High Level Design (HLD)

Consumer Goods Ad-Hoc Insights

Revision Number: 1.5
Last date of revision: 13/03/2023

Pranit Patil

Document Version Control

Date Issued	Version	Description	Author
06/02/2023	1.0	Abstract, Introduction	Pranit Patil
09/02/2023	1.1	General Description	Pranit Patil
15/02/2023	1.2	Design Details	Pranit Patil
28/02/2023	1.3	Deployment	Pranit Patil
11/03/2023	1.4	KPI	Pranit Patil
13/03/2023	1.5	Final Revision	Pranit Patil

Contents

Abstract

Atliq Hardware's is one of the leading computer hardware producers in India and well expanded in other countries too. However, the management wanted to get enough insights such as understanding changing consumer preferences, focusing on sustainability, building brand loyalty, customer behavior, preferences, and trends. By using data to inform decision-making across functions such as product development, marketing, and supply chain management, companies can better understand their customers and create more effective strategies to make quick and smart data-informed decisions.

1 Introduction

1.1 Why this High-Level Design Document?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions before coding and can be used as a reference manual forhow the modules interact at a high level.

The HLD will be focusing on the below objectives:

- Present all the design aspects and define them in detail.
- Describe the user interface being implemented.
- Describe the hardware and software interfaces.
- Describe the performance and requirements.
- Include design features and the architecture of the project.
- List and describe the non-functional attributes like:

  - Security
  - Reliability
  - Maintainability
  - Portability
  - Reusability
  - Application compatibility
  - Resource utilization
  - Serviceability

1.2 Scope

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to theadministrators of the system.

2 General Description

2.1 Problem Statement and Task

Atliq Hardware's is one of the leading computer hardware producers in India and well expanded in other countries too. However, the management wanted to get enough insights such as understanding changing consumer preferences, focusing on sustainability, building brand loyalty, customer behavior, preferences, and trends. By using data to inform decision-making across functions such as product development, marketing, and supply chain management, companies can better understand their customers and create more effective strategies to make quick and smart data-informed decisions.

Task:

1. Check 'ad-hoc-requests.pdf' - there are 10 ad hoc requests for which the business needs insights.
2. You need to run a SQL query to answer these requests.
3. The target audience of this dashboard is top-level management - hence you need to create a presentation to show the insights.

2.2 Tools used

Microsoft Excel, MySQL Workbench, Microsoft Power BI, Microsoft PowerPoint are used to build the whole framework. are used to build the whole framework.

