EXAMINER'S REPORT

MAY 2004

LOGISTICS MANAGEMENT

General Comments

This year the results were a bit worse than usual, with one third getting "F". Like last year there were two "As". As in recent years, the case and the theory were done well while the quantitative questions were not done as well, and generally differentiated between success and failure. Once again I will focus on these aspects in this report.

The quantitative sections contain relatively predictable applications that follow set rules. Generally Section C has a question on Inventory and Section D a question on linear programming. Most people did these questions. So I will focus on them.

The way this course and exam is structured requires one to first explore the theory, then the techniques and finally how to apply the ideas in practice. This follows a learning cycle. Ideally people should look at the cases early on to get an idea of the types of problems that occur. These are mixtures of marketing, logistics, mathematics and strategy. Subsequently one should get into the theory, but not spend the year learning it off. Students generally have a clear understanding of what is in the text and some practical illustrations from outside, including from Irish applications. The middle part of the year should be spent on the quantitative techniques, hopefully linking them into the cases and the theory, and anecdotes about Irish companies where possible.

Some people got through by getting full marks for one of the quantitative questions and getting by on the others. People who failed invariably did one or two sections poorly and were not able to compensate from another section. It is safer to prepare all the sections. Many passed because they attempted a question in all four sections.

The case questions are designed to bring one through a process of analysis, evaluation, diagnosis and prognosis. Most people tried all parts of the case section, and attempted all the sections. Consequently there were fewer than ever failures due to an unbalanced answer to the case, or due to reiterating information from the case. In the past poorly structured answers to the case were a common mistake. One of the problems with the case seems to be that it was done last, which is justifiable, but without being given enough time. It does account for 40%, i.e. it is equivalent to two of the other questions. It should be understood that Logistics is important not just of itself but also because it requires one to put on one's quantitative thinking cap when addressing marketing problems. Some people did no quantitative evaluation in the case, which was regrettable. Generally most people seemed to have been well prepared for the case.

QUANTITATIVE QUESTIONS

Firstly, before I get into specifics, I would like to emphasise that there is no need to do rough work and then write your answer out neatly. It wastes your precious time. Do the question as best you can. If you think you are making a mistake say so, and try to correct the mistake. If you blank out, just leave two pages so that you can move onto other questions. Maybe later you will be able to do the rest of that question. Do not waste your time doing restarts.

The idea of having two different quantitative sections is to separate the less standard from the standard, the unstructured from the straightforward application of algorithms.

Section C contained question on **stock (inventory) control**. This is a long section in the text and likely to occur every year. Most people got the economic order quantity of 155 units.

Generally the key to my seeing if inventory is understood is to put in something unusual and to require a calculation of total costs. Keeping one's head is critical. People are used to annual inventory costs. The figures given were daily costs. Some people converted the figures into an annual basis. Both methods are correct. The most common error was to mix up the two approaches.

Total costs	= ½ Q C_h + D/Q + demand D by purchase cost					
For the EOQ case	= ½ by 155 by €0.2 + 6/155 by €400 + 6 by €40 (daily)					
	=	€15.5 +	€15.5 +	€240	=	€271 (daily)
Multiplied by 365	=	€5,658 +	€5,657 +	€87,600	=	€98,915 (annually)

For the 500 or more cases many calculated for 499 and 501. This was not necessary.

For the 500 case	= ½ by 500 by €0.2 + 6/500 by €400 + 6 by €32 (daily)					
	=	€50 +	€4.8 +	€192	=	€246.8 (daily)
Multiplied by 365	=	€18,250 +	€1,752 +	€70,080	=	€90,082 (annually)

So, it was better to make orders of 500 cases.

Section C also contained a **formulation** question.
The key to this is the starting point. You must take an immensly practical point of view and say "what do we need to know here?". In this case it is the following: "I have six different four hour time periods in the 24-hour day. How many people do I need for each period?"
The trick is that people work eight hours. So, in any period I will have some people starting off and others half-way through their shift.

I should define my variables as X_1 = the number of people starting at midnight, X_2 the number starting at 4 a.m. etc. Then the four hour time period from 4 a.m. is covered by both these groups. So $X_1 + X_2 \leq 7$, etc.

There was a clue in the question: "if they start at midnight, 4.00 a.m. or 8.00 p.m. they will get paid 30% over the normal rate".

This meant that one minimised 1.3 by X_1 + 1.3 by X_2 + X_3 + X_4 + X_5 + 1.3 by X_6

SECTION D: STANDARD QUANTITATIVE QUESTIONS

The **transport** question is an example of a standard application of an algorithm which people did reasonably well, but could have done better.

The other such question in Section D was a standard application of **graphical linear programming** with an extra (unusual) constraint.

This also seems to have not been well prepared generally. It is not a simple method; one must develop an understanding of the technique. But, if one does, it gives a great way to visualise resource limitations in management. The basics are straightforward.

1. Develop the constraints.
2. Draw the graph.
3. Find the corners most likely to be best.
4. Put these into the objective function to get the best one.

Generally this was not done well, even though it is fairly routine work.

The main constraint used 18 sales minutes for each EasyCard phone and 30 minutes for each Day Mainly phone and had a limit of 60 hours over the planning period. This gives:

$$18\,E + 30\,D \leq 3600 \text{ or } 3\,E + 5\,D \leq 600$$

The biggest problem was not converting the hours to minutes.
There were constraints requiring one to sell at least 50 of each type of phone.
The other kind of problem was including these as “at most” or “less than or equal to”.

The added constraint of selling at least as many DayMainly as EasyCard phones becomes:

$$D \leq E \text{ or } D - E \leq 0$$

Care should be taken to determine whether this means that the upper or lower part of the feasible region is to be used. Few appeared to get this aspect.