

## PROJECT REPORT

Group 23

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**Percentage of Effort Contributed by Student1: 50%**

**Percentage of Effort Contributed by Student2: 50%**

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## **EXECUTIVE SUMMARY:**

This project focuses on applying data management to enhance many facts about e-commerce online retail operations and data management principles. All issue statements will be discussed and show how data management and analysis can provide answers and insights.

The major data management that we considering is the profit that the e-commerce website is earning considering all the product costs and revenue generated which will be incurred to deliver the product to the customers.

By analysing past data of e-commerce, which includes product categories, which products are getting sold in high demand, product category performance, customer behaviour with the product he bought, and calculating the profit of the category of a product, Maximizing profit needs Gathering historical data on an e-commerce site that includes sales transactions (i.e., order date, product date, product ID, revenue generated, cost, and product categories)

We are going to compare all the categories and obtain the profit margin among the categories. We are going to compare the reviews obtained for each category and also find out the category which is in demand and also to indicate which stock to increase so that e-commerce could further increase the profit.

## **I. INTRODUCTION**

Convenience is king in the age of digital technology today. Thanks to electronic commerce, or e-commerce, the internet, which was originally used exclusively for information and networking, has evolved into a humming marketplace. For people all across the world, this phenomenon has made daily life simpler.

E-commerce, which includes both retail and wholesale, is quickly increasing in popularity and is quickly becoming a crucial component of contemporary business. It gives customers a wide range of options, including a variety of brands, sizes, and product groups including electronics and housewares. Customers can easily examine these possibilities and make selections from many vendors through online apps, encouraging healthy competition.

E-commerce stands out for its ability to offer products at various prices to suit all price points, from budget-friendly to upscale. Online purchasing is becoming widely used as a result of this accessibility. As a result, companies are scrambling to build a strong online presence with transactional capabilities to satisfy customers' changing needs.

In conclusion, e-commerce has completely changed how businesses operate by providing unmatched ease and choice. Businesses are adjusting as it grow and using online platforms to meet the ever-changing demands of their clients.

## REQUIREMENTS:

The system revolves around a product-centric approach, where each product is categorized and associated with various entities. The product is categorized under a specific category, ensuring that each product belongs to one and only one category. Conversely, a category can encompass one or more products.

- Products are supplied by vendors, and each product can be supplied by one or more vendors. On the other hand, vendors can supply multiple products, establishing a many-to-many relationship.
- The purchasing process involves users who can buy multiple products, and each product can be purchased by multiple users. This implies a many-to-many relationship between users and products.
- Additionally, products have a stock status, indicating the availability or quantity of the product. Optionally, each stock status is associated with a single product.
- Users can provide reviews for products, with each user capable of writing zero to multiple reviews. This relationship allows for user-generated feedback on products.
- Transactions involve users making purchases, creating a relationship where each user can have zero to multiple transactions. Furthermore, each transaction is associated with a specific payment method, and each payment method can be linked to multiple transactions.
- A distinct payment status is assigned to each transaction, signifying the state of payment completion. This ensures that each transaction has precisely one payment status.
- For efficient management, payment methods have a default payment status, providing a standardized initial state for transactions associated with that payment method. This default payment status can be associated with multiple payment methods, offering flexibility in defining default states.

In summary, the system is designed to handle the dynamic relationships between products, categories, vendors, users, reviews, transactions, payment methods, payment statuses, and stock statuses, facilitating a comprehensive and interconnected platform for product management and user transactions.

