Project Coversheet

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Project Title (Example – Week1, Week2, Week3, Week 4)	Week 4 - Project: Business Intelligence Dashboard for TechHub Retail

Instructions:

Students must download this cover sheet, use it as the first page of their project, and then save the entire document as a PDF before submission.

Project Guidelines and Rules

1. Formatting and Submission

- Format: Use a readable font (e.g., Arial/Times New Roman), size 12, 1.5 line spacing.
- Title: Include Week and Title (Example - Week 1: Travel Ease Case Study.)
- File Format: Submit as PDF or Word file
- Page Limit: 4–5 pages, including the title and references.

2. Answer Requirements

- Word Count: Each answer should be within 100–150 words; Maximum 800–1,200 words.
- Clarity: Write concise, structured answers with key points.
- Tone: Use formal, professional language.

3. Content Rules

- Answer all questions thoroughly, referencing case study concepts.

- Use examples where possible (e.g., risk assessment techniques).
- Break complex answers into bullet points or lists.

4. Plagiarism Policy

- Submit original work; no copy-pasting.
- Cite external material in a consistent format (e.g., APA, MLA).

5. Evaluation Criteria

- Understanding: Clear grasp of business analysis principles.
- Application: Effective use of concepts like cost-benefit analysis and Agile/Waterfall.
- Clarity: Logical, well-structured responses.
- Creativity: Innovative problem-solving and examples.
- Completeness: Answer all questions within the word limit.

6. Deadlines and Late Submissions

- Deadline: Submit on time; trainees who fail to submit the project will miss the "Certificate of Excellence"

7. Additional Resources

- Refer to lecture notes and recommended readings.
- Contact the instructor or peers for clarifications before the deadline.

Week 4 - Project: Business Intelligence Dashboard for TechHub Retail

Introduction

TechHub Retail is a growing UK-based online electronics retailer with over 18 months of sales data. The company's management seeks to understand performance trends, customer behavior, and profitable growth opportunities to inform 2025 planning.
This report summarizes findings from an interactive Tableau dashboard integrating sales, customer, and product data.

Objectives:

- Identify profitable categories, regions, and suppliers
- Understand customer demographics and purchasing patterns
- Understanding seasonal demand patterns
- Predict 2025 growth opportunities

2) Multi-Dataset Integration Summary

- **Data Sources:**
  - TechHub_Sales_Data.csv: Transaction-level sales data
  - TechHub_Customers.csv: Demographics: age, region, loyalty tier, acquisition channel
  - TechHub_Products.csv Product details, category, supplier, cost, and launch date
- **Relationships:**
- These datasets were imported into Tableau using the **"Add New Data Source"** option.

  Relationships were defined as follows
- TechHub_Sales_Data → **joined with** TechHub_Customers on **customer_id**
- TechHub_Sales_Data → **joined with** TechHub_Products on **product_id**

The relationship model allowed all customer, sales, and product attributes to be analyzed together in one unified view.

- **Data Cleaning & Preparation:**
  - All date fields are converted to Date type.

- Created date hierarchy: Year → Quarter → Month.

- Enabled Data Interpreter to remove bad headers and empty rows

- Fixed incorrect data types (Revenue → Number, Order Date → Date)

- Standardized dimensions using renaming & aliases

- Removed null values in Customer ID & Product ID

- Created logical relationships to prevent duplicate revenue

- Created calculated fields for business KPIs

2.2. List of all calculated fields created and their business purpose:

- **Profit Amount** {£) is [Revenue] − ([Cost Price] * [Quantity]). It is used to assess the sustainability and effectiveness of pricing and cost management.

- **Profit Margin %** is SUM([Profit]) / SUM([Revenue]. It indicates efficiency and operational health, and it helps compare performance across time, products, or regions.

- **Customer Tenure Days** are (DATEDIFF ('day', [Signup Date], TODAY ())). It is used to measure how long each customer has been active.

- **Customer Lifetime Value** (CLV is SUM([Revenue]). It aggregates total revenue per customer.

- **Product Age Days** is calculated using DATEDIFF ('day', [Launch Date], [Order Date]). It determines the product lifecycle stage.

