

Project Coversheet

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Date of Submission	2/08/2025
Project Week	Week 4

Project Guidelines and Rules

1. Submission Format

- **Document Style:**
 - Use a clean, readable font such as *Arial* or *Times New Roman*, size 12.
 - Set line spacing to **1.5** for readability.
- **File Naming:**
 - Use the following naming format:
Week X – [Project Title] – [Your Full Name Used During Registration]
Example: Week 1 – Customer Sign-Up Behaviour – Mark Robb
- **File Types:**
 - Submit your report as a **PDF**.
 - If your project includes code or analysis, attach the **.ipynb notebook** as well.

2. Writing Requirements

- Use formal, professional language.
- Structure your content using headings, bullet points, or numbered lists.

3. Content Expectations

- Answer **all** parts of each question or task.
- Reference tools, frameworks, or ideas covered in the programme and case studies.
- Support your points with practical or real-world examples where relevant.
- Go beyond surface-level responses. Analyse problems, evaluate solutions, and demonstrate depth of understanding.

4. Academic Integrity & Referencing

- All submissions must be your own. Plagiarism is strictly prohibited.
- If you refer to any external materials (e.g., articles, studies, books), cite them using a consistent referencing style such as APA or MLA.
- Include a references section at the end where necessary.

5. Evaluation Criteria

Your work will be evaluated on the following:

- Clarity: Are your answers well-organised and easy to understand?
- Completeness: Have you answered all parts of the task?
- Creativity: Have you demonstrated original thinking and thoughtful examples?
- Application: Have you effectively used programme concepts and tools?
- Professionalism: Is your presentation, language, and formatting appropriate?

6. Deadlines and Extensions

- Submit your work by the stated deadline.
- If you are unable to meet a deadline due to genuine circumstances (e.g., illness or emergency), request an extension **before the deadline** by emailing:
support@uptrail.co.uk

Include your full name, week number, and reason for extension.

7. Technical Support

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- If you face technical issues with submission or file access, contact our support team promptly at support@uptrail.co.uk.

8. Completion and Certification

- Certificate of Completion will be awarded to participants who submit at least two projects.
- Certificate of Excellence will be awarded to those who:
 - Submit all four weekly projects, and
 - Meet the required standard and quality in each.
- If any project does not meet expectations, you may be asked to revise and resubmit it before receiving your certificate.

YOU CAN START YOUR PROJECT FROM HERE

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Uptrail Internship Program Week 4 Project

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By Rory Scott

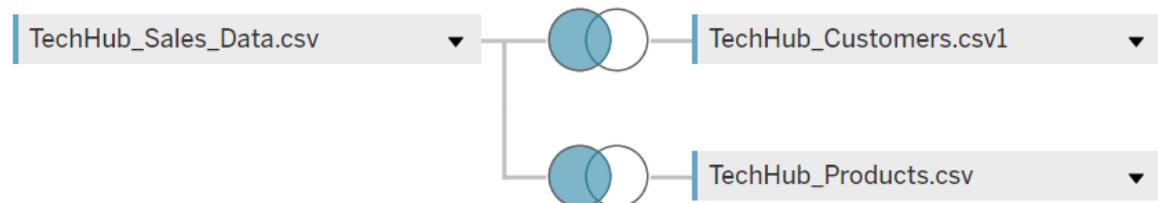
Introduction

Section 1: Multi-Dataset Integration Summary

❖ Part 1: Merging 3 Datasets

- 1st Join: Sales_data left-joined with Customers on Customer id. (Many-One Relationship)
- 2nd Join: Result – Left-joined with Products on Product id. (Many-One Relationship)

TechHub_Merged_Data.csv is made of 3 tables. ⓘ



TechHub_Merged_Data.csv ▾ 33 fields 12000 rows

❖ Part 2: Missing Values

All three datasets, Sales, Customers, and Products, show **0 null values** across all key fields, confirming the data is **complete and reliable** for analysis.

Sales Data Null Table

Null Check - Customer Acquisition channel	0
Null Check - Customer Id	0
Null Check - Product Id	0
Null Check - Region	0
Null Check - Product Category	0
Null Check - Order Date	0
Null Check - Quantity	0
Null Check - Revenue	0

Customers Data Null Table

Null Check - Age Group	0
Null Check - City	0
Null Check - Customer Id	0
Null Check - Signup Date	0
Null Check - Customer Type	0
Null Check - Gender	0
Null Check - Loyalty Tier	0

Product Data Null Table

Null Count - Cost Price	0
Null Count - Launch Date	0
Null Count - List Price	0
Null Count - Product Category	0
Null Count - Product Id	0
Null Count - Product Name	0
Null Count - Supplier	0

❖ Part 3: Date Formatting / Hierarchies

We created date hierarchies to enable flexible time-based analysis, such as drilling down from year to quarter, month, or day. This makes it easier to explore trends at different time granularities and improves the interactivity and usability of visualizations across the dashboard.