## II. CONCEPTUAL DATA MODELING

### EER DIAGRAM

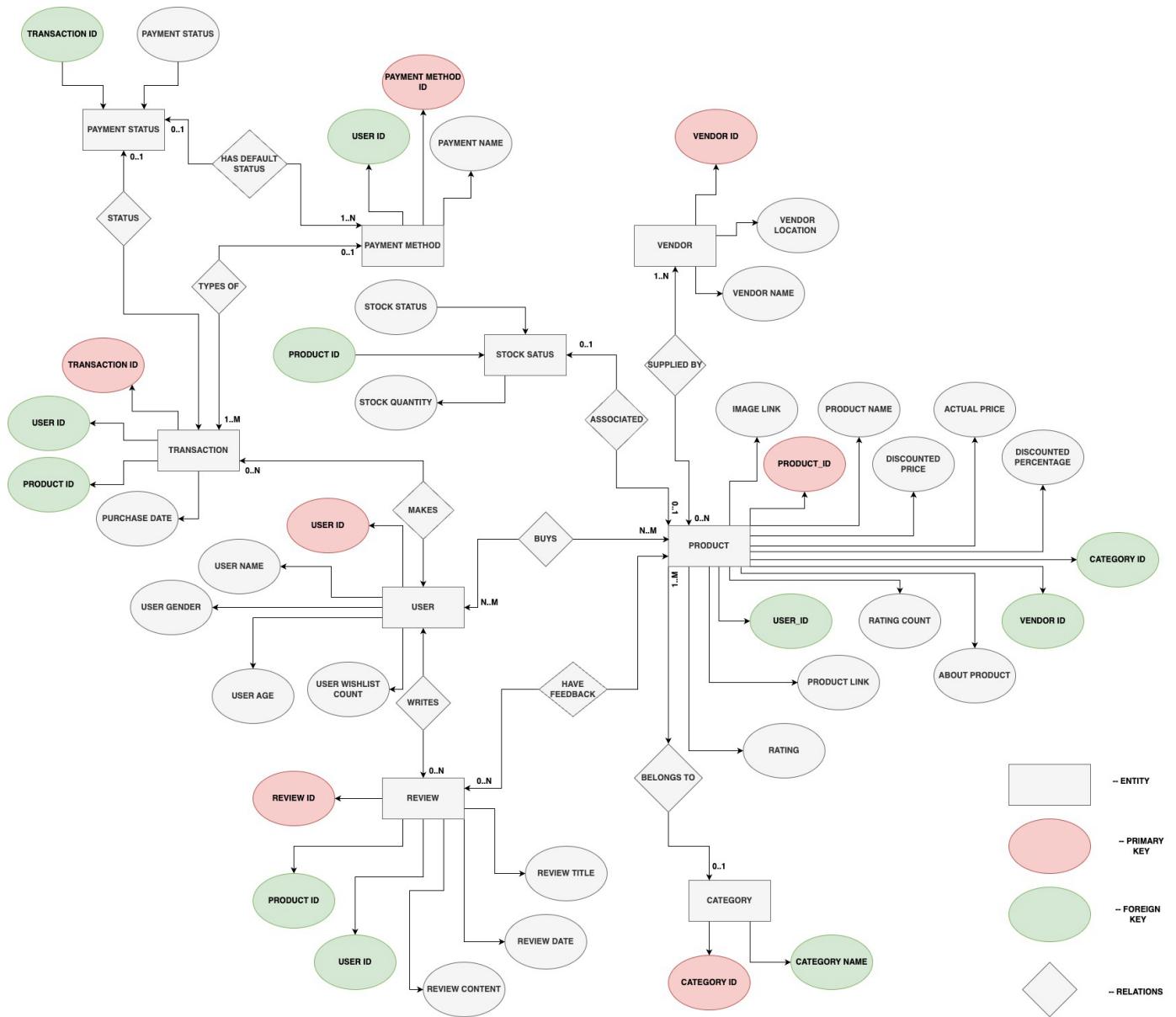


Fig 1. EER Diagram of E-Commerce

## UML CLASS DIAGRAM

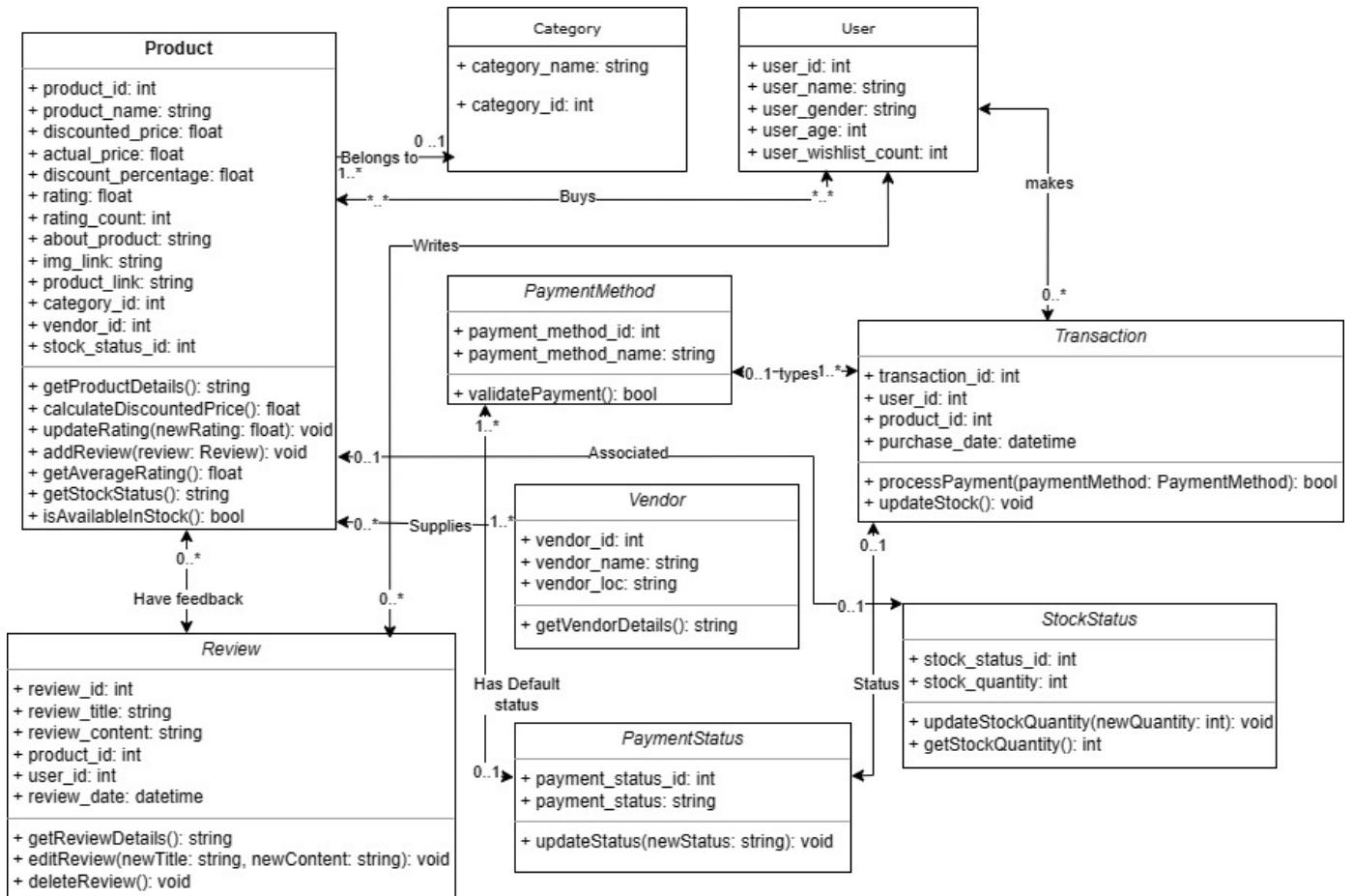


Fig 2. UML Class Diagram of E-Commerce

### III. MAPPING CONCEPTUAL MODEL TO RELATIONAL MODEL

**Product**(product\_id, product\_name, id\_user\_bought, category\_id, discounted\_price, actual\_price, discount\_percentage, rating, rating\_count, about\_product, vendor\_id)

- product\_id: Primary key and NOT NULL
- id\_user\_bought: Foreign key (references User(user\_id))
- category\_id: Foreign key (references Category(category\_id))
- vendor\_id: Foreign key (references Vendor(vendor\_id))

