

# CHALMERS

## Exam of Management of Physical Distribution, TEK620

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Date: 9 June 2020

Time: 09:00-13:00

Location:

Credits: 6 main questions with a total of 63 points.

Examiner: Dan Andersson 031 772 1339

All the answers should be in English

Read each question carefully before answering

All your answers should contain references showing what your answer is based on

You are not allowed to collaborate with anyone else

- You should write and submit your answer in a text document, i.e. Word.
  - Create one text document for each of the six exam questions.
  - Name your text document Question\_YY. *Example:* Question\_01.doc
  - Submit your answers by uploading the text documents (with your name at the top of each document) via Canvas before the due time.
- Exam problem solutions involving calculations, figures, diagrams etc. could be included in the word document or written by hand on paper as in a normal exam, in the latter case follow these instructions.
  - Make sure that each paper is clearly marked with your name, exam question number and page number.
  - Scan or photograph your solutions.
  - Name your image files Question\_YY\_Page\_XX. *Example:* Question\_01\_Page\_02.jpg.
  - If you want, you can combine images for the same problem into a single document (e.g. Word) named Question\_YY.
  - Submit your solutions by uploading the image files or documents via Canvas before the due time.

### Question 1 Purchasing of distribution services

8 points

- a) You have been asked by the managing director of the company BG (see below) to help their transport manager to prepare a purchase of physical distribution services for their European operations. You are supposed to explain to him the most important parts of the preparation for this purchase and if there are different approaches you should explain which is most suitable in this specific case (or if several are possible). NB This is not about selecting the future provider, BG has already contracted a consultant to help them with this, your help is only needed for the preparations. (4p)
- b) There are two fundamentally opposing views on contracts when buying logistics services. One view is that lack of contract is as a strength the other view is that contracts are essential for the success of the purchase of logistics services. Use the company BG to discuss these two perspectives and give a recommendation regarding what they should do (4p)

#### Case description

The manufacturing company Bengtsson and Gustafsson (BG) has decided to start a procurement process for their European distribution system. It was more than five years since they actually made a formal tendering process. The last years they have instead had a discussion with the current providers and just prolonged the old contract since they believed everything was just fine. However, some people argue that the cost of distribution has increased lately, but it is more or less impossible to analyse this and there are different opinions about this. Both the persons handling the purchasing process before are now retired and no one in the company has any knowledge about how to prepare this kind of purchasing (the old material has been saved in a centralised file storage system, but the files are corrupt and there are no back-ups.).

The company is distributing their products to a large number of customers in Europe. Currently BG is using many different service providers for their distribution operations. The transport providers taking care of transports from their production units in Sweden (they have several) to terminals in countries in different parts of Europe are shown. In addition, there are currently also transports from these nodes to the final destinations as well as other distribution services performed by other firms. Since both the supply units and the customers are working in a very tight schedule and has limitations regarding the number of gates for loading/unloading they are trying to get as narrow time windows as possible and have been taking direct contacts with the hauliers regarding this.

The company use a large number of service providers used for the main transport from the production units to distribution centres/warehouses of major customers in different European countries. These companies are providing the company BG several different services, but BG do also want to add new ones. The following services are currently supplied by their service providers: freight forwarding; international freight transport; express- and airfreight forwarding; standard warehouse services. BG also wants to add kitting and assembly services of some new products that they have not produced before.

### Question 2 Pricing

9 points

- a) The haulier, X-Transport AB provides distribution services in southern Sweden. The company expect that the demand for its service will increase next year and they will then not have sufficient capacity to handle the demand. The question is if they should make an investment to increase the capacity. The current utilization of the company's capacity is 65% and this is equivalent to 40 000 shipments annually. The average price of a shipment is 1 000 SEK and this price generates an annual profit of 800 000 SEK. The marginal cost for a shipment is 200 SEK. It is assumed that the current demand can be depicted as a linear demand (DA) curve, where the demand stops if the price reaches 2000 SEK per shipment. Based on a market survey the company has managed to get some basic facts about the future demand curve. Based on the market study the demand for XTAB's services is expected to increase to 68 000 shipments annually if the price is not changed. The new estimated linear demand curve (DB) shows that the demand is 1 000 shipments per year if the price reaches 2200 SEK per shipment. The expected increase in demand leads to a need for an increased capacity and the company assumes that it is better to make a substantial investment at once since the demand is believed to continue to increase. The fixed cost for the capacity increase is estimated to 20 million SEK annually and the marginal cost is assumed to be the same as for the original capacity.

