20260226 ISM-Qualification Exam

資訊管理資格考：答案卷範本（深度分析版）

題目：運用數據驅動之決策支援系統 (DSS) 優化企業庫存管理與採購決策之分析

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1. 業務問題描述及其影響 **(Business Problem and Its Impact)**

在現代全球供應鏈環境下，潤滑油品代理貿易商（如經銷 Shell, Mobil, Total 等國際品牌）面臨著高度動態且複雜的庫存管理挑戰。根據實務觀察，企業普遍存在「庫存雙重矛盾」：

1. 熱銷品缺貨成本（**Stockout Costs**）：由於缺乏精準的需求預測機制，A 類熱銷產品在高峰期頻繁缺貨。這不僅造成直接的銷售損失（Lost Sales），更會因無法滿足合約需求而導致客戶忠誠度流失，產生高昂的機會成本。
2. 呆滯存貨堆積（**Slow-moving Inventory**）：經營一段時間後，倉庫中充斥著大量 C 類冷門產品。這些呆滯物料（Dead Stock）長期積壓不僅耗費倉儲租金與保險成本，更嚴重的是造成企業現金流（Cash Flow）的凍結，降低資本周轉率。

業務影響與決策瓶頸：傳統採購依賴管理者的直覺或啟發式法（Heuristics），在面臨多樣化的 VN 分類（如精品、賣場專用、重車用油等）時，人為決策極易受「近期偏誤（Recency Bias）」影響。當外部環境（如市場景氣、國際油價）波動時，缺乏數據支撐的採購決定將使企業陷入經營危機。

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2. 資訊系統類型與選用理由 **(System Selection and Justification)**

為解決上述問題，本方案建議導入結合 商業智慧 **(BI)** 邏輯的「智慧化決策支援系統 **(Decision Support System, DSS)**」。

- 選用理由：採購與庫存控制屬於「半結構化決策問題（Semi-structured Problem）」。結構化部分（如庫存水位、銷售加權統計）可交由 PHP 程式自動運算；而非結構化部分（如貨源是否充足、政策變動）則保留給管理員進行最後審核。
- 系統特性：系統具備「模型管理（Model Base）」能力，能根據銷售變動動態調整 ABC 分類，避免傳統 ERP 固定參數導致的僵化管理。

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3. 系統架構、數據需求與整合挑戰 **(Architecture, Data, and Integration)**

3.1 系統架構圖 **(System Architecture Diagram)**

本系統透過四層架構實現從數據到決策的轉換：

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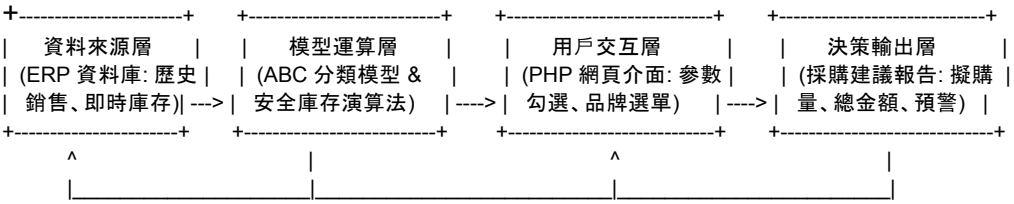

3.2 進階：ERP 整合的技術細節 (Technical Details of ERP Integration)

要實現高效的 DSS，系統與底層 ERP 的深度整合是成敗關鍵。技術層面需關注以下細節：

1. 異質資料庫連結：DSS 採用 PHP 開發，需透過 ODBC 或 API 串接後端大型 ERP 資料庫（如 SQL Server 或 Oracle）。在 SQL 查詢中，必須精確處理 VN（產品分類）與品牌代碼的關聯，確保數據過濾的準確率。
2. 數據同步策略（**ETL**）：考慮到系統效能，不宜直接在生產資料庫進行複雜的統計分析。應設計 ETL（擷取、轉換、載入）流程，於離峰時間將歷史銷售明細同步至數據中台，並進行「數據清洗」，剔除掉異常促銷導致的銷售離群值。
3. 併發控制與即時性：在「擬購量」計算時，必須考慮「在途庫存（On-order Inventory）」與「已預配庫存」。整合介面需具備即時鎖定機制，避免多名採購員重複下單。