**Category**(category\_id, category\_name)

- category\_id: Primary key and NOT NULL

**User**(user\_id, user\_name, user\_gender, user\_age, user\_wishlist\_count)

- user\_id: Primary key and NOT NULL

**Review(review\_id, product\_id, user\_id, review\_title, review\_content, review\_date)**

- review\_id: Primary key and NOT NULL
- product\_id: Foreign key (references Product(product\_id))
- user\_id: Foreign key (references User(user\_id))

**Vendor(vendor\_id, vendor\_name, vendor\_loc)**

- vendor\_id: Primary key and NOT NULL
- vendor\_name: NOT NULL
- vendor\_loc: NOT NULL

**Transaction(transaction\_id, user\_id, product\_id, purchase\_date)**

- transaction\_id: Primary key and NOT NULL
- user\_id: Foreign key (references User(user\_id))
- product\_id: Foreign key (references Product(product\_id))

**PaymentMethod(user\_id, payment\_method\_id, payment\_method\_name)**

- user\_id: Foreign key (references User(user\_id))
- payment\_method\_id: Primary key and NOT NULL

**ProductImageLink(product\_id, img\_link, product\_link)**

- product\_id: Primary key and Foreign key (references Product(product\_id))

**StockStatus(stock\_status, product\_id, stock\_quantity)**

- product\_id: Primary key and Foreign key (references Product(product\_id))

**PaymentStatus(transaction\_id, payment\_status)**

- transaction\_id: Foreign key (references Transaction(transaction\_id))

## IV. IMPLEMENTATION OF RELATION MODEL VIA MYSQL AND NOSQL

### MySQL Implementation:

The database was created in MySQL and the following queries were performed:

#### *Query: -1*

Retrieve the names of products along with their discounted prices and vendor names for products with a rating greater than 4

```
SELECT p.product_name, p.discounted_price, v.vendor_name FROM product_table p  
JOIN vendor_table v ON p.vendor_id = v.vendor_id  
WHERE p.rating > 4  
GROUP BY p.product_name, p.discounted_price, v.vendor_name LIMIT 0, 1000;
```

The screenshot shows a SQL IDE interface with the following details:

- Toolbar:** Includes icons for file operations, search, and export.
- Query Editor:** Displays the following SQL code:
 

```

1 • USE DMA_PJT;
2 -- Retrieve the names of products along with their discounted prices and vendor names for products with a rating greater than 4
3 • SELECT p.product_name, p.discounted_price, v.vendor_name
4 FROM product_table p
5 JOIN vendor_table v ON p.vendor_id = v.vendor_id
6 WHERE p.rating > 4
7 GROUP BY p.product_name, p.discounted_price, v.vendor_name
8 LIMIT 0, 1000;
9
      
```
- Result Grid:** Shows a table with columns: product\_name, discounted\_price, and vendor\_name. The data includes various products like Crompton IHL 251 1500-Watt Immersion Water... (640), AGARO Imperial 240-Watt Slow Juicer with Col... (12609), Western Digital WD 2TB My Passport Portable Hard Disk Drive, USB 3.0 with?? Automatic Backup, 256 Bit AES Hardware Encryption, Password Protection, Compatible with Windows and Mac, External HDD-Black (1889), etc.
- Right Panel:** Contains a sidebar with icons for Result Grid, Form Editor, Field Types, Query Stats, and Execution Plan.

## Query: -2

List the products with a discount percentage greater than 20% and order them by the discounted price in descending order

```

SELECT product_name, discounted_price, discount_percentage
FROM product_table WHERE discount_percentage > 20
ORDER BY discounted_price DESC;
      
```

The screenshot shows a SQL IDE interface with the following details:

- Toolbar:** Includes icons for file operations, search, and export.
- Query Editor:** Displays the following SQL code:
 

```

10 -- List the products with a discount percentage greater than 20% and order them by the discounted price in descending order:
11 • SELECT product_name, discounted_price, discount_percentage
12 FROM product_table
13 WHERE discount_percentage > 20
14 ORDER BY discounted_price DESC;
15
16
      
```
- Result Grid:** Shows a table with columns: product\_name, discounted\_price, and discount\_percentage. The data includes various products like USHA 1212 PTC with Adjustable Thermostat Fa... (348777), Bajaj Rex DLX 750 W 4 Jars Mixer Grinder, Whi... (304167), Samsung 138 cm (55 inches) Crystal 4K Neo S... (47990), MI 138.8 cm (55 inches) 5X Series 4K Ultra HD... (46999), LG 1.5 Ton 5 Star AI DUAL Inverter Split AC (Co... (42990), Acer 139 cm (55 inches) H Series 4K Ultra HD... (35999), MI 108 cm (43 inches) 5X Series 4K Ultra HD L... (31999), iQOO 9 SE 5G (Sunset Sierra, 8GB RAM, 128GB... (29990), Xiaomi Pad 5i Qualcomm Snapdragon 860 120... (26999), Samsung Galaxy M53 5G (Deep Ocean Blue, 6... (23999), Redmi Note 11 Pro + 5G (Phantom White, 8GB... (20999), iQOO Z6 Pro 5G by vivo (Phantom Dusk, 8GB... (20999), Hisense 108 cm (43 inches) 4K Ultra HD Smart... (20990), Samsung Galaxy M33 5G (Mystique Green, 8G... (18499), Samsung Galaxy M33 5G (Emerald Brown, 6G... (16999), Coway Professional Air Purifier for Home, Long... (14400), LG 80 cm (32 inches) HD Ready Smart LED TV... (13490), Redmi Note 11 (Horizon Blue, 6GB RAM, 64GB... (12999), Redmi Note 11 (Space Black, 4GB RAM, 64GB... (12999), AGARO Imperial 240-Watt Slow Juicer with Col... (12609), Acer 80 cm (32 inches) S Series HD Ready And... (12499), Samsung 24-inch(60.46cm) FHD Monitor, IPS... (10099), Samsung Galaxy M04 Light Green, 4GB RAM,... (9499), Tecno Spark 9 (Sky Mirror, 6GB RAM, 128GB St... (8999), Redmi 10A (Charcoal Black, 4GB RAM, 64GB S... (8999), Aquasure From Aquaguard Amaze RO+UV+MT... (8199), Acer 80 cm (32 inches) N Series HD Ready TV... (7999)
- Right Panel:** Contains a sidebar with icons for Result Grid, Form Editor, Field Types, Query Stats, and Execution Plan.