Should the company make the investment or not? Explain this based on calculations and the assumptions made in the case? (5p)

- b) X-transport AB in the case above did initially not intend to change the price. But what are the arguments for changing or not changing the price in the situation they are in, both from a company and a society perspective (here you also could make assumptions about the market situation). (4p)

### Question 3 Urban freight

12 points

- a) Urban logistics/freight involves multiple stakeholders who need to be explicitly considered when implementing urban logistics initiatives and policies. Explain the primary objectives of the main stakeholder groups in urban logistics (i.e. state the objectives but also explain why these are important for a specific stakeholder). (4p)
- b) Explain how different types of urban consolidation centres may be used individually or in combination in a European city like Gothenburg. You should also explain what effects this use of urban consolidation centres may result in when used in the city centre of the city you have used as an example (4p)
- c) Explain what the public sector can do to improve the performance of urban freight in a city. Select the most promising initiatives and explain how these will benefit different stakeholders in a European city like Gothenburg. However, you should not include different ways to promote consolidation or off hour deliveries (4p)

### Question 4 Evaluation of distribution systems and its cost 11 points

- a) Explain good and structured approach to evaluate the load factor (fill rate/load capacity utilisation) for two different types of companies, a food distributor and a food manufacturer. (4p)
- b) What are the challenges when evaluating the total performance of an entire distribution system. (3p)
- c) What different types of economies may influence the cost of the services performed by the haulier X-transport described above, and how can you determine whether or not some of them exist in this case? (4p)

### Question 5 Distribution structures and Division of roles 12 points

- a) The company Gamma (see case description below) is considering a centralisation of their European distribution system for products sold to manufacturing companies. However, they are not sure about what the effects of this might result in since when they started to prepare and read about centralisation they found statements that contradicted each other's. Some stated that the cost will increase others that the cost will decrease. Explain what types of cost changes they might expect and why (and related to the different types of theories and assumptions this is based on). Your answer should not only focus on the total cost but also be explicit about the different types of cost elements (but not consider environmental cost). (4p)
- b) The CEO of Gamma attended a conference where he realised that if they were going to centralise their European distribution system they should also consider outsourcing their distribution system. Explain from a theoretical as well as practical perspective why this might be a good idea for the company, i.e. what are the main driving forces for outsourcing. 4p
- c) If you specifically apply an environmental perspective what advice would you offer Gamma regarding a total redesign of their physical distribution system? (4p)

## Case description

Gamma is currently trying to solve a number of problems related to its physical distribution. Most of the perceived problems are related to the overall organisation of the logistics: e.g. no organisation taking the overall responsibility from supply units to final delivery, it is perceived to be too many hand-overs from the manufacturing units to the customers warehouse, and a lack of information, at the same time as there are duplication of resources etc. But they company also suffers from an extreme expansion, both in terms of sales volumes and new markets they enter.

The distribution costs for Gamma is dominated by warehouse and inventory costs and the transportation costs is a smaller share (but contains an increasing cost for express transport). This is a result of high product values, many SKUs (more than 10 000) excessive stock levels combined with frequent stock outs and high demands for short lead times. In most of the cases a customer order will consist of rather few order lines. It is clear that duplication of resources with a number of different distribution units working in parallel has resulted in difficulties to reduce cost.

The lead times are varying within each business unit as well as between business units and the delivery precision does also vary much between different countries. The requirements on the distribution system will increase in the future as the customer demands will increase. There will also be higher demands on delivery precision.

### Question 6 Information systems

11 points

- a) What type of Transport Management System (TMS) you would recommend to company Gamma (described in question 5 above) and discuss the implications of using this TMS regarding benefits and disadvantages? (5p)
- b) Explain the main benefits the companies Gamma and X-transport, respectively would get from Smart Transportation Management (STM), and especially in what way the environmental impact and management of disruptions in operational transport planning will be influenced (6p)