3 Design Details

3.1 Functional Architecture

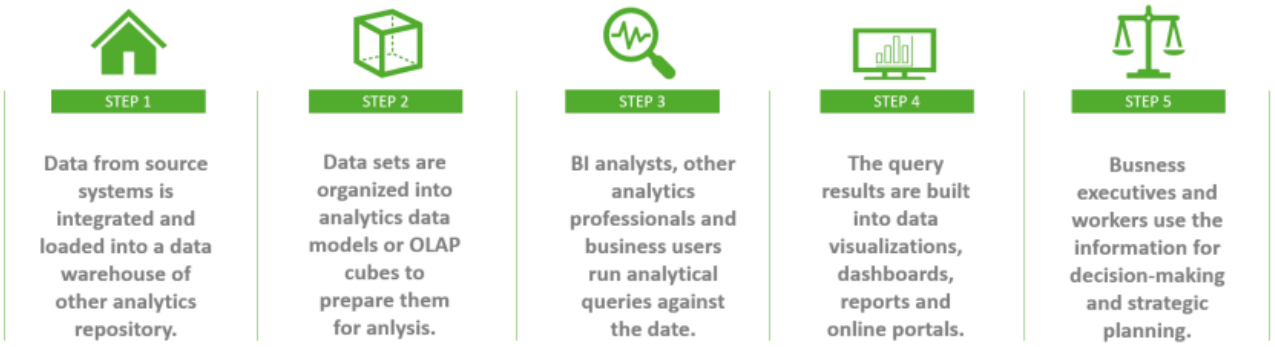


Figure 1: Functional Architecture of Business Intelligence

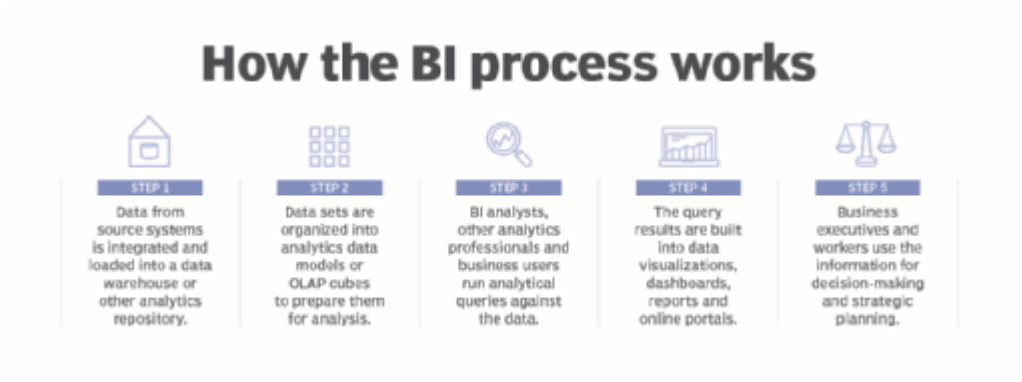


Figure 2: Working of BI process

3.2 BI Reporting Architecture

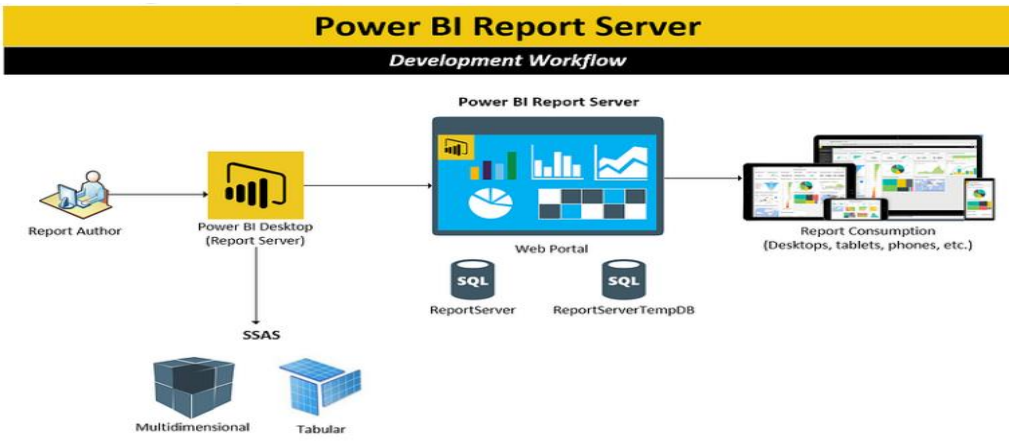


Figure 3: Power BI Architecture

3.3 Optimization

1. **Your data strategy drives performance**
   - Minimize the number of fields.
   - Minimize the number of records.
   - Optimize extracts to speed up future queries by materializing calculations,removing columns and the use of accelerated views.

2. **Reduce the marks (data points) in your view**
   - Practice guided analytics. There's no need to fit everything you plan to show in a single view. Compile related views and connect them with action filters to travel from overview to highly-granular views at the speed of thought.
   - Remove unneeded dimensions from the detail shelf.
   - Explore. Try displaying your data in different types of views.

3. **Limit your filters by number and type**
   - Reduce the number of filters in use. Excessive filters on a view will create a more complex query, which takes longer to return results. Double-check your filters and remove any that aren't necessary.

- Use an include filter. Exclude filters load the entire domain of a dimension while including filters do not. An include filter runs much faster than an exclude filter, especially for dimensions with many members.

- Use a continuous date filter. Continuous date filters (relative and range-of- date filters)can take advantage of the indexing properties in your database and are faster than discrete data filters.

- Use Boolean or numeric filters. Computers process integers and Booleans (t/f) much faster than strings.

- Use parameters and action filters. These reduce the query load (and work across data sources).

