> NL .9*	12113 * 79		859
6] Italy direct >	UK	4781 * 62		296
	NL	5278 * 79		417
		-----		-----
		10059		714

Appendix XXVI : Results sensitivity analysis (1).

Table I. Sensitivity analysis of the results in 1990.

a1 Product origin 50% from Asia	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS
1] Current Situation	1,360	815	605	413	559	3,752
2] Markets Moved	1,345	841	605	376	620	3,787
3] 50% to Italy	1,314	856	605	385	583	3,743
4] Pas de Calais	2,146	1,117	556	184	727	4,730
5] Felixstowe	1,744	873	556	596	601	4,370
6] Rotterdam	1,732	912	556	237	765	4,193

Table II. Sensitivity analysis of the results in 1990.

a2 Product origin 100% from Asia	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS
1] Current Situation	1,360	1,487	743	413	492	4,495
2] Markets Moved	1,345	1,443	743	376	494	4,401
3] 50% to Italy	1,314	1,474	743	385	457	4,373
4] Pas de Calais	2,146	1,705	683	184	476	5,194
5] Felixstowe	1,744	1,530	683	596	394	4,947
6] Rotterdam	1,732	1,289	683	237	502	4,443

Table III. Sensitivity analysis of the results in 1990.

b1 Parameter: Currency 1£ = f3.15	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS
1] Current Situation	1,280	1,124	660	385	495	3,944
2] Markets Moved	1,284	1,119	660	355	534	3,952
3] 50% to Italy	1,252	1,141	660	360	497	3,910
4] Pas de Calais	2,086	1,366	607	184	585	4,828
5] Felixstowe	1,570	1,160	607	536	449	4,322
6] Rotterdam	1,682	1,086	607	237	615	4,227

Table IV. Sensitivity analysis of the results in 1990.

b2 Parameter: Currency 1£ = f3.85	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware- housing	Handling in / out	TOTALS
1] Current Situation	1,439	1,178	660	441	549	4,267
2] Markets Moved	1,407	1,166	660	398	580	4,211
3] 50% to Italy	1,375	1,188	660	402	543	4,168
4] Pas de Calais	2,207	1,451	607	184	617	5,066
5] Felixstowe	1,918	1,109	607	656	662	4,952
6] Rotterdam	1,782	1,243	607	237	649	4,518

5,086  
4,384

Appendix XXVII : Results sensitivity analysis (2).

Table V. Sensitivity analysis of the results in 1990.

c) Interest rate + 50%	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware-housing	Handling in / out	TOTALS
1] Current Situation	1,360	1,151	990	413	522	4,436
2] Markets Moved	1,345	1,142	990	376	557	4,410
3] 50% to Italy	1,314	1,165	990	381	520	4,370
4] Pas de Calais	2,146	1,409	911	184	601	5,251
5] Felixstowe	1,744	1,202	911	596	499	4,952
6] Rotterdam	1,732	1,097	911	237	632	4,609

Table VI. Sensitivity analysis of the results in 1990.

d) Fixed rate ton*km 1 ton*km = f0.375	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware-housing	Handling in / out	TOTALS
1] Current Situation	1,360	1,151	660	413	522	4,136
2] Markets Moved	1,307	1,142	660	376	557	4,042
3] 50% to Italy	1,117	1,165	660	381	520	3,843
4] Pas de Calais	1,505	1,409	607	184	601	4,306
5] Felixstowe	1,633	1,202	607	596	499	4,537
6] Rotterdam	1,769	1,097	607	237	632	4,342

Table VII. Sensitivity analysis of the results in 1990.

e) Containers to Italy 100%	Transport outgoing	Transport incoming	Interest Stk + Tr	Ware-housing	Handling in / out	TOTALS
1] Current Situation	1,360	1,151	660	413	522	4,106
2] Markets Moved	1,345	1,142	660	376	557	4,080
3] 100% to Italy	1,276	1,187	660	385	484	3,992
4] Pas de Calais	2,146	1,409	607	184	601	4,947
5] Felixstowe	1,744	1,202	607	596	499	4,648
6] Rotterdam	1,732	1,097	607	237	632	4,305



Appendix XXVIII : Distances to the various markets together.