❖ Part 4: Data Validation

- No **null values** across Sales, Customer, and Product

- Ensuring **correct joins** (Sales left-joined with Customers and Products on unique IDs), final dataset has **33 fields** and **12000 rows**.
-
- Confirmed **data types** and value ranges were appropriate

Part 5: Calculated Fields

We create calculated fields in Tableau to derive new insights from existing data, enabling deeper analysis and more tailored visualizations. For example, "**Profit Margin %**" helps compare profitability across products, while "**Customer Lifetime Value**" estimates the total value a customer brings over time. These custom fields let us adapt raw data to specific business questions.

Section 2: Dashboard Design Summary

Introduction

This dashboard offers a high-level summary of TechHub's integrated sales, customer, and product data, combining KPIs, trends, and segment insights. It supports data-driven decisions by revealing key growth areas and performance opportunities across marketing, sales, and product strategy.

❖ Part 1: Navigation

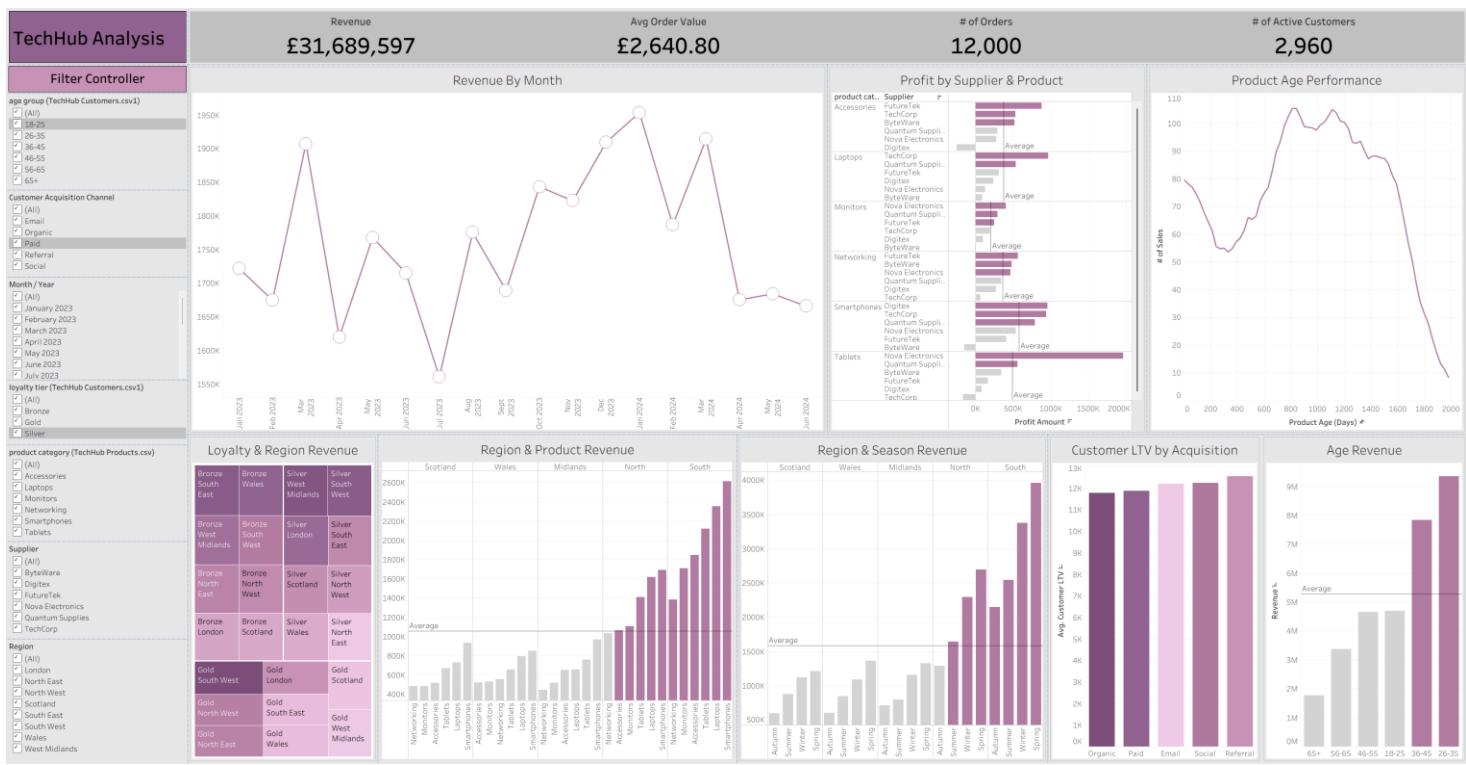
- **Interactive Filter Controller:** Users can dynamically filter visualisations by age group, acquisition channel, loyalty tier, product category, supplier, region, and month/year.
- **Customisable Data Views:** The multi-select filters allow users to isolate and compare specific segments for more tailored insights across customer behaviour, product performance, and regional trends.