Read Only

### Query: -3

**Retrieve the payment methods used by each user along with the count of transactions for each payment method**

```
SELECT u.user_name, pm.payment_method_name, COUNT(t.transaction_id) AS transaction_count
FROM user_table u LEFT JOIN transaction_table t ON u.user_id = t.user_id
LEFT JOIN payment_method_table pm ON u.user_id = pm.user_id
GROUP BY u.user_name, pm.payment_method_name;
```

user_name	payment_method_name	transaction_count
Iva	upi	1
POTNURU RAJINI	upi	1
Amazon Customer	mobile_banking	7
Ram K	cod	1
Priya	upi	8
Sagar	mobile_banking	1
Ananthu	debit_credit	1
vaneesha	mobile_banking	1
Jrs	upi	1
Usha	upi	1
M L	upi	1
Pearna S	cod	1
ABHISHEK KUM...	mobile_banking	1
Pavan A H	debit_credit	1
Esther newmal	cod	1
Bharanidharan	debit_credit	1
Nafisa Nehar	upi	1
Actual user	debit_credit	4
Aduvuri	upi	4
Neeraj Vishwakar...	cod	4
Neeraj Vishwakar...	upi	4
SELVA velayuthan	cod	1
ARUN KUMAR A V	cod	1
Ashish Payasi	debit_credit	1
Shravani	mobile_banking	1
Ananya	cod	1
Chandu	cod	1

Result 20      Read Only

### Query: -4

**Retrieve the latest review for each product along with the reviewer's name and review date**

```
SELECT r.review_id, p.product_name, u.user_name, r.review_date
FROM review_table r JOIN product_table p ON r.product_id = p.product_id
JOIN user_table u ON r.user_id = u.user_id
WHERE r.review_date = (SELECT MAX(review_date) FROM review_table WHERE product_id = p.product_id);
```

```

22
23 -- Retrieve the latest review for each product along with the reviewer's name and review date
24 • SELECT r.review_id, p.product_name, u.user_name, r.review_date
25   FROM review_table r
26   JOIN product_table p ON r.product_id = p.product_id
27   JOIN user_table u ON r.user_id = u.user_id
28 WHERE r.review_date = (SELECT MAX(review_date) FROM review_table WHERE product_id = p.product_id);
29

```

Result Grid

review_id	product_name	user_name	review_date
P03T000ZIDQ008	Xiaomi Pad S1 Qualcomm Snapdragon 860 10...	Na...	6/31/22
R05U7AW0L0S0C0	Skudion WiFi Adapter for pc   Car Accessories...	POTNURU RAJINI	10/19/22
R1P2VLNH2HSCU	LOHAYA Voice Assistant Remote Compatible to...	Amazon Customer	5/20/22
R2K2YNYU952HJ5	POPIO Tempered Glass Screen Protector Compa...	Ram K	3/4/22
R5NHWFVPLK9SA0	TP-Link Nano AC600 USB Wi-Fi Adapter/Archer...	Priya	4/21/22
R5NHWFVPLK9SA0	TP-Link Nano AC600 USB Wi-Fi Adapter/Archer...	Priya	4/21/22
R2E3GV1LFQ0NF0	boAt Rockerz 400 Bluetooth On Ear Headphone...	Saga	3/3/22
R1TKXWV0L0VNL5	boAt Rockerz 400 Over Ear Bluetooth Headphon...	Ananthu	10/10/22
R5BD1CP3B0L0G0B	boAt Rockerz 400 Over Ear Bluetooth Headphon...	vaneesh	1/2/23
R7M4STGM0D20	Gizmonauts Wireless Charger Privacy Protect...	...	4/15/22
R2GKWK7SWYRZ...	Lifelong LLF-H21 Regalia 2000 W Fan Heater...	Usha	5/14/22
RK56D5TRLNG7	Philips EasySpeed Plus Steam Iron GC2145/20...	M L	9/11/22
R2RT36U5WGRK6	Storite USB 2.0 A to Mini 5 pin B Cable for Exter...	Partha S.	1/27/22
R2G2HWNGVMVBJ...	LG 1.5 Ton 5 Star AI DUAL Inverter Split AC (Co...	ABHISHEK KUM...	8/2/22
R2X090D1YHACKP	Mi USB Type-C Cable Smartphone (Black)	Pavan A H	2/12/22
R3M030MPMSUEAFJ	Litra Roti Maker Electric Automatic (chapati...	Esther newmail	3/2/22
R1PLP00000000000000	Amazon Basic Smart Controller (Black)	Bharandharan	9/2/22
R5COL04F3T1J2	Clasmate Pulse Smart Notebook - 260 mm x 1...	Neeraj Nehar	8/2/22
R6QBCRMHM1L0Y	Ambrane G011 3A Fast Charging Output Cable...	Actual user	4/13/22
R8QBCCRMM1L0Y	Ambrane 60W /3A Fast Charging Output Cable...	Actual user	5/8/22
R2E2U1JB1AM0OQ	AmazonBasics Micro USB Fast Charging Cable...	Neeraj Vishwakar...	9/15/22
R2E2U1JB1AM0OQ	AmazonBasics Micro USB Fast Charging Cable...	Neeraj Vishwakar...	7/16/22
R2Q0HVJ9HQYNOA0	HealthSense Weight Machine for Kitchen, Kitch...	SELVA velayutham	1/2/22/22
R3FTW5HNPCKX66C	Acer 80 cm (32 inches) N Series HD Ready TV...	ARUN KUMAR A V	5/1/22
R10SNR3MGFRPSF	Inovu 3607T 1080P Full HD Security Camera, H...	Ashish Pasi	1/1/22/22
R13QVB0A0AYGU6U	iBELL SEK15L Premium 1.5 Litre Stainless Ste...	Shravani	1/1/22/22
R3JQMMUHFAUWJK	PrettyCrafts Folding Laundry Basket for Clothes...	Ananya	4/24/22