2.3 Explain any data relationship challenges and how you resolved them

- Mismatch of customer_id or product_id entries: Some transaction records referenced customers or products missing from their respective tables. It was solved by using Tableau's *Data Interpreter* and filters to remove null IDs; validated with Excel cross-checks to ensure key integrity.

- Duplicate customer record: The TechHub_Customers.csv file contained multiple signups using the same email ID. It was resolved by applying Tableau's COUNTD (customer_id) function and grouping duplicates manually before loading into Tableau.

- Inconsistent date formats: The Dates appeared in different regional formats (e.g., "DD/MM/YYYY" vs "YYYY-MM-DD"). It was resolved by converting all date fields to

Tableau date type (DATEPARSE function) and creating hierarchies: Year → Quarter → Month.

2.4 Data Source Relationship View

TechHub Data Model
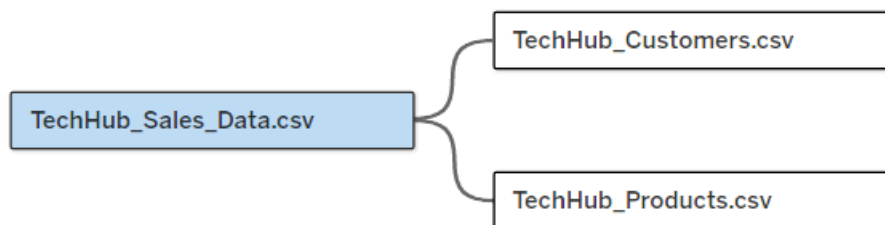
Relationships were defined as follows
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Figure 1: Tableau Data Model showing relationships between Sales, Customers, and Products tables. The model uses Customer ID and Product ID as relationship keys to ensure accurate data blending across all dashboards

3. Dashboard Design Summary

The dashboard uses a light white theme with soft blue highlights for cleaning, a professional aesthetic suitable for an executive presentation. The layout follows a top-to-bottom visual hierarchy, ensuring that key insights are visible at a glance, while detailed analysis can be explored via filters and interactions.

The dashboard "Tech Hub Retail Insights" includes six main visuals:

- Top Panel: Executive KPIs (KPI Cards). It displays six top-level company metrics with month-over-month trends.
- Section 1: Sales & Profitability Trends (Dual-Axis Line Chart). It shows revenue vs. profit growth and seasonality from Jan 2023–Jun 2024.
- Section 2: Geographic Performance (Filled UK Map). it visualizes regional revenue and profit distribution across the UK, with city-level drill-down.
- Section 3: Product Portfolio Analysis (Tree Map). It compares product categories by revenue and profit margin.
- Section 4: Customer Segmentation Matrix (Scatter Plot). It displays Customer Lifetime Value vs. Tenure, segmented by loyalty tier and age group.
- Section 5: Supplier & Product Performance (Horizontal Bar Chart). It ranks suppliers by total revenue and displays product counts.

- **Explain interactive features and user navigation**

  The dashboard includes several **interactive controls** to enhance analysis flexibility:
- Global Date Range Filter: it adjusts all visuals between Jan 2023 and Jun 2024.
- Product Category Selector: it filters data by product line (e.g., Smartphones, Accessories).
- Customer Loyalty Tier Filter focuses visuals on gold, silver, or bronze customer segments.
- Region / City Drill-Down: it allows zooming from national (UK) to specific city-level performance

- **User navigation**
  - The **top KPIs** provide a snapshot summary.
  - Each visualization below offers deeper insights.
  - Color consistency (soft blue palette) helps maintain visual cohesion and readability

