

Wednesday 26<sup>th</sup> April 2023 9.00 to 12:10

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## **Paper 2**

*Answer not more than **four** questions.*

*Answer each question in a separate booklet.*

*All questions carry the same number of marks.*

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your candidate number not your name on the cover sheet of each booklet.*

## **STATIONERY REQUIREMENTS**

8 page answer booklet x 4

Rough work pad

## **SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM**

CUED approved calculator allowed

Engineering data books

**10 minutes reading time is allowed for this paper at the start of the exam.**

**You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.**

**You may not remove any stationery from the Examination Room.**

**Question 1**

(a) A major European supermarket has recently been facing rising supply chain costs. Analysis of supply chain data revealed that orders to suppliers (e.g., wholesaler to distributor, and distributor to manufacturer) tend to have a larger variability than sales to buyers, resulting in an amplified demand variability upstream.

(i) Explain three possible causes of such dynamics in supply chains.

[15%]

(ii) Discuss possible strategies that the company can use to reduce the impact of such supply chain dynamics on operations.

[25%]

(b) An engineering firm manufactures security equipment for airports. Some of their critical components and raw materials are procured from suppliers based in Russia and Ukraine. The firm is currently facing supply chain disruptions and incurring losses. In this context:

(i) Explain the terms *event*, *vulnerability*, *risk*, and *resilience*.

[20%]

(ii) Explain how you would develop an end-to-end supply chain risk management approach for the firm.

[40%]

## Question 2

(a) For some manufacturers, the increased emphasis on environmental performance can be viewed as a positive opportunity. Options revolve around the following categories of *circular economy service business models*: 1) product-oriented, 2) user-oriented, 3) results-oriented and 4) end of life.

(i) Describe the circular economy service business models within each of these categories.

[20%]

(ii) Using specific examples, discuss how they enable improvement in sustainability.

[40%]

(b) Vitsoe is a small sized manufacturer of long-lasting furniture. Reducing environmental impact is central to the ethos of this company. Rather than buying complete new products, over time customers can reconfigure, adapt and repair modular products with Vitsoe accessories/parts. Customers therefore do not often buy new versions of complete furniture, so sales are potentially reduced. However, the company strategy is aimed at increasing customer loyalty and word-of-mouth marketing. In this context:

(i) Describe, and illustrate with examples, what forms of sustainable value – economic, environmental and social – are created and delivered by Vitsoe.

[30%]

(ii) Explain the key factors that have enabled Vitsoe to develop and sustain its unique business model.

[10%]

**Question 3**

- (a) Explain why managing change in a large, long-established organisations is so difficult, and what can be done to increase the likelihood of success.

[25%]

- (b) You and your best friend are CEO and CTO respectively of a start-up company that applies machine learning to predict supply chain risks for manufacturing firms. You have received your initial investment of £500k from a Venture Capital (VC) fund for an initial deployment of the technology. You are talking to the VC fund about raising an additional £5 million to grow the business substantially and rapidly in response to high market demand. However, the CTO is more comfortable keeping the business relatively small and wants you to take a more cautious approach to developing the business. Discuss the people management issues that you, as CEO, would be most concerned about in these circumstances within the context of the potential rapid expansion of the business.

[40%]

- (c) *“Partnerships are enshrined in contracts, but require people to negotiate, agree and deliver them. People are idiosyncratic, so relationships take time to build and depend upon trust.”*

Discuss, using examples, the challenges of forming and managing partnerships in conditions of rapid change within the context of the above statement.

[35%]

#### Question 4

Ryanair Group, an Irish low-cost commercial airline, was founded in 1984. As a result of the deregulation of the aviation industry in Europe in 1997 and the success of its low-cost business model, the airline is known for its success and rapid expansion. In 2010, the company transported 66.5 million passengers. By 2020, the number increased to 148.6 million passengers, yielding a turnover of €8,495 million. Ryanair's route network currently serves 40 countries, most of which are in Europe. It currently operates more than 400 Boeing 737-800 aircrafts, with a single 737-700 used as a charter aircraft, as a backup. In this context:

- (a) Discuss Ryanair's *market life cycle*, providing strategic considerations and comparisons with other companies to illustrate your points. State any assumptions clearly.

[50%]

- (b) Ryanair's low-cost business model is strategically supported by streamlined operations and *performance measures*.

- (i) Explain the four perspectives of the *Balanced Scorecard* and discuss how each perspective contributes to achieving Ryanair's strategic objectives.

[40%]

(TURNOVER

(ii) Classify the following measures using the four perspectives of the *Balanced Scorecard*. If you think that some of the measures fit in more than one perspective, explain the logic for their multiple fit.

- Employee satisfaction
- Quarterly sales growth
- Operational cash flow
- Net Profit Margin
- Crew retention
- On-time maintenance delivery
- Percentage of sales per new product
- Percentage of customers who are “very” or “extremely” satisfied
- Number of flights departed on time
- Sales turnover or sales revenue
- Inventory turnover
- % of flights departed late due to lack of pilots
- Number of new vs. repeat website visits
- % of market share
- Cycle time variation
- Number of months to develop new generations of products
- % of employees fully trained
- Number of faults measured per unit per flight
- Customer retention rate
- Number of new product-service introductions per year
- % of net profit invested on service development
- EBITDA (Earnings Before Interest, Taxes, Depreciation, & Amortization)

[10%]

**Question 5**

You have been appointed as *Open Innovation* manager at BigPlayer plc., a large consumers good company, operating internationally. The mission of the company is to “improve the lives of customers now and in the future, caring for the health of the environment”. In your role, you are supporting the *New Product Introduction (NPI)* process for two different categories of products (homecare and healthcare). The company aims to innovate in at least 50% of their products and your job is to provide access to technologies which help the company fulfil its mission, grow their market and reduce production costs by 2035.

(a) Making assumptions whenever needed based on the above scenario and by building on your understanding of *Open Innovation* and of the *New Product Introduction* processes in large multinational companies, discuss how you would expect the company to be organised to innovate and explain what your role will be within it.

[40%]

(b) Based on your answer in part (a) and on your understanding of the *Technology Management* processes, explain how you plan to carry out *Open Innovation* activities to:

(i) *identify* new technologies and opportunities for the two categories of products mentioned above;

[20%]

(ii) *select* the most promising technologies;

[20%]

(iii) *acquire* the selected technologies.

[20%]

For each, justify and give appropriate illustrative examples of the methods you would like to implement, explaining the practical initiatives you would introduce.

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**Question 6**

The UK imports nearly 100% of all smartphones. In line with its net-zero target, BT (British Telecom plc.) has recognized this as a business opportunity. BT decided to develop an innovative smartphone that can be manufactured in the UK with much lower emissions. You have been appointed as the Chief Sustainability Innovation Officer (CSIO) in charge of the “smartphone of the future” project. Your aim is to maximise eco-efficiency.

(a) Using examples, explain how you could adopt two eco-efficiency principles each when designing the following:

(i) the smartphone;

[20%]

(ii) the factory to produce it.

[20%]

(b) As the price of Lithium - an essential material for smartphone batteries - has been soaring, you have searched for alternatives. You identified a university spin-out that has developed and patented a sodium-based alternative including a manufacturing process that allows for cost-efficient battery production at scale.

Discuss the advantages and disadvantages of the following three *technology acquisition* routes. Explain which one you would prefer and why. State any assumptions clearly.

- Purchasing the company;
- Acquiring a license with 4-years, worldwide exclusivity;
- Acquiring a non-exclusive license.

[60%]

**END OF PAPER**