### Query: -5

List the products with low stock quantities (less than 10) along with their current stock status:

```

SELECT p.product_name, s.stock_quantity, ss.stock_status
FROM product_table p JOIN stockstatus_table s ON p.product_id = s.product_id
JOIN stockstatus_table ss ON s.product_id = ss.product_id WHERE s.stock_quantity < 10;

```

```

24
25 -- List the products with low stock quantities (less than 10) along with their current stock status:
26 • SELECT p.product_name, s.stock_quantity, ss.stock_status
27   FROM product_table p
28   JOIN stockstatus_table s ON p.product_id = s.product_id
29   JOIN stockstatus_table ss ON s.product_id = ss.product_id
30 WHERE s.stock_quantity < 10;
31
32

```

Result Grid

product_name	stock_qty...	stock_stat...
INALSA Vacuum Cleaner Handheld 800W High...	0	Unavailable
IQOO Neo 6 5G (Dark Nova, 8GB RAM, 128GB...	0	Unavailable
Noise Buds VS201 V2 in-Ear Truly Wireless Ear...	0	Unavailable
Prestige PSMBF 800 Watt Sandwich Toaster wit...	7	Available
Havells Ambrose 1200mm Ceiling Fan (Pearl W...	0	Unavailable
Zebrotron ZEB-VITA Wireless Bluetooth 10W P...	0	Unavailable
Redmi Note 11 (Space Black, 4GB RAM, 64GB...	0	Unavailable
Verilux? USB C Hub Multiport Adapter - 6 in 1...	0	Unavailable
Noise Pulse Go Bluetooth Watch Bluetooth C...	0	Unavailable
Sony Stylish Portable Bluetooth Speaker Ch...	4	Available
Fix Micro Usb Cable For Smartphone (Black)	0	Available
Fix Micro Usb Cable For Smartphone (Black)	0	Available
Airtel Digital TV HD Set Top Box with 1 Month B...	0	Unavailable
Lbra Room Heater for Home, Room Heaters H...	0	Unavailable
boAt Rockerz 455 Bluetooth On Ear Headphone...	0	Unavailable
Samsung Galaxy M33 5G (Mystique Green, 8G...	0	Unavailable
Samsung Galaxy M53 5G (Deep Ocean Blue, 6...	0	Unavailable
E-COSMOS 5V 1.2W Portable Flexible USB LE...	0	Unavailable
DIGITEK?? (DLS-9FT) Lightweight & Portable A...	7	Available
Robustion (Anti-Scratches) & (Smudge Proof) [S...	0	Unavailable
Redmi A1 (Light Green, 2GB RAM 32GB ROM)...	0	Unavailable
Ambrane Umbrabreak 10A Fast Charging Bracke...	9	Available
LG 80 cm (32 inches) HD Ready Smart LED TV...	0	Unavailable
pTron Bullet Pro 36W PD Quick Charger, 3 Port...	0	Unavailable
... ...	...	...
Result 12	Result 13	Result 14
		Result 15

### Query: -6

Total Revenue from Product Sales per Category

```

SELECT category_name, SUM(actual_price - discounted_price) AS total_revenue
FROM product_table
JOIN category_table ON product_table.category_id = category_table.category_id

```

GROUP BY category\_name;

```

38
39 -- Total Revenue from Product Sales per Category
40 • SELECT category_name, SUM(actual_price - discounted_price) AS total_revenue
41   FROM product_table
42   JOIN category_table ON product_table.category_id = category_table.category_id
43   GROUP BY category_name;
44
    
```

Result Grid   Filter Rows:   Search   Export:

category_name	total_revenue
Computers&Accessories	43478743
Electronics	29414265
Home&Kitchen	-38217096
OfficeProducts	664
HomeImprovement	350

*Query: -7*

**Calculate the total revenue generated from product sales for each vendor:**

```

SELECT vendor_name, SUM(actual_price - discounted_price) AS total_revenue
FROM product_table
JOIN vendor_table ON product_table.vendor_id = vendor_table.vendor_id
GROUP BY vendor_name;
    
```

```

45   -- Calculate the total revenue generated from product sales for each vendor:
46 •   SELECT vendor_name, SUM(actual_price - discounted_price) AS total_revenue
47     FROM product_table
48     JOIN vendor_table ON product_table.vendor_id = vendor_table.vendor_id
49     GROUP BY vendor_name;
50
    
```

Result Grid   Filter Rows:   Search   Export:

vendor_name	total_revenue
Christopher	1008280
John	34356
Henry	105846
Robert	101591
Michael	1505535
Alexander	411888
Ella	637742
Mia	1204428
Joseph	170731
Ava	1048892
Benjamin	457548
Jane	323775
Isabella	308916
David	233736
Sophia	83280
Amelia	962456
Olivia	68607
Matthew	162190
James	192302
Sophie	1203070
William	-2914950
Daniel	864240
Grace	816684
Emma	322736
Emily	227765

*Query: -8*

**Find the total stock quantity for each product and its stock status:**

```

SELECT product_name, stock_status, SUM(stock_quantity) AS total_stock_quantity
FROM product_table
JOIN stockstatus_table ON product_table.product_id = stockstatus_table.product_id
GROUP BY product_name, stock_status;

```

```

51   -- Find the total stock quantity for each product and its stock status:
52 •  SELECT product_name, stock_status, SUM(stock_quantity) AS total_stock_quantity
53   FROM product_table
54   JOIN stockstatus_table ON product_table.product_id = stockstatus_table.product_id
55   GROUP BY product_name, stock_status;
56