The screenshot shows a vertical stack of filter sections within a purple header labeled 'TechHub Analysis' and a pink header labeled 'Filter Controller'.

- age group (TechHub Customers.csv1)**: A list of checkboxes for age groups. '18-25' is selected and highlighted in grey.
- Customer Acquisition Channel**: A list of checkboxes for acquisition channels. 'Paid' is selected and highlighted in grey.
- Month / Year**: A list of checkboxes for months from January 2023 to July 2023. 'July 2023' is selected and highlighted in grey.
- loyalty tier (TechHub Customers.csv1)**: A list of checkboxes for loyalty tiers. 'Silver' is selected and highlighted in grey.

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Part 2: Dashboard Design



Row 1:

- KPIs:** displayed at the top for quick performance scanning.

Row 2:

- Revenue by Month** line chart takes centre stage to show overall revenue performance over time.
- Profit by Supplier & Product** bar chart and **Product Age Performance** line chart show best forming products, from which suppliers, also how Product age significantly affects Revenue.

Row 3:

- Combines revenue breakdowns by loyalty & region, product & region, and seasonal patterns.

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- Includes specific insights like customer LTV by acquisition channel and revenue by age group.

Color & Layout:

- Consistent color scheme (purples and greys) improves readability and visual appeal.
- Clear use of spacing and alignment avoids clutter and enhances flow.

Section 3: Key Insights & Findings

1. Profitability Varies by Supplier and Product Category

Quantum Supplies and the Networking category consistently deliver the highest average profit margins, making them strategic priorities for 2025.

2. Younger Age Groups Drive Revenue

Customers aged 26–45 generate the highest revenue, indicating they should be the main focus for targeted marketing efforts.

3. Product Age Drives Lifecycle Trends

Sales peak between 900–1300 days after launch, confirming a clear lifecycle pattern that can guide inventory and promotional planning.

4. Regional and Seasonal Patterns Matter

The South region dominates in revenue, especially during Spring and Winter, highlighting strong seasonal and geographic trends.

5. Acquisition Channels and Loyalty Influence LTV

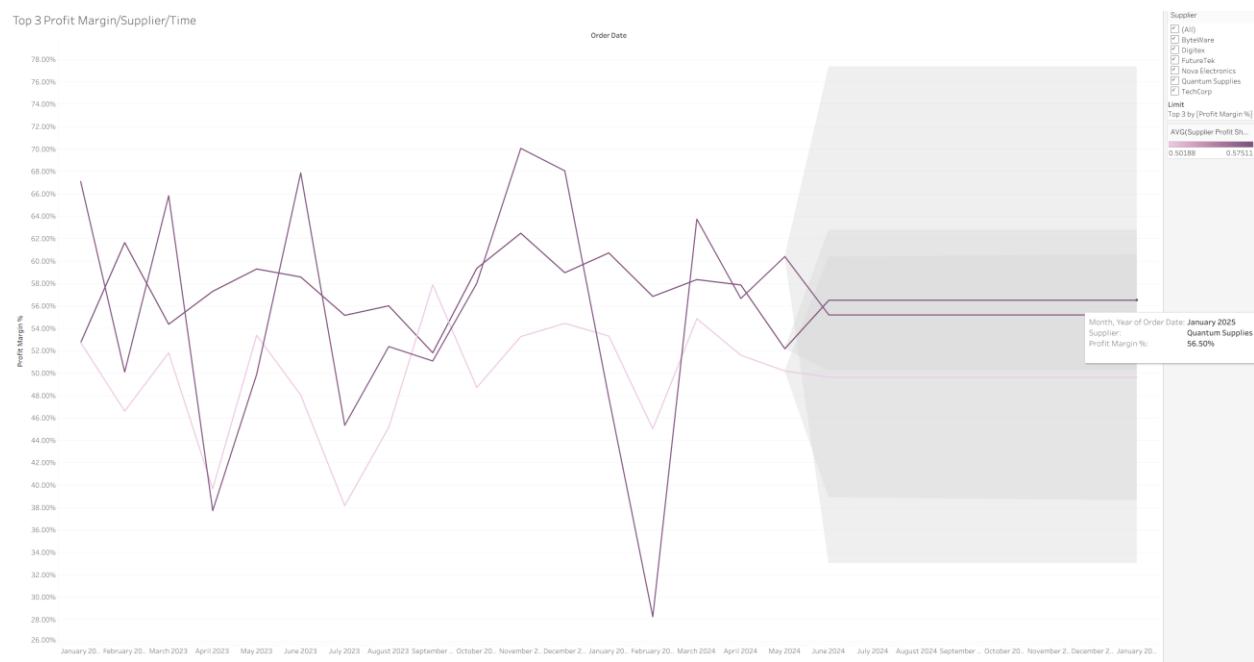
Referral customers offer the highest average LTV, while Organic acquisition brings the largest total value, supporting both quality and scale.

