



STRATHMORE BUSINESS SCHOOL
BACHELOR OF SCIENCE IN SUPPLY CHAIN AND OPERATIONS MANAGEMENT
END OF SEMESTER EXAMINATION
BSC 4106: SUPPLY CHAIN INTELLIGENCE AND DATA ANALYTICS

DATE: Wed, 31st July 2024

TIME: 10:30 – 12:30

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One

(30 marks)

- a) Read the case below and answer the questions that follow.

A Specialty Steel Bar Company Uses Analytics to Determine Available-to-Promise Dates

A company that does not wish to disclose its name (or even its precise industry) was facing a major problem of making decisions on which inventory of raw materials to use to satisfy which customers. This company supplies custom configured steel bars to its customers. These bars may be cut into specific shapes or sizes and may have unique material and finishing requirements. The company procures raw materials from around the world and stores them in its warehouse.

When a prospective customer calls the company to request a quote for the specialty bars meeting specific material requirements (composition, origin of the metal, quality, shapes, sizes, etc.), the salesperson usually has just a little bit of time to submit such a quote including the date when the product can be delivered and, of course, prices, and so on. It must make available-to-promise (ATP) decisions, which determine in real time the dates when the salesperson can promise delivery of products that customers requested during the quotation stage. Previously, a salesperson had to make such decisions by analyzing reports on available inventory of raw materials. Some of the available raw material may have already been committed to another customer's order. Thus, the inventory in stock might not really be inventory available. On the other hand, there may be raw material that is expected to be delivered in the near future that could also be used for satisfying the order from this prospective customer. Finally, there might even be an opportunity to charge a premium for a new order by repurposing previously committed inventory to satisfy this new order while delaying an already committed order. Of course, such decisions should be based on the cost-benefit analyses of delaying a previous order. The system should thus be able to pull real-

time data about inventory, committed orders, incoming raw material, production constraints, and so on.

To support these ATP decisions, a real-time DSS was developed to find an optimal assignment of the available inventory and to support additional what-if analysis. The DSS uses a suite of mixed-integer programming models that are solved using commercial software. The company has incorporated the DSS into its enterprise resource planning system to seamlessly facilitate its use of business analytics.

Required:

- i). Explain how the integer programming models may have been used to facilitate decision-making for the specialty steel bar company. **(5 marks)**
 - ii). Explain any other **two** applications that could be derived from data analytics for the specialty steel bar company in the supply chain management function. **(3 marks)**
- b) Explain the **four** major components of a Business Intelligence (BI) system? **(5 marks)**
- c) Distinguish between categorical and nominal data using a simple example. **(2 marks)**
- d) DHL is a global delivery company (competing with FedEx and UPS). It has a supply chain division that works with many business partners. AI, IoT and machine learning are changing the manner by which the company, its partners, and even its competitors operate. Eventually most of these are facilitating supply chain intelligence through data analytics.

Required:

- Explain any **three** ways that the AI, IoT and machine learning may separately or in combination facilitate supply chain intelligence or performance. **(9 marks)**
- e) Explain the meaning and application of the following in supply chain intelligence and data analytics.
- i). Information dashboards **(3 marks)**
 - ii). Visual analytics **(3 marks)**

Question Two (15 marks)

- a) Business applications can be programmed to act on what real-time BI systems discover. Describe **two** approaches to the implementation of real-time BI. **(4 marks)**
- b) Explain any **three** fundamental characteristics of data warehousing. **(5 marks)**
- c) Data Warehousing entails usually several stages. Describe the **four** major components of the data warehousing process. **(6 marks)**

Question Three (15 marks)

- a) The Web is one of the richest sources of data and if used effectively can make an organization succeed in achieving its strategic objectives for the supply chain.

Required:

- Explain **three** ways that the web may be a source of supply chain intelligence considering the application of data mining. **(6 marks)**
- b) Explain **four** reasons that the Web poses great challenges for effective and efficient knowledge discovery through data mining for supply chain intelligence. **(6 marks)**
- c) Distinguish between sentiment analytics and text analytics **(3 marks)**

Question Four **(15 marks)**

Retail value chains are quite complex especially when there are widespread stores and locations. These therefore require a lot of support in the highly competitive environment to ensure the supply and value chains are efficient and where appropriate responsive. Organisations in this sector have identified several possible analytics applications.

Required:

Using a retail chain as an example explain any **five** analytics applications in the retail value chain. Ensure you explain how analytics contributes to the overall organisation success. **(15 marks)**

Question Five **(15 marks)**

- a) Emerging trends in data analytics require developments in the management and storage of data. Some recent technologies and developments have been touted to be influential in the future of data warehousing.

Required

- Explain any **three** of the recently popularized concepts and technologies that may play a significant role in defining the future of data warehousing. **(6 marks)**
- b) In predictive analytics many models are used. Using a simple example, explain the use of linear programming in analytics. **(3 marks)**
- c) Decision making in practice often entails quite complex scenarios which pose some challenges when utilizing linear programming.

Required:

- Explain how linear programming models may be vulnerable when used in complex situations. **(3 marks)**
- d) Explain any two examples where a sensitivity analysis may be used in data analytics. **(3 marks)**