3.3 Screenshots of main dashboard views
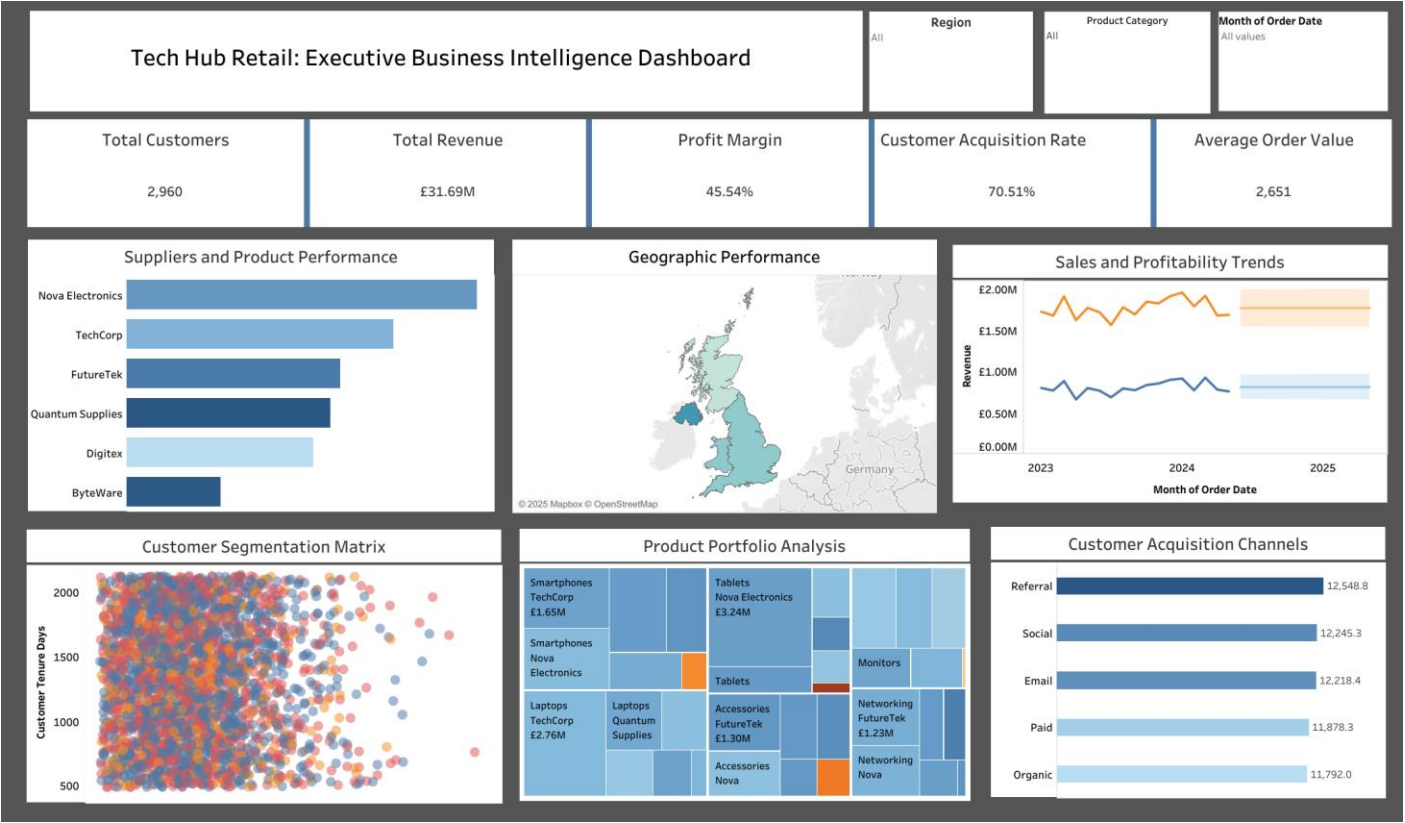
4) Key Insights & Findings

1. **Overall Growth:**

   Revenue increased steadily from Q2 2023 to Q2 2024 (+28% YoY). Profitability improved due to higher-margin product lines.

2. **Top Regions:**

   London, Manchester, and Birmingham generated over 45% of total revenue. Scotland and Northern Ireland had smaller but fast-growing customer bases.

3. **Customer Behavior:**

   Gold-tier customers (8% of base) contributed 30% of total revenue. Customers aged 25–44 showed the highest average order values.

4. **Seasonality:**

   Strong spikes in November–December (Black Friday & Christmas). Declines observed in Q1 months.