Section 4: Business Insights and Answers

❖ Question 1: Which product categories and suppliers offer the best profit margins for 2025 focus?

Graph 1: Top-Performing Suppliers (2025):

- **Quantum Supplies** stands out with the **highest average profit margin** in 2025 (~**56.50%**).
- **Biteware** shows a **recent spike in profit margin**, but due to a **downward trend over time**, its forecasted margin for 2025 is **lower than Quantum Supplies**.
- This highlights the importance of **sustained performance over time**, not just short-term peaks, when selecting suppliers for 2025 focus.

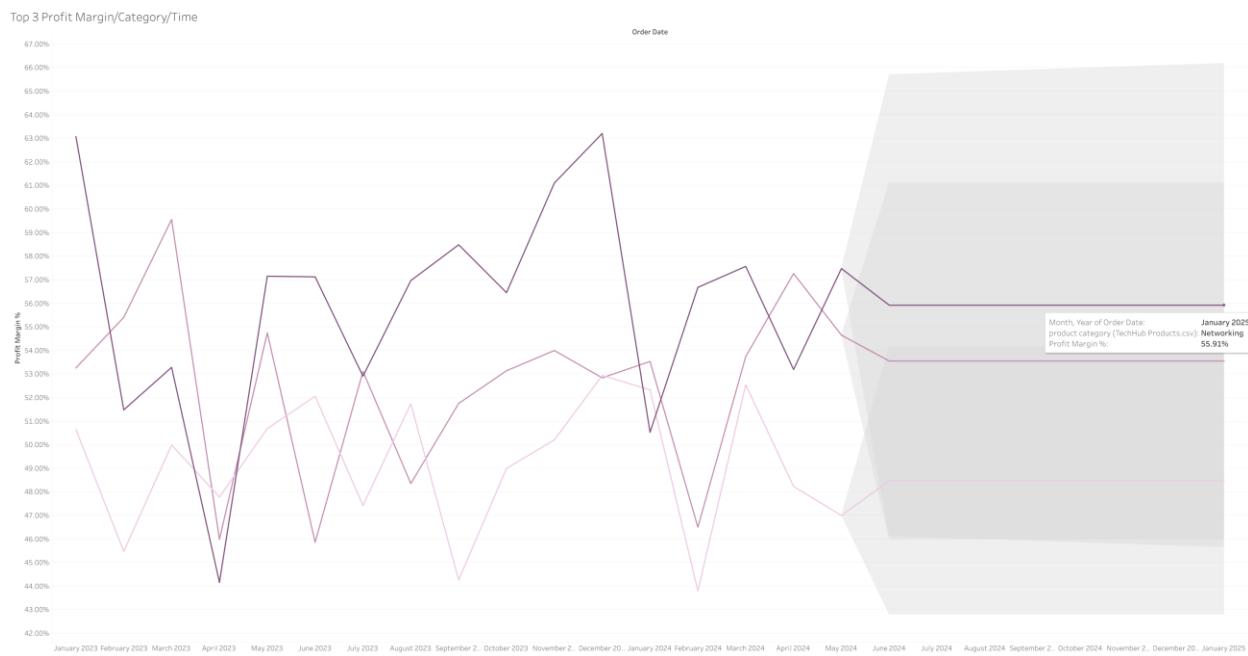


Graph 2: Top-Performing Product Categories (2025):

- **Networking** shows a strong average profit margin of approximately **55.91%** in 2025.