4 Deployment

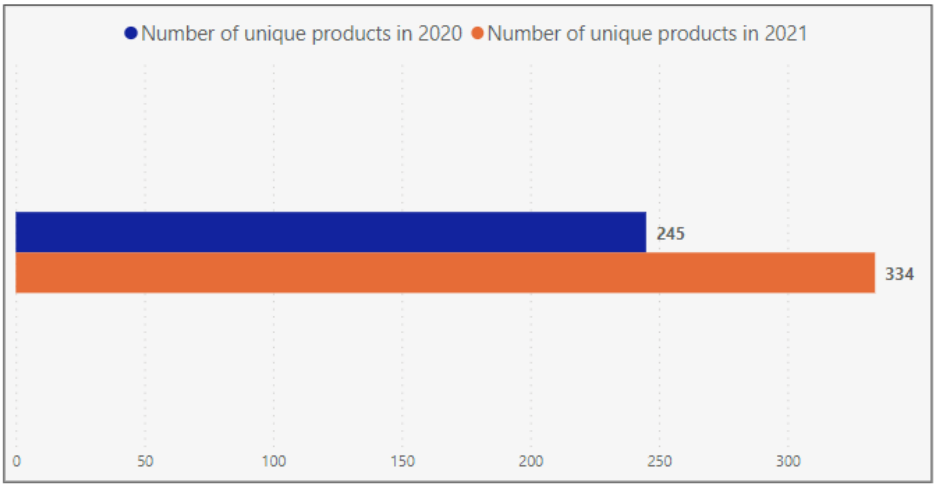
Prioritizing data and analytics couldn't come at a better time. Your company, no matter what size, is already collecting data and most likely analyzing just a portion of it to solve business problems, gain competitive advantages, and drive enterprise transformation. With the explosive growth of enterprise data, database technologies, and the high demand for analytical skills, today's most effective IT organizations have shifted their focus to enabling self-service by deploying and operating Power BI at scale, as well as organizing, orchestrating, and unifying disparate sources of data for business users and experts alike to author and consume content. Power BI prioritizes choice in flexibility to fit, rather than dictate, your enterprise architecture. Power BI Desktop and Power BI Service leverage your existing technology investments and integrate them into your IT infrastructure to provide a self-service, modern analytics platform for your users. With on-premises, cloud, and hosted options, there is a version of Power BI to match your requirements.

Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 2

What is the percentage of unique product increase in 2021 vs. 2020? The final output contains these fields,
unique_products_2020
unique_products_2021
percentage_chg

Number of unique products in 2020	Number of unique products in 2021	Percentage change
245	334	36.33

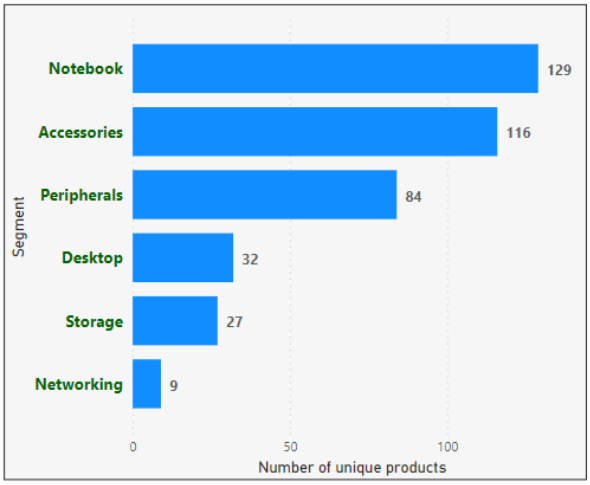


Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 3

Provide a report with all the unique product counts for each segment and sort them in descending order of product counts.
The final output contains 2 fields
segment,
product_count

Segment	Number of unique products
Notebook	129
Accessories	116
Peripherals	84
Desktop	32
Storage	27
Networking	9

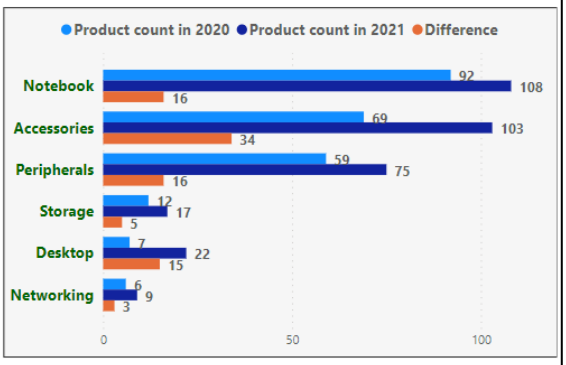


Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 4

Which segment had the most increase in unique products in 2021 vs 2020? The final output contains these fields,
segment
product_count_2020
product_count_2021
difference