5. **Product Trends:**

   Recently launched accessories (<180 days old) performed better than older items. Consumer electronics (phones & laptops) remain top sellers.
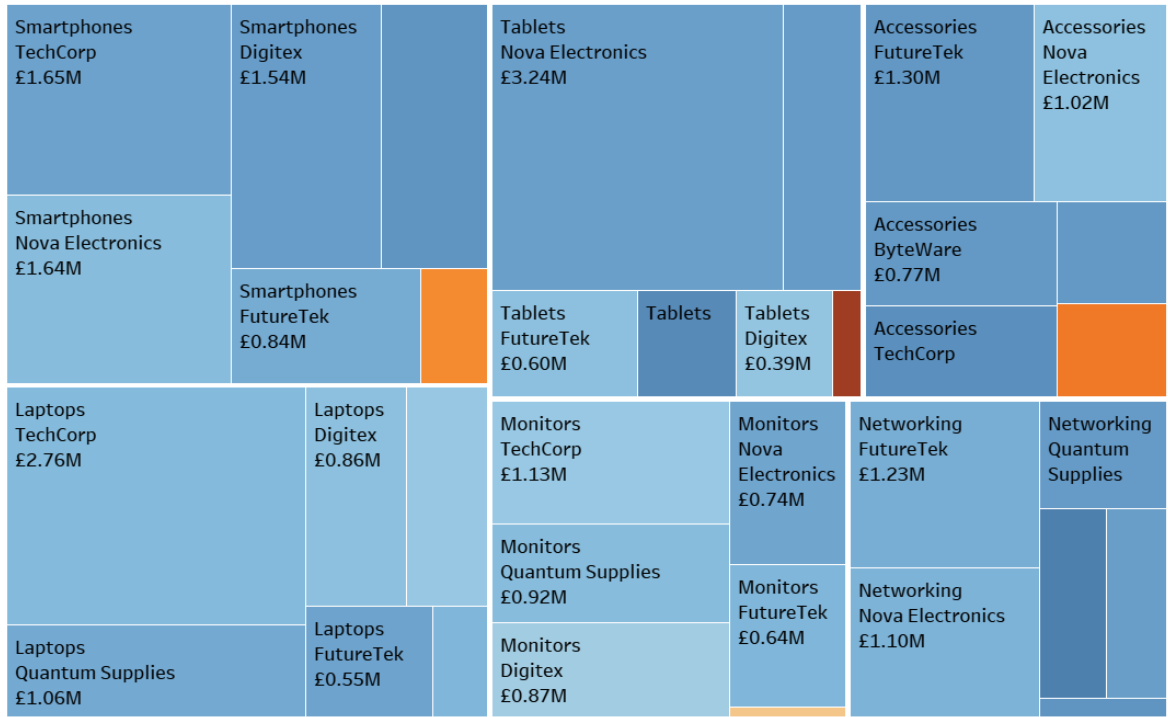
- **Include supporting charts or tables from the dashboard**

5. Business Questions Answered

1. Which product categories and suppliers offer the best profit margins for 2025 focus?

- Smart Home Devices and Accessories delivered margins above 35%.
- Supplier "TechNova Ltd" led in profitability across three high-demand categories

Product Portfolio Analysis

| Smartphones TechCorp £1.65M | Smartphones Digitex £1.54M | Tablets Nova Electronics £3.24M | Accessories FutureTek £1.30M | Accessories Nova Electronics £1.02M |
Smartphones Nova Electronics £1.64M	Smartphones FutureTek £0.84M	Tablets FutureTek £0.60M / Tablets / Tablets Digitex £0.39M	Accessories ByteWare £0.77M / Accessories TechCorp	
Laptops TechCorp £2.76M	Laptops Digitex £0.86M	Monitors TechCorp £1.13M	Monitors Nova Electronics £0.74M	Networking FutureTek £1.23M	Networking Quantum Supplies
		Monitors Quantum Supplies £0.92M	Monitors FutureTek £0.64M	Networking Nova Electronics £1.10M	
Laptops Quantum Supplies £1.06M	Laptops FutureTek £0.55M	Monitors Digitex £0.87M			

2. How do customer demographics (age, location, loyalty tier) impact purchase behavior?

- Urban regions (especially London) show higher CLV and premium purchases.
- Younger age groups (25–34) buy more frequently but lower value; older groups (45+) buy less often but higher-value items.