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4. 核心理論補充：ABC 分類法的學術定義與應用

ABC 分類法（**ABC Analysis**）係基於「柏拉圖原則（Pareto Principle）」，即「80/20 法則」在存貨管理上的應用。其學術核心定義如下：

- **A** 類貨品（**Vital Few**）：數量佔總品項約 10%~20%，但其年度銷售貢獻（或資金占用）高達 70%~80%。
  - 管理策略：需實施「嚴格控制」，進行精確的需求預測，維持低水位但高頻率的採購，確保不缺貨。
- **B** 類貨品（**Moderate Middle**）：數量與價值各佔約 30%。
  - 管理策略：實施「正常控制」，採定期訂購制，設定合理安全庫存。
- **C** 類貨品（**Trivial Many**）：數量佔 50% 以上，但價值僅佔 5%~10%。
  - 管理策略：實施「簡化控制」，可採用大批量採購或僅在接單時補貨，以降低訂購成本與管理心力。

動態調整機制：本系統之卓越處在於「動態性」。如「aboutDSS.pdf」所述，系統允許設定 6, 9, 12 個月的銷售加權，能自動偵測產品生命周期的轉變（例如某產品從 A 類降至 B 類），並自動調降安全庫存參數，預防呆滯產生。

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5. 預期成效、利益與潛在風險 (Outcomes, Benefits, and Risks)

5.1 預期利益與成功評估框架

本系統預期達成資金占用降低 20% 以及訂單滿足率提升至 98% 的目標。

> 理論引用：根據 **DeLone & McLean** 的資訊系統成功模型 **(IS Success Model)**，本 DSS 的最終效益取決於：
>
> - 系統品質：PHP 介面的穩定性與模型計算的反應速度。
> - 資訊品質：ERP 產出數據的精確性、完整性與即時性。當兩者兼備，才能提升使用者的「使用意願」與「滿意度」，進而創造個人及組織的淨效益。

5.2 潛在風險

- 黑天鵝效應：歷史數據無法預測如新冠疫情導致的供應鏈中斷。
- 技術債與維護：PHP 系統與 ERP 版本升級後的相容性挑戰。

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6. 倫理、組織與策略思考 **(Ethical, Organizational, and Strategic)**

1. 組織轉型與人才重塑：導入 DSS 意味著採購職能從「勞動力」轉向「判斷力」。組織需培訓員工解讀數據的能力，而非僅是操作介面。
2. 演算法倫理與透明度：ABC 分類的標準（如設定 6 個月還是 12 個月）影響供應商的獲利。決策過程必須具備透明度，避免因演算法黑箱造成不公平的供應商評選。
3. 策略韌性：在地緣政治不穩定的今日，這套系統不僅是優化庫存的工具，更是企業建立「韌性供應鏈」的基石。透過精確的數據分析，企業能更靈活地在品牌間調撥資源，達成永續經營。

Qualification Exam: Information Systems Strategy

Topic: *Leveraging a Data-Driven Decision Support System (DSS) to Optimize Inventory Management and Procurement Strategy: A Critical Analysis*

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1. Business Problem and Its Impact

In the modern global supply chain environment, lubricant trading organizations (distributing international brands such as Shell, Mobil, and Total) face highly dynamic and complex inventory challenges. Based on empirical observations, firms often suffer from the "Inventory Paradox":

1. **Stockout Costs of High-Demand Items:** Without a precise demand forecasting mechanism, Category A (fast-moving) products frequently run out during peak periods. This results in not only lost sales but also long-term erosion of customer loyalty and high opportunity costs due to the inability to fulfill service-level agreements.
2. **Accumulation of Slow-moving Inventory (Dead Stock):** Over time, warehouses become cluttered with Category C (low-demand) items. The capital tied up in these stagnant assets freezes cash flow, increases warehousing overhead/insurance, and significantly reduces the total asset turnover ratio.

Decision Bottlenecks: Traditional procurement relies heavily on human heuristics. When dealing with diverse classifications (e.g., premium, mass-market, or heavy-duty oils), manual decisions are prone to "Recency Bias." Without data-driven support, organizations struggle to adapt to external market fluctuations or supply disruptions.

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2. System Selection and Justification

To address these issues, I propose a **Decision Support System (DSS)** integrated with **Business Intelligence (BI)** logic.