TRANSPORT OUTGOING, IN KILOMETRES

DISTRIBUTION QUANTITIES TO:	FREQ. NUMBER	1 CURRENT SITTN.	2 MARKETS MOVED + 3	4 PAS DE CALAIS	5 FELIX-STOWE	6 ROTTER DAM
AUSTRIA (Linz)	1	1,044	1,044	1,300	1,500	1,044
BELGIUM (Brussel)	1	200	200	213	300	200
DENMARK (K'hagen)	1	1,044	726	1,100	1,150	726
ENGLAND (London)	1	100	100	130	100	494
FINLAND (H'sinki)	1	2,150	1,772	2,150	2,150	1,772
FRANCE (Paris)	1	415	480	250	350	480
HOLLAND (Breda)	1	100	100	264	300	100
IRELAND (Dublin)	1	540	540	670	540	1,034
ISRAEL	1	6,364	6,364	6,000	6,200	6,364
ITALY (Milano)	1	1,260	1,260	1,534	1,734	1,260
NORWAY (Oslo)	1	1,620	1,374	1,700	1,620	1,374
P'TUGAL (Lisboa)	1	2,240	2,320	2,170	2,240	2,320
SPAIN (B'lona)	1	1,500	1,550	1,300	1,500	1,550
SWEDEN (Malmo)	1	1,150	826	1,150	1,150	826
TOTAL :		19,727	18,656	19,931	20,834	19,544

TRANSPORT OUTGOING, IN KILOMETRES \* FREQUENCIES

DISTRIBUTION QUANTITIES TO:	FREQ. NUMBER	1 CURRENT SITTN.	2 MARKETS MOVED + 3	4 PAS DE CALAIS	5 FELIX-STOWE	6 ROTTER DAM
AUSTRIA	52	54,288	54,288	67,600	78,000	54,288
BELGIUM	130	26,000	26,000	27,690	39,000	26,000
DENMARK	130	135,720	94,380	143,000	149,500	94,380
ENGLAND	255	25,500	25,500	33,150	25,500	125,970
FINLAND	24	51,600	42,528	51,600	51,600	42,528
FRANCE	130	53,950	62,400	32,500	45,500	62,400
HOLLAND	255	25,500	25,500	67,320	76,500	25,500
IRELAND	36	19,440	19,440	24,120	19,440	37,224
ISRAEL	24	152,736	152,736	144,000	148,800	152,736
ITALY	130	163,800	163,800	199,420	225,420	163,800
NORWAY	24	38,880	32,976	40,800	38,880	32,976
PORTUGAL	12	26,880	27,840	26,040	26,880	27,840
SPAIN	24	36,000	37,200	31,200	36,000	37,200
SWEDEN	52	59,800	42,952	59,800	59,800	42,952
TOTAL :		870,094	807,540	948,240	1,020,820	925,794

UK IMPORTANCE %

3 \*

3 \*

3 \*

2 \*

14

Appendix XXIX : A questionnaire, supplier choice criteria.

QUESTIONNAIRE INVESTIGATION SUPPLIER CHOICE CRITERIA.

You are one of Bensons customers, try to think from the customers point of view.

1a. Which criteria are important for you to take a certain brand in your assortment ?

	unim- portant	not very important	more or less im- portant	consider- able im- portant	very im- portant
<b>PRICE ASPECTS</b> * bruto margin * price * quantumprices					
<b>IMAGE</b> * knownness					
<b>DISTRIBUTION</b> * supply from stock * delivery speed * delivery in time * delivery according to the order * no damage delivery * information					
<b>PAYMENT CONDITIONS</b> * credit facilities					
<b>SALES SUPPORT</b> * promotion material * sales material (displays) * advise * customer service					
<b>PRODUCT CHARACTERISTICS</b> * quality * completeness product range					
Supplier is just an agent					

Different, namely

- \* .....
- \* .....
- \* .....
- \* .....