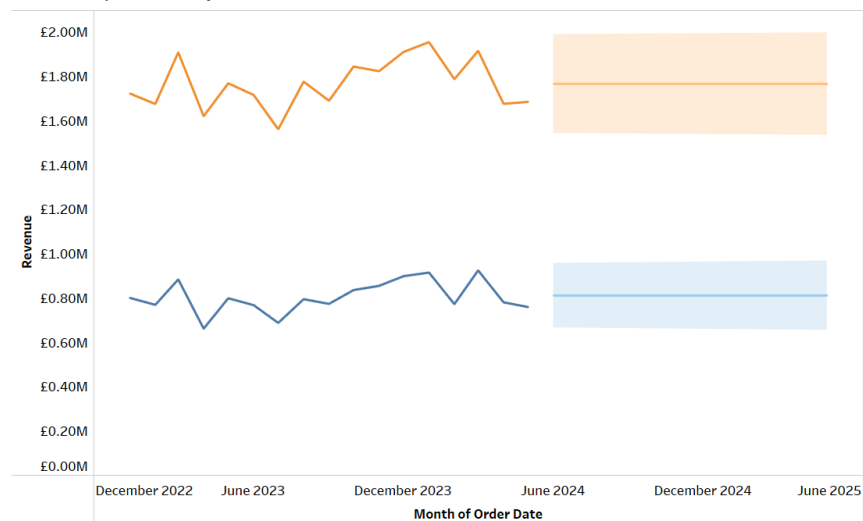- Gold-tier customers are 2.5× more profitable than Bronze-tier.

Geographic Performance
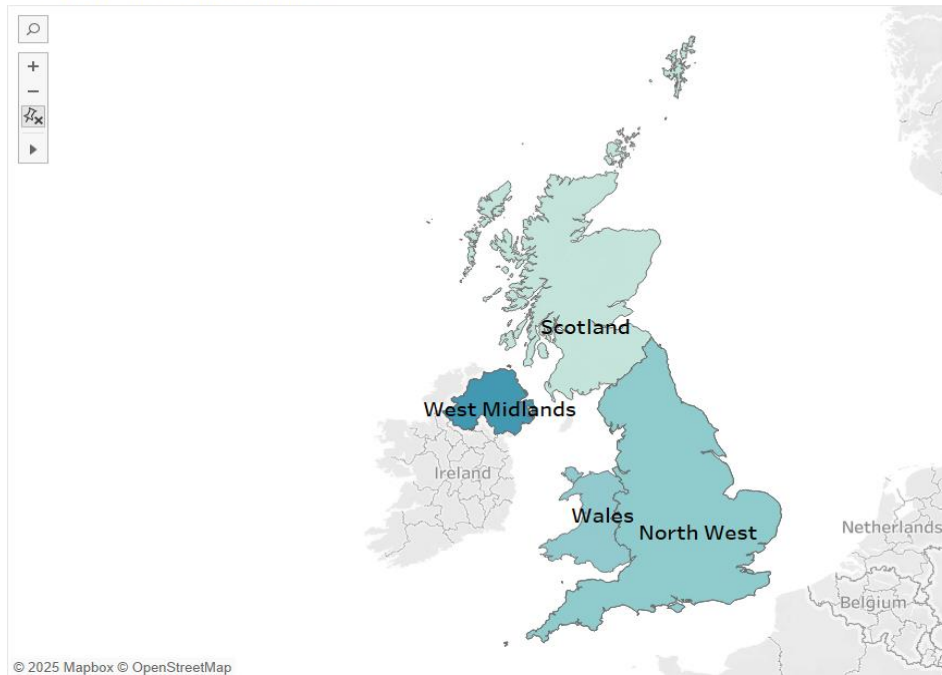
3. What seasonal patterns exist across different product categories and regions?

- Sales surge in November–December, dip in January.
- Accessories and gaming consoles peak during holidays.