```

100% | 37:55

**Result Grid** Filter Rows:  Search Export:

product_name	stock_stat...	total_stock_quan...
Xiaomi Pad 5I Qualcomm Snapdragon 860I 120...	Unavailable	0
Skadioo WiFi Adapter for pc   Car Accessories,...	Available	94
LOHAYA Voice Assistant Remote Compatible fo...	Unavailable	0
POPIO Tempered Glass Screen Protector Com...	Unavailable	0
TP-Link Nano AC600 USB Wi-Fi Adapter(Archer...	Unavailable	0
boAt Rockerz 400 Bluetooth On Ear Headphone...	Unavailable	0
boAt Rockerz 550 Over Ear Bluetooth Headpho...	Unavailable	0
Eureka Forbes Trendy Zip 1000 Watts powerful...	Unavailable	0
Gizga Essentials Webcam Cover, Privacy Prote...	Unavailable	0
Lifelong LLFH921 Regalia 2000 W Fan Heater,...	Unavailable	0
Philips EasySpeed Plus Steam Iron GC2145/20...	Available	183
Storite USB 2.0 A to Mini 5 pin B Cable for Exter...	Available	52
LG 1.5 Ton 5 Star AI DUAL Inverter Split AC (Co...	Unavailable	0
MI Usb Type-C Cable Smartphone (Black)	Unavailable	0
Libra Roti Maker Electric Automatic Chapati Ma...	Available	81
Amazon Basics HDMI Coupler, Black	Unavailable	0
Classmate Pulse Spiral Notebook - 240 mm x 1...	Available	34

**NoSQL Implementation:**

Tables were imported to Mongodb. The queries are as follows:

**Query: - 1**

**Find all products with the categoryid 0, limiting to 3**

```
db.Product.find({ category_id: 0 }).limit(3)
```

```

PROBLEMS TERMINAL OUTPUT DEBUG CONSOLE PORTS JUPYTER
PS D:\college\NEU\DMA> mongosh $Env:MDB_CONNECTION_STRING;
Current Mongosh Log ID: 6570ef954a0a170e30cd7fcf
Connecting to:      mongodb://localhost:27017/?appname=mongodb-vscode+1.3.1&directConnection=true&serverSelectionTimeoutMS=2000
Using MongoDB:     7.0.4
Using Mongosh:     2.1.0
mongosh 2.1.1 is available for download: https://www.mongodb.com/try/download/shell

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

-----
The server generated these startup warnings when booting
2023-12-02T21:26:11.837-05:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

test> use DMAProject
switched to db DMAProject
DMAProject> db.Product.find({ category_id: 0 }).limit(3)
[
  {
    _id: ObjectId('6570e105f155c8ed26733ad0'),
    product_id: 'B09XXZXQC1',
    product_name: 'Xiaomi Pad 5 | Qualcomm Snapdragon 860 | 120Hz Refresh Rate | 6GB, 128GB | 2.5K+ Display (10.95-inch/27.81cm) | 1 Billion Colours | Dolby Vision Atmos | Quad Speakers | Wi-Fi | Gray',
    id_user_bought: 'AGIQYUS5MG4UWTEF4PRMPZWPQA',
    category_id: 0,
    discounted_price: 26999,
    actual_price: 37999,
    discount_percentage: 29,
    rating: Decimal128('4.6'),
    rating_count: 2886,
    about_product: 'Qualcomm Snapdragon 860 Octa-core processor | 6GB RAM | 128GB Internal Storage|WQHD+ (2560x1600 high resolution) 10.95" Dolby Vision display | 120Hz refresh rate | Supports DCI-P3 with over 1 billion colours|Quad Speakers with Dolby Atmos | Long lasting 8720 mAh Battery | Android 11|13MP Rear Camera with 4K recording | 8MP Front camera | Ultra Slim design',
    vendor_id: 72
  },
  {
    _id: ObjectId('6570e105f155c8ed26733ad1'),
    product_id: 'B09LHNZLR',
    product_name: 'skadioo WiFi Adapter for pc | Car Accessories, WiFi Dongle for pc | USB WiFi Adapter for pc | wi-Fi Receiver 2.4GHz, 802.11b/g/n UNano Size WiFi Dongle Compatible Adapter WiFi dongle for pc'
  }
]

```

### *Query: - 2*

**Find the names and genders of users who purchased a product with a discount percentage greater than 50%.**

```

db.User.find({
  "user_id": {
    $in: db.Transaction.distinct("user_id", {
      "product_id": {
        $in: db.Product.distinct("product_id", {
          "discount_percentage": { $gt: 50 }
        })
      }
    })
  }
}, { "_id": 0, "user_name": 1, "user_gender": 1 })

```

```
DMAProject> db.User.find({ "user_id": { $in: db.Transaction.distinct("user_id", { "product_id": { $in: db.Product.distinct("product_id", { "discount_percentage": { $gt: 50 } } ) } } } }, { "_id": 0, "user_name": 1, "user_gender": 1 })
[ { user_name: 'POTNURU RAJINI', user_gender: 'Female' },
  { user_name: 'Amazon Customer', user_gender: 'Male' },
  { user_name: 'Sagar', user_gender: 'Male' },
  { user_name: 'Ananthu', user_gender: 'Male' },
  { user_name: 'Jrs', user_gender: 'Male' },
  { user_name: 'Usha', user_gender: 'Female' },
  { user_name: 'Partha S.', user_gender: 'Female' },
  { user_name: 'Bharanidharan', user_gender: 'Female' },
  { user_name: 'Actual user', user_gender: 'Female' },
  { user_name: 'Neeraj Vishwakarma', user_gender: 'Female' },
  { user_name: 'Ashish Pyasi', user_gender: 'Male' },
  { user_name: 'Shravan', user_gender: 'Female' },
  { user_name: 'Ananya', user_gender: 'Male' },
  { user_name: 'Chandu', user_gender: 'Male' },
  { user_name: 'pruthvi natraj', user_gender: 'Female' },
  { user_name: 'Velir', user_gender: 'Female' },
  { user_name: 'Ajit Kumar Rai', user_gender: 'Male' },
  { user_name: 'Shiv Kumar Saini', user_gender: 'Female' },
  { user_name: 'Manav', user_gender: 'Female' },
  { user_name: 'Aashishnautiyal', user_gender: 'Male' }
]
Type "it" for more
DMAProject> s
```

*Query: - 3*

**Calculate the average rating for each vendor.**

```
db.Review.aggregate([
```

```
    { $lookup: { from: "Product", localField: "product_id", foreignField: "product_id", as: "products" } },
```