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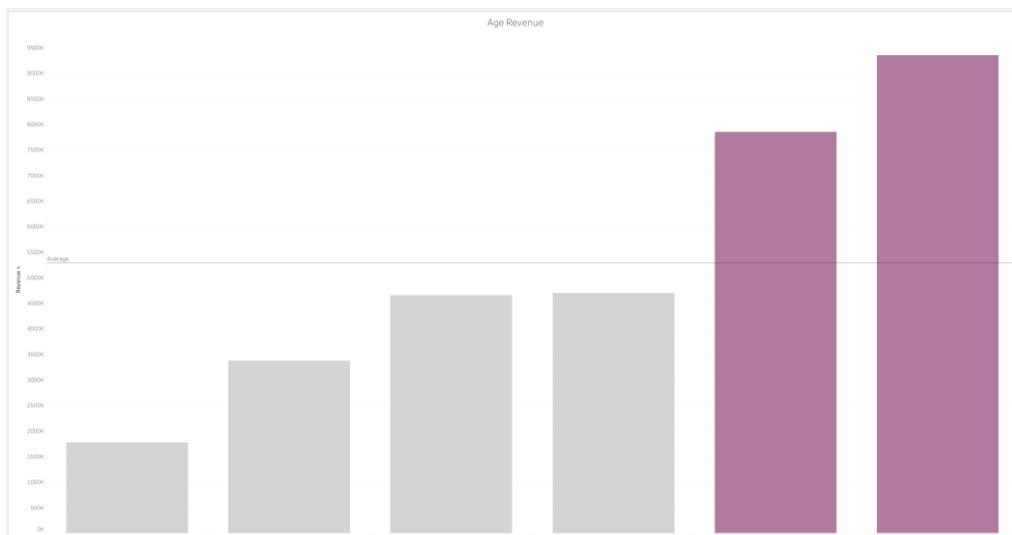
- The variance of the prediction relatively high, however does not drop below the next competitor - Tablets.



❖ Question 2: How do customer demographics (age, location, loyalty tier) impact purchasing behavior?

Graph 1: Revenue by Age Group

- Customers aged **26–45** generate the highest revenue, indicating strong purchasing power in this demographic.
- Older customers generate the least revenue, as shown in the graph below – the top 3 oldest groups, produce the least revenue. This guides marketing efforts towards, younger age groups to increase revenue.



Graph 2: Average Revenue Heatmap by Region/Loyalty

- Silver Tiered Customers from the Midlands, provide the highest average revenue per customer.** Across Bronze, Silver and Gold Tiers, the average revenue per customer is strongest in Regions – North, South and Midlands. Scotland and Wales, have lower average revenue per customer.