Segment	Product count in 2020	Product count in 2021	Difference
Accessories	69	103	34
Desktop	7	22	15
Networking	6	9	3
Notebook	92	108	16
Peripherals	59	75	16
Storage	12	17	5



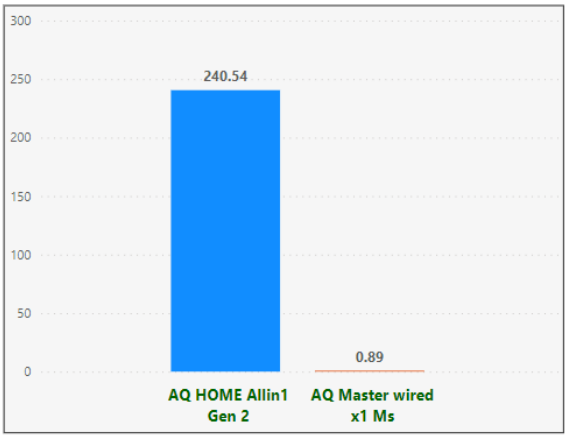
Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 5

Get the products that have the highest and lowest manufacturing costs. The final output should contain these fields,
product_code
product
manufacturing_cost

Product Code	Product	Manufacturing Cost
A6120110206	AQ HOME Allin1 Gen 2	240.54
A2118150101	AQ Master wired x1 Ms	0.89

AQ HOME Allin1 Gen 2 has highest manufacturing cost at 240.54 whereas
AQ Master wired x1 Ms has lowest manufacturing cost at 0.89 only

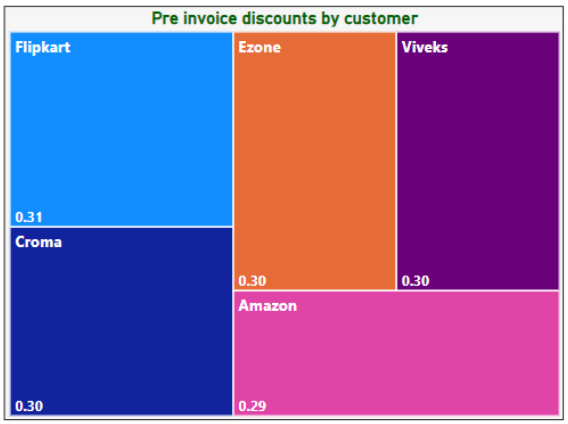


Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 6

Generate a report which contains the top 5 customers who received an average high pre_invoice_discount_pct for the fiscal year 2021 and in the Indian market. The final output contains these fields,
customer_code
customer
average_discount_percentage

Customer code	Customer	Average pre invoice discount
90002009	Flipkart	0.31
90002002	Croma	0.30
90002003	Ezone	0.30
90002006	Viveks	0.30
90002016	Amazon	0.29

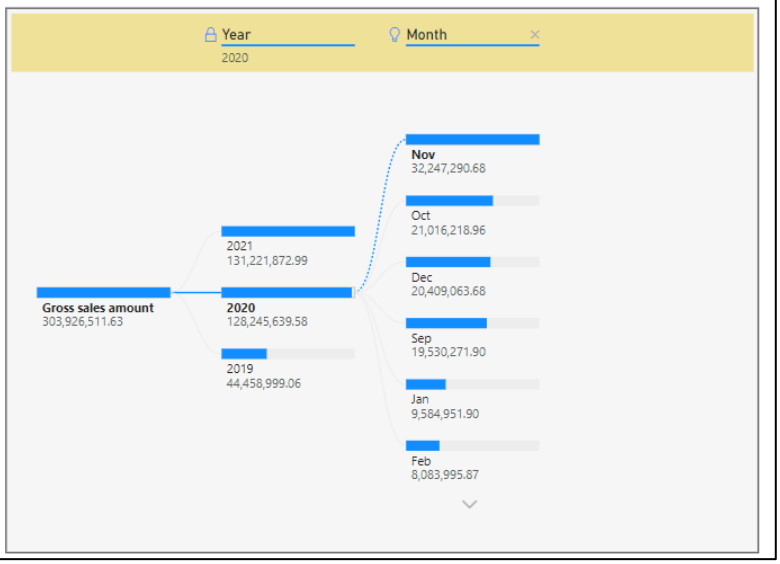


Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 7

Get the complete report of the Gross sales amount for the customer "Atliq Exclusive" for each month. This analysis helps to get an idea of low and high-performing months and take strategic decisions. The final report contains these columns:
Month
Year
Gross sales Amount