{ \$unwind: "\$products" },

```
{ $lookup: { from: "Vendor", localField: "products.vendor_id", foreignField: "vendor_id", as: "vendors" } },
```

```
{ $group: { id: "$vendors.vend
```

},

```
{ $project: { id: 0, vendor name: "$ id", average rating: 1 } },
```

{ \$sort: { average rating: -1 } }

1)

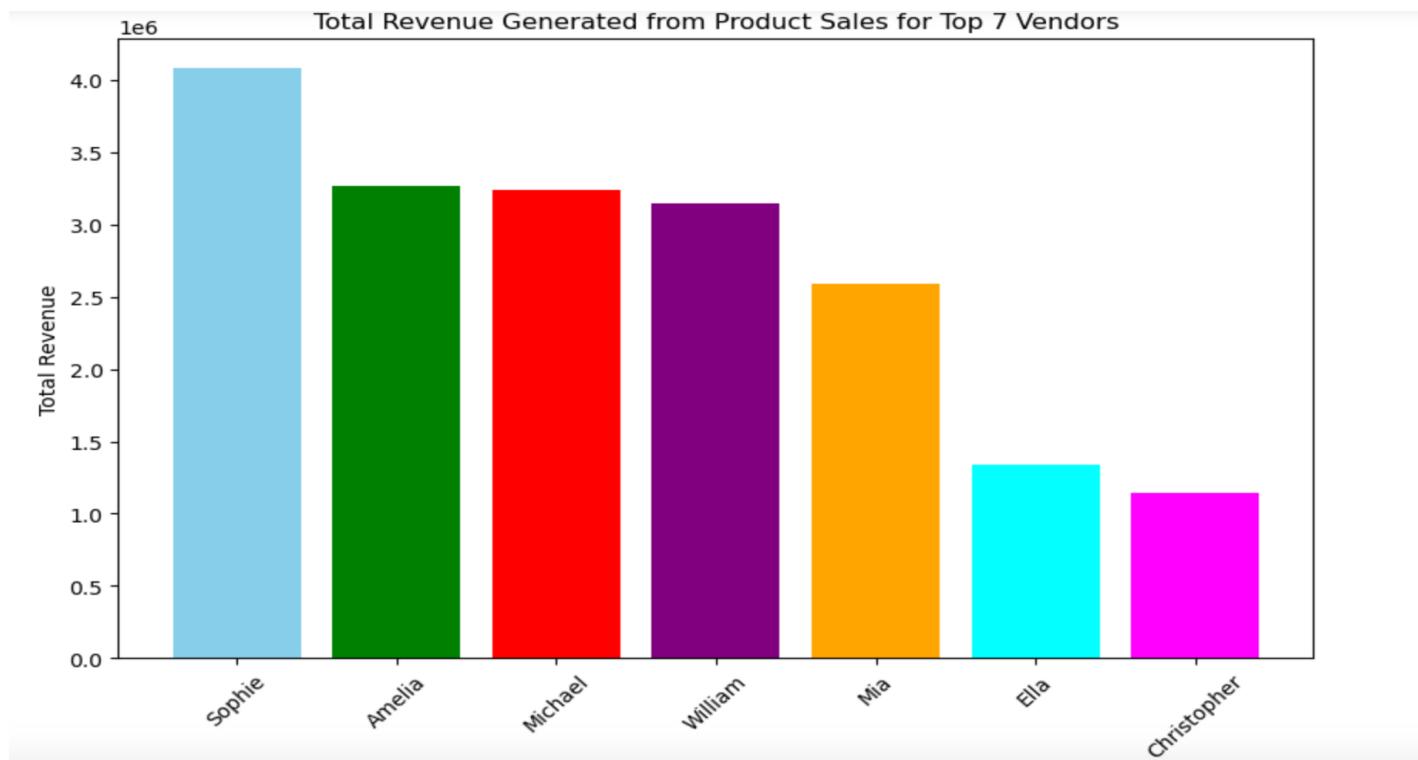
## V. DATABASE ACCESS VIA R OR PYTHON

Python is used to access the database, and the data visualizations that result from the analysis are displayed below. MySQL connector is used to connect MySQL to Python. Data frames are then created for each table, and Matplotlib is used to plot the graphs for the analytics.