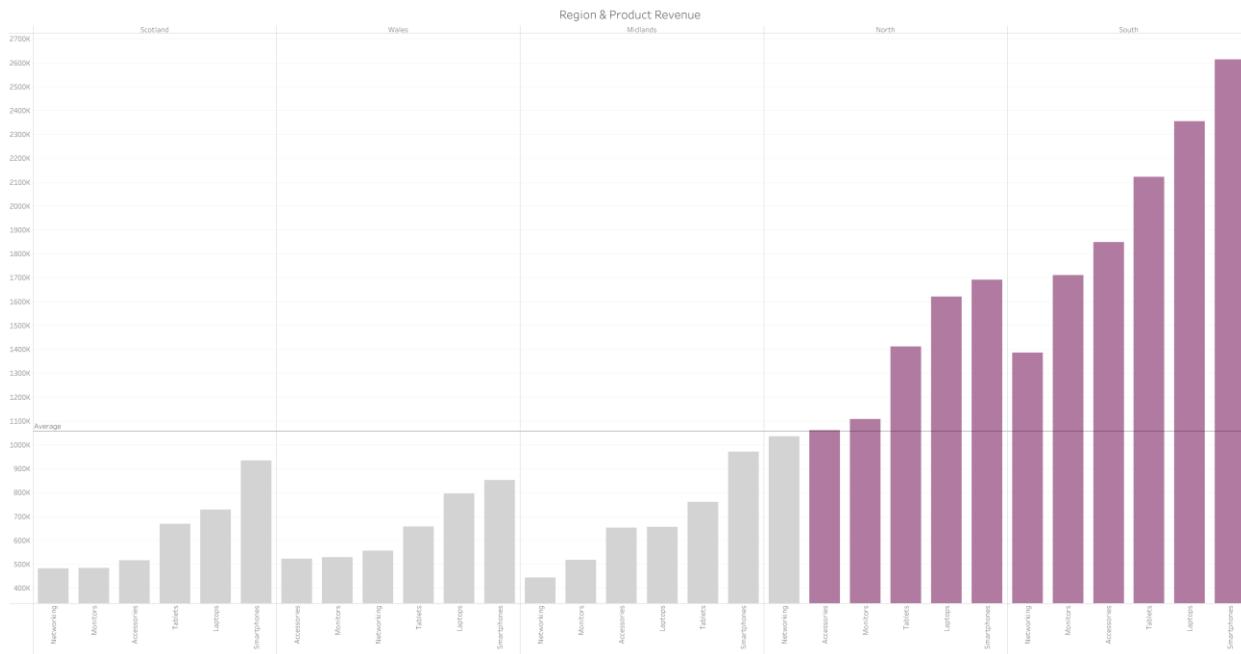


❖ Question 3: What seasonal patterns exist across different product categories and regions?

Graph 1: Region & Product Revenue

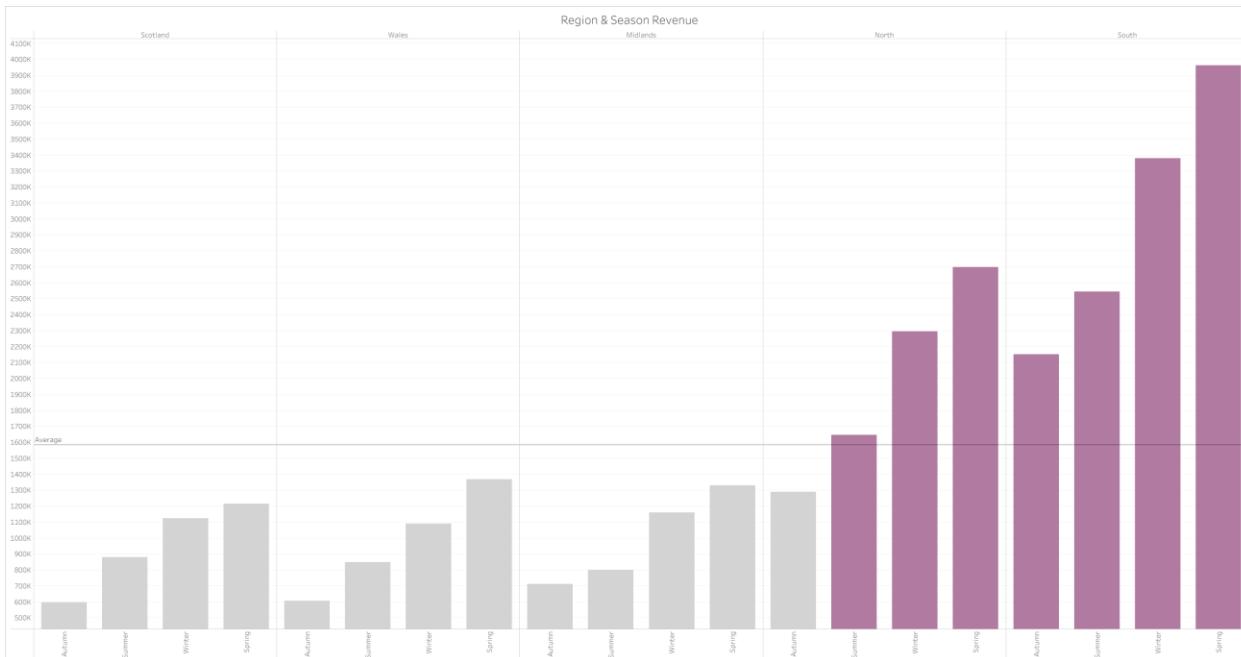
- South region consistently outperforms** all others across product categories, especially for **Smartphones and Laptops**, indicating a stronger seasonal demand or customer base throughout the year.
- Regions like **Scotland and Wales show lower, more stable sales across all products**, suggesting **less pronounced seasonal variation** and lower regional demand volatility.