- **Justification:** Inventory control is a "Semi-structured Problem." The structured elements (e.g., stock levels, weighted sales statistics) are handled by algorithmic computations, while the unstructured elements (e.g., market sentiment, geopolitical supply risks) are reserved for human expert review.
- **System Characteristics:** Unlike rigid ERP modules, this DSS features a "Model Management" component that dynamically adjusts ABC classifications based on shifting sales patterns, ensuring agile inventory parameters.

3. System Architecture and ERP Integration

3.1 System Architecture Diagram

The system transforms raw data into strategic decisions through a four-tier architecture:

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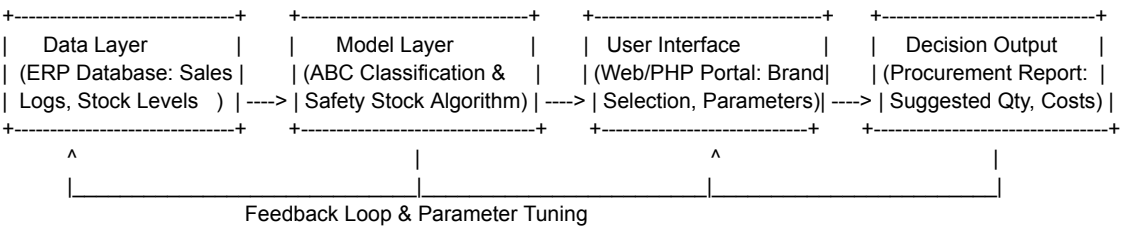

3.2 Technical Details of ERP Integration

The seamless integration between the DSS and the underlying ERP system is critical for success:

1. **Heterogeneous Database Connectivity:** Developed in PHP, the DSS connects to the ERP backend (e.g., SQL Server or Oracle) via APIs or ODBC. SQL queries must precisely map brand codes and "VN" categories to ensure data filtering accuracy.
2. **ETL (Extract, Transform, Load) Strategy:** To maintain system performance, complex analytics are not performed on the live production database. An ETL process synchronizes data to a staging area during off-peak hours, where "Data Cleansing" is performed to remove outliers caused by one-time promotions.
3. **Concurrency and Real-time Integrity:** The model must account for "On-order Inventory" and "Allocated Stock." The integration layer requires real-time locking mechanisms to prevent duplicate ordering by different procurement officers.

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4. Theoretical Framework: ABC Analysis

ABC Analysis is an application of the **Pareto Principle (80/20 Rule)** in inventory management. Its academic definition is as follows:

- **Category A (Vital Few):** Represents ~10-20% of items but accounts for 70-80% of annual consumption value. *Strategy:* Strict control, high-frequency replenishment, and precise forecasting.
- **Category B (Moderate Middle):** Represents ~30% of items and value. *Strategy:* Normal control with periodic reviews.
- **Category C (Trivial Many):** Represents >50% of items but only 5-10% of value. *Strategy:* Simplified control, bulk ordering, or "make-to-order" to minimize administrative costs.

Dynamic Adjustment: The strength of this DSS lies in its temporal flexibility. By analyzing sales over 6, 9, or 12-month windows, the system automatically detects product lifecycle shifts (e.g., an item dropping from A to B), triggering an immediate reduction in safety stock parameters to prevent obsolescence.

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5. Outcomes and Key Success Factors

5.1 The DeLone & McLean IS Success Model

The expected benefits include a 20% reduction in capital tied in inventory and a 98% fulfillment rate.

> **Critical Reflection:** According to the **DeLone & McLean IS Success Model**, the impact of this DSS is a function of:
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> - **System Quality:** The stability of the PHP interface and the computational efficiency of the models.
> - **Information Quality:** The accuracy, completeness, and timeliness of the ERP-sourced data. Higher quality in these dimensions leads to increased "User Satisfaction," which ultimately drives "Net Benefits" for the organization.

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6. Strategic and Ethical Considerations

1. **Organizational Transformation:** Implementing a DSS shifts the procurement role from "Labor-intensive" to "Judgment-intensive." The organization must focus on upskilling employees to interpret data rather than just executing transactions.
2. **Algorithmic Transparency and Ethics:** The criteria for ABC classification impact supplier livelihoods. The logic must be transparent to avoid "Black-box Bias" that might unfairly disadvantage certain brands or vendors.

3. **Strategic Resilience:** In an era of geopolitical uncertainty, this system is a cornerstone of "Supply Chain Resilience." It allows the firm to pivot resources between brands based on data, ensuring long-term sustainability.