Connected this to Python application with the following code:-

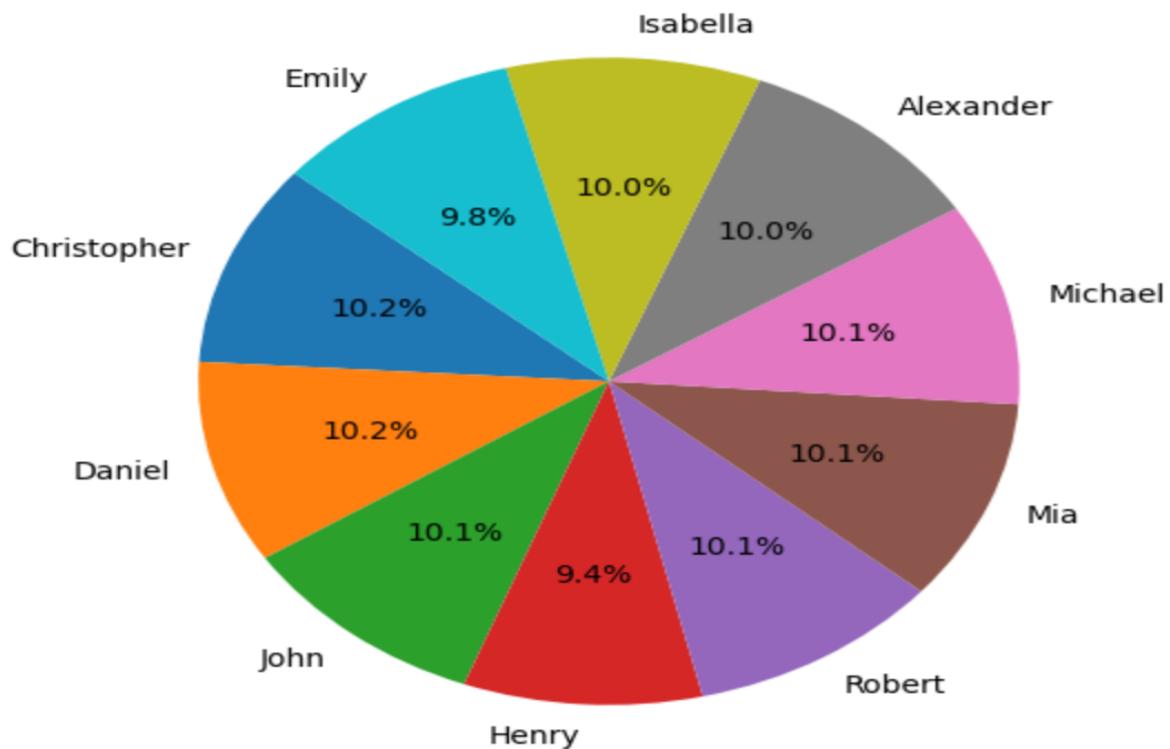
```
import mysql.connector
#
from mysql.connector import Error
#
try:
    connection = mysql.connector.connect(host='localhost',
                                          database='DMA_PJT',
                                          user='root',
                                          password='Mysql@2321',
                                          auth_plugin = 'mysql_native_password')
    if connection.is_connected():
        db_Info = connection.get_server_info()
        print("Connected to MySQL Server version ", db_Info)
        cursor = connection.cursor()
        cursor.execute("select database();")
        record = cursor.fetchone()
        print("Your connected to database: ", record)
    #
    sql_select_Query = "select DISTINCT(product_name) from product_table"
    cursor = connection.cursor()
    cursor.execute(sql_select_Query)
    records = cursor.fetchall()
    print("Data of Product names:\n")
    for row in records:
        print('Product Name =',row[0],"\n")
    #
except Error as e:
    print("Error while connecting to MySQL", e)
finally:
    if (connection.is_connected()):
        cursor.close()
        connection.close()
        print("MySQL connection is closed")
```

## Total revenue generated from product sales for the top 7 vendors.

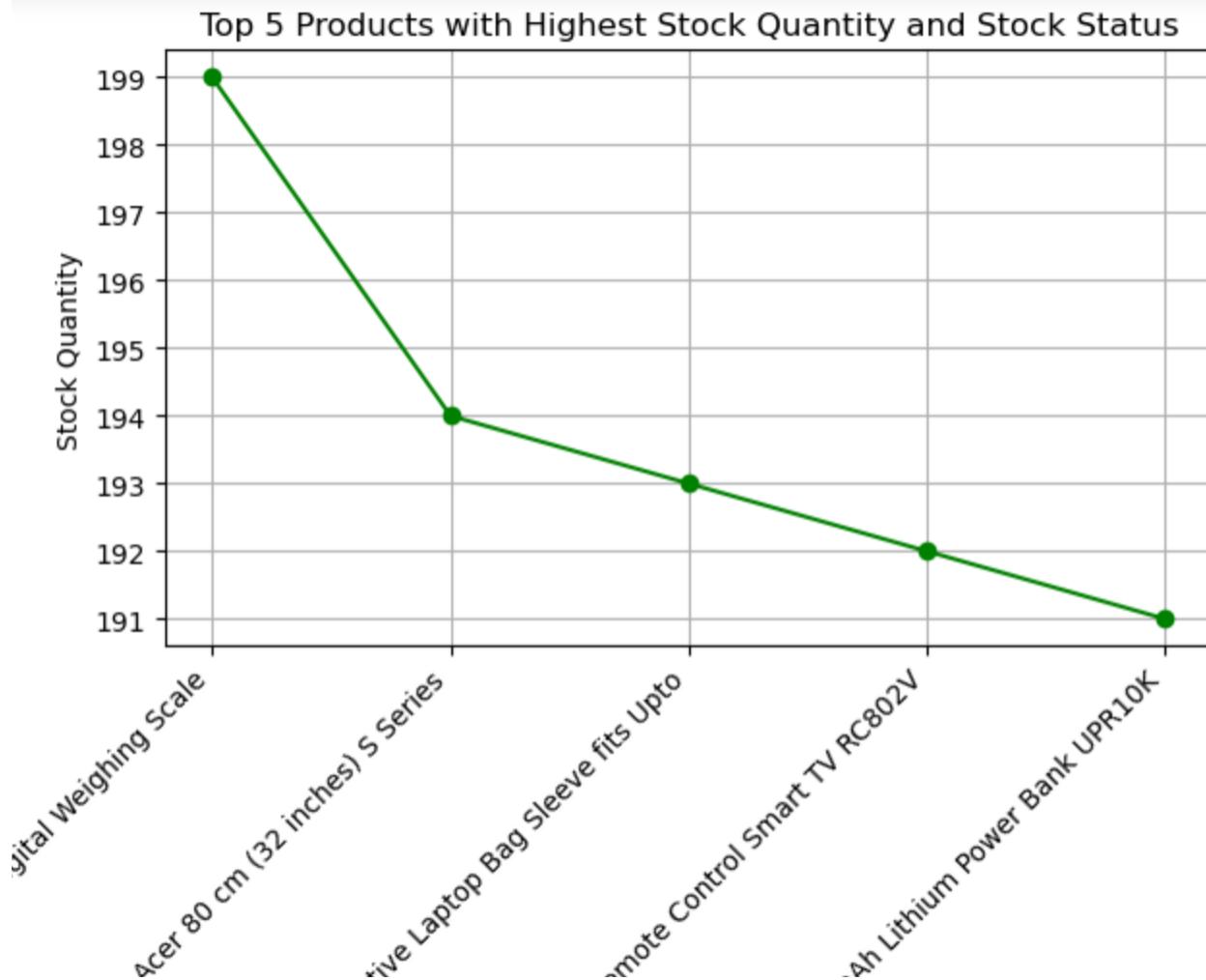


## Average rating for each vendor

### Top 10 Vendors According to this Average