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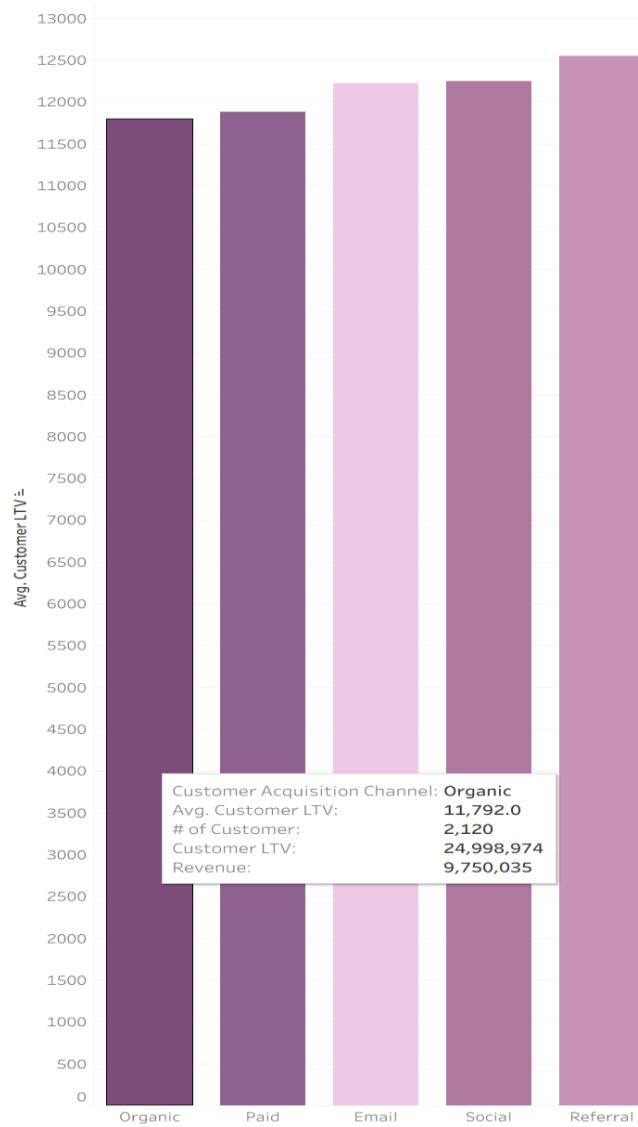
Graph 2: Region & Seasons Revenue

- Season revenue is consistent within regions, with **highest revenue in Spring, then Winter and Summer – with least performing season being autumn.**
- Revenue, again, is **highest across the South and North Regions.**



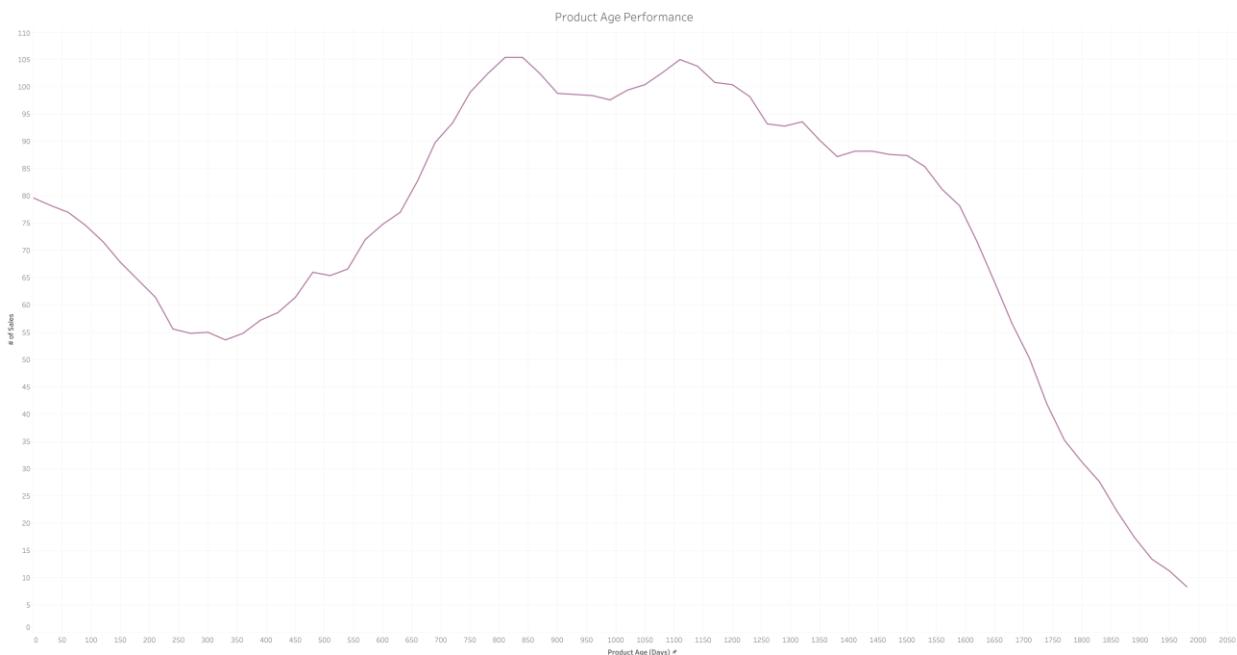
❖ Question 4: Which customer acquisition channels deliver the highest lifetime value customers?