Month Name	Year	Gross_sales_Amount
Nov	2020	32,247,290.68
Oct	2020	21,016,218.96
Dec	2020	20,409,063.68
Jan	2021	19,570,702.79
Sep	2020	19,530,271.90
May	2021	19,204,310.02
Mar	2021	19,149,625.28
Jul	2021	19,044,969.71
Feb	2021	15,986,605.01
Jun	2021	15,457,580.57
Nov	2019	15,231,895.21
Apr	2021	11,483,530.74
Aug	2021	11,324,548.87
Oct	2019	10,378,637.79
Dec	2019	9,755,795.21
Jan	2020	9,584,951.90
Sep	2019	9,092,670.85
Feb	2020	8,083,995.87
Aug	2020	5,638,281.79
Jul	2020	5,151,815.71
Jun	2020	3,429,736.75
May	2020	1,586,963.98
Apr	2020	800,072.08
Mar	2020	766,976.28



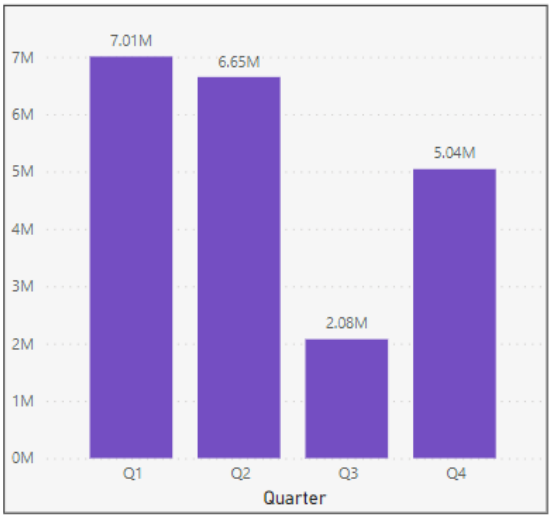
Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 8

In which quarter of 2020, got the maximum total_sold_quantity?
The final output contains these fields sorted by the total_sold_quantity, Quarter, total_sold_quantity.