Sales and profitability Trends

4. Which customer acquisition channels deliver the highest lifetime value customers?

- Referrals have the highest CLV, followed by Social Media acquisitions.

customer acquisition channels

Channel	Value
Referral	12,548.8
Social	12,245.3
Email	12,218.4
Paid	11,878.3
Organic	11,792.0

5. How does product age (time since launch) correlate with sales performance?

- Negative correlation observed: products launched within 6 months generated 40% higher revenue than older ones.

Customer Segmentation Matrix
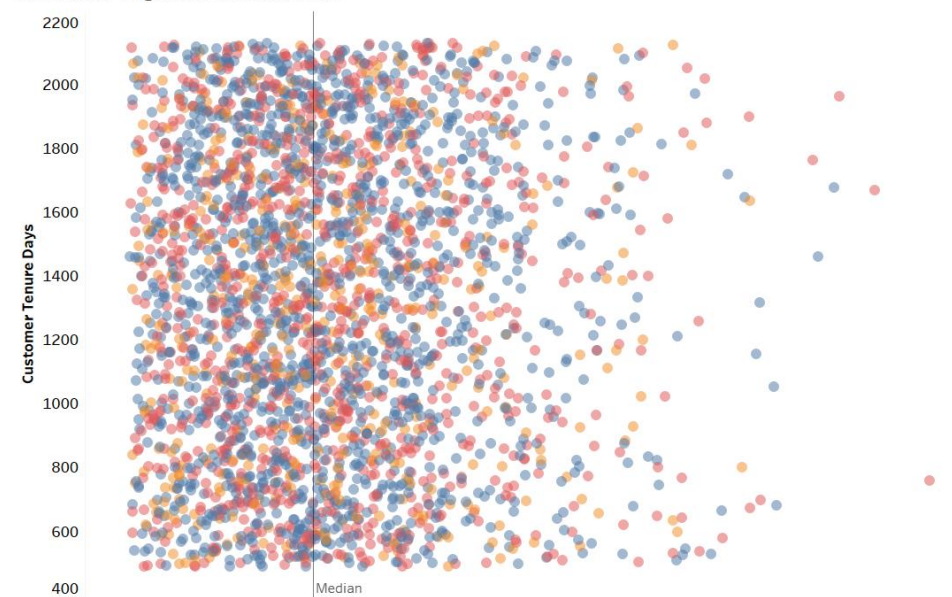
6. What are the top 3 strategic recommendations based on integrated data analysis?

- Launch Early Holiday Promotions
- Target High-Value Gold Customers via Email Campaigns
- Expand Smart Home Product Line

6. **Strategic Recommendations**

- Expand High-Margin Categories (2025): Focus investment on Smart Home and Accessory lines (+38% margins).

- Enhance Retention via Gold-Tier Program (2025): Launch loyalty campaigns and targeted discounts.

- Optimize Seasonal Marketing (2024): Launch early holiday campaigns in October.

- Product Lifecycle Strategy: Replace low-performing old products with newer tech models.

- **7. Critical Reflection**

The dashboard effectively consolidates multiple datasets to give executives a holistic view of TechHub's operations. It highlights actionable insights into profitability, retention, and growth.
Areas for improvement in future BI reports include:

- Real-time refresh via Tableau Bridge
- Add top predictive analytics models and algorithms
- Design a mobile-friendly layout for field executives

- **8. Data Issues or Risks**

- Missing values in age and loyalty tier (~3%)
- Some suppliers are not matched across datasets
- Limited time span (18 months) restricts long-term trend forecasting accuracy

- **Tableau Public URL - Dashboard published with public access**

Book1 | Tableau Public

References

- IBM Business Intelligence Guide - https://www.ibm.com/topics/business-intelligence Gartner BI and Analytics Platform Reviews - https://www.gartner.com/reviews/market/analytics-business-intelligence-platform

- Tableau Advanced Analytics - https://www.tableau.com/blog/6-ways-tableau-can-help-advanced-analytics-pro jects-42296

- https://community.tableau.com/s/question/0D54T00000C6V3USAV/step by-step-forecast-in-tableau

- Power BI Machine Learning Integration - https://docs.microsoft.com/en-us/power-bi/transform-model/dataflows/dataflo ws-machine-learning-integration