1b. Can you point out the three most important criteria ?

2a. Which aspects of delivery of the product are involved ?

Aspects of delivery	unim- portant	not very important	more or less im- portant	consider- able im- portant	very im- portant
<ul style="list-style-type: none"> <li>* from stock</li> <li>* delivery complete according to order</li> <li>* delivery speed</li> <li>* last minute deliveries</li> <li>* delivery in time</li> <li>* information for special requests</li> <li>* information about stock and sales</li> <li>* few damages</li> <li>* after sales service (replacement)</li> <li>* suppliers reachability</li> <li>* personal contact</li> <li>* different, namely</li> <li>.....</li> <li>.....</li> <li>.....</li> </ul>					

2b. Which aspects are according to you, the most important ones ?

3. How does your supplier (Bensons International Systems Ltd.) match these criteria ?

	very bad	bad	reasonable	good	very good
<b>PRICE ASPECTS</b> * bruto margin * price * quantumprices					
<b>IMAGE</b> * knownness					
<b>DISTRIBUTION</b> * supply from stock * delivery speed * delivery in time * delivery according to the order * no damage delivery * information					
<b>PAYMENT CONDITIONS</b> * credit facilities					
<b>SALES SUPPORT</b> * promotion material * sales material (displays) * advise * customer service					
<b>PRODUCT CHARACTERISTICS</b> * quality * completeness product range					

4. How does, according to your opinion, the most important competitor of Bensons International Systems Ltd. match these criteria ?

	very bad	bad	reason-able	good	very good
<b>PRICE ASPECTS</b> * bruto margin * price * quantumprices					
<b>IMAGE</b> * knownness					
<b>DISTRIBUTION</b> * supply from stock * delivery speed * delivery in time * delivery according to the order * no damage delivery * information					
<b>PAYMENT CONDITIONS</b> * credit facilities					
<b>SALES SUPPORT</b> * promotion material * sales material (displays) * advise * customer service					
<b>PRODUCT CHARACTERISTICS</b> * quality * completeness product range					

5. If your supplier can't make the delivery, what do you in general do ?

- \* maintain the order and wait for new stock 1
- \* the same brand, but another type of mechanism 2
- \* another brand, but the same type of mechanism 3
- \* the order goes to another supplier 4
- \* no order whatever 5
- \* different, namely .....

6a. Does it happen that for this product last minute orders are asked for ?

6b. Within how many hours / days has this order to be delivered ?

7a. Within what period after the order release, has a supplier to make the delivery ?

- \* within 24 hours 1
- \* within 2 days 2
- \* within 5 days 3
- \* within 2 weeks 4
- \* within 4 weeks 5
- \* more than 4 weeks 6

7b. Within what period, according to your opinion, should the supplier make its deliveries to supply your customers in time ?

8. Which developments do you see in the market, concerning the distribution-technical aspects ? For instance :

- \* big suppliers are going to use more locations
- \* manufacturers are going to supply more direct to the customer
- \* more wholesalers will come up
- \* more manufacturers will open own distribution centra

9. What does Europe 1992 mean for you ?  
For instance :
- \* competition will be tougher
  - \* because import is easier and quicker, you are going to buy more in foreign countries
  - \* the wholesalers will get difficult times
10. What will get, from a logistic point of view, more important for a competitors position ?
- \* faster deliveries
  - \* bigger assortment
11. What is different in the logistic area, between Bensons and other suppliers ? What do you prefer ?
12. What will happen in the future with the order-processing ?  
For instance :
- \* price listings on floppy
  - \* catalogue on floppy
  - \* telecommunication with supplier, electronic ordering
  - \* electronic connection with suppliers stock system
  - \* more goods will be collected from the warehouse
  - \* orders will be smaller and more frequent
13. What do you think about our catalogue concerning the lay-out, size, tekst, pictures.

Thank you for your co-operation,

Paul Burgers