Quarter	Total sold quantity
Q1	7005619
Q2	6649642
Q3	2075087
Q4	5042541

1st quarter had the highest sales with sold_quantity of 7.01 million

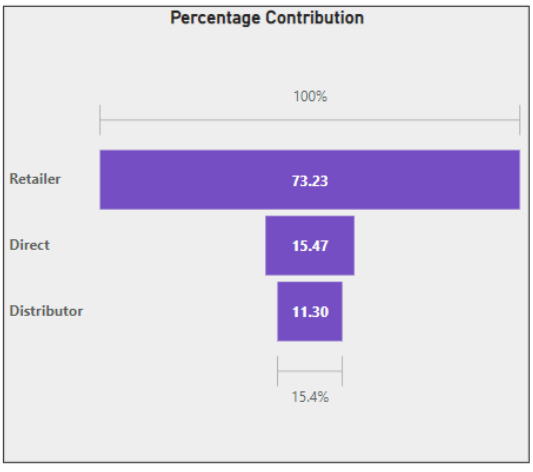


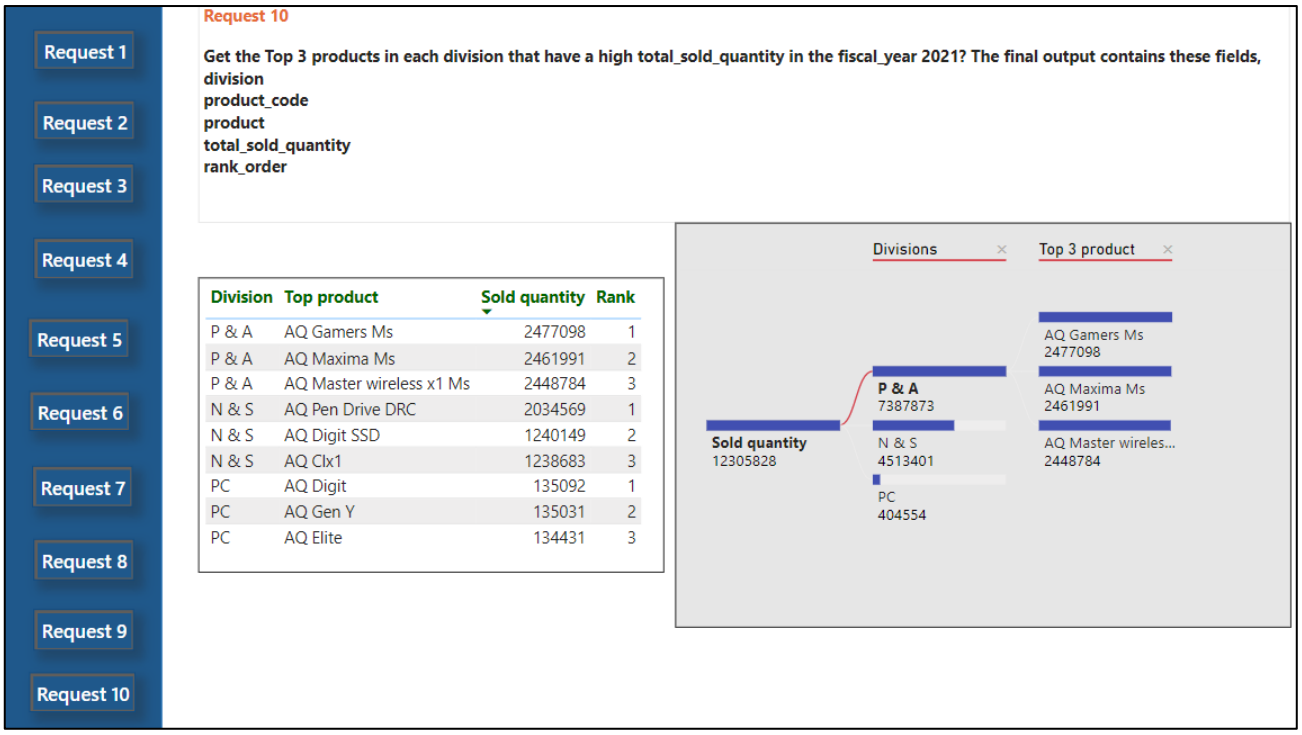
Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10

Request 9

Which channel helped to bring more gross sales in the fiscal year 2021 and the percentage of contribution? The final output contains these fields,
channel
gross_sales_mln
percentage

Channel	Gross sales_mln	Percentage Contribution
Retailer	1,219.08	73.23
Direct	257.53	15.47
Distributor	188.03	11.30




Request 1
Request 2
Request 3
Request 4
Request 5
Request 6
Request 7
Request 8
Request 9
Request 10
Request 10
Get the Top 3 products in each division that have a high total_sold_quantity in the fiscal_year 2021? The final output contains these fields,
division
product_code
product
total_sold_quantity
rank_order
Division Top product Sold quantity Rank
P & A AQ Gamers Ms 2477098 1
P & A AQ Maxima Ms 2461991 2
P & A AQ Master wireless x1 Ms 2448784 3
N & S AQ Pen Drive DRC 2034569 1
N & S AQ Digit SSD 1240149 2
N & S AQ Clx1 1238683 3
PC AQ Digit 135092 1
PC AQ Gen Y 135031 2
PC AQ Elite 134431 3
Divisions
Top 3 product
Sold quantity
12305828
P & A
7387873
N & S
4513401
PC
404554
AQ Gamers Ms
2477098
AQ Maxima Ms
2461991
AQ Master wireles...
2448784

5 KPIs (Key Performance Indicators)

Dashboard are implemented to display and indicate certain KPIs and relevant indicators. As and when, the system starts to capture the historical/periodic data for a user, the dashboard will be included to display charts over time with progress on various indicators or factors.

Key indicators displaying a summary of the Consumer Goods Ad-Hoc Project and its relationship with different metrics:

1. Market Distribution of Atliq Exclusive in the APAC Region.

2. Percentage increase in Unique Products (2020 VS 2021).

3. Segment Wise Product Count.

4. Product Count 2020 & 2021 by Segment & Difference by Segment.

5. Highest and Lowest Costing Products.

6. Top 5 Customers with High Average Discount.

7. Monthly Gross Sales Amount for Fiscal Year 2020 and 2021.

8. Total Sold Quantity Per Quarter of 2020.

9. Gross Sales and Percentage Contribution through each Channel.

10. Total Sold Quantity by Division, Product, Rank Order.