- **Referral** is the top-performing acquisition channel in terms of average Customer Lifetime Value (LTV), indicating that customers brought in through referrals tend to be more loyal and valuable over time. This suggests strong word-of-mouth trust and high retention among referred users.
- While **Organic acquisition** has a slightly lower average LTV, it contributes the highest overall Customer LTV total due to a larger customer base. This indicates it's the most scalable channel, offering broad reach and long-term revenue potential despite lower per-customer value.



❖ Question 5: How does product age (time since launch) correlate with sales performance?

- **Sales decline slightly in the first 200–300 days** after product launch, suggesting a slow start or adoption lag for newly released products.
- **Sales volume steadily increases** as products age, peaking between **900 to 1300 days after launch**, suggesting a strong **mid-life sales window**.
- After the peak, performance **declines sharply**, indicating **product saturation or reduced demand** - highlighting the importance of **timely product refreshes, upgrades, or promotional strategies** to extend lifecycle value.



❖ Question 6: What are the top 3 strategic recommendations based on integrated data analysis?

1. **Prioritize high-margin suppliers and stable product categories**
 - Focus on **Quantum Supplies** and the **Networking** category, which consistently deliver strong profit margins with lower volatility.

- Monitor suppliers like **Biteware** that show short-term gains but declining long-term trends.
2. **Align campaigns with seasonal and regional performance patterns**
- Leverage **Spring and Winter** as key high-revenue periods, especially in the **South and North** regions where demand peaks.
 - Target product promotions by region and season to capitalise on cyclical revenue opportunities.
3. **Enhance acquisition efforts via Referral and Organic channels**
- **Referral customers have the highest average LTV**, indicating strong loyalty and ROI.
 - **Organic acquisition yields the highest total LTV**, making it ideal for scaling long-term growth.

Section 5: Critical Reflection

❖ Part 1: Analytical Approach

- This project enabled the integration of customer, product, and sales data in Tableau to uncover multi-dimensional trends. By exploring metrics over time, regions, product lifecycle, and customer channels, I was able to generate insights that directly inform strategic decision-making.

❖ Part 2: Strengths

- A major strength was the ability to combine different dimensions into a cohesive dashboard, making it easier to identify high-value suppliers, profitable customer segments, and seasonal revenue patterns. The visual clarity of the dashboard supported strong data storytelling.

❖ Part 2: Challenges

- The dashboard was originally created on a 4K monitor, which provided a spacious design canvas. However, this led to **scaling issues** when viewed on smaller screens or laptops, requiring manual adjustments to ensure readability and usability across different devices.

- Balancing **layout flexibility** with design clarity was a key challenge, particularly when managing overlapping elements, filters, and legends.

Part 3: Areas of Improvement

1. Improve Simplicity and Layout Clarity

The current dashboard includes a lot of visual elements, which can feel **overcrowded**. Future versions should focus on **simplifying layout**, prioritising key KPIs, and potentially splitting content into **separate, purpose-driven dashboards**.

2. Enhance Tooltips for Better Context

Tooltips could be more **informative and user-friendly**. Adding clear labels, context, and formatted figures would help end-users quickly interpret data without needing to click or explore deeply.

3. Responsive Design for Different Devices

Created on a 4K monitor, the dashboard did not scale well to smaller screens. Using **fixed or range-based sizing** and previewing across devices would ensure better usability across laptops and tablets.

4. Strengthen Data Validation

Issues such as mismatched product categories and negative product ages highlighted the need for **stronger data validation steps** during import and transformation.

5. Explore Deeper Analytical Techniques

Beyond descriptive visuals, incorporating **forecasting, segmentation, or trend analysis** could offer more strategic insight and predictive value.

Section 6: Data Issues and Risks

1. Inconsistent Fields

The **product category** field existed in both the sales and product datasets. Upon merging, discrepancies were found between the two versions, leading to inconsistency. The analysis used the **product category from the product dataset**, which was more reliable and structured.

2. Negative Product Age Values

While calculating **product age** using sale date - launch date, some values were **negative**, indicating that sales were recorded before the product launch date. This suggests either **data entry errors** or the inclusion of **pre-order sales**, which should be clarified in future data collection.

3. No Check for Outliers

There is a risk that certain assumptions (e.g. excluding outliers, assuming pre-orders) may affect **data accuracy or business interpretation** if not addressed in future datasets.

[END OF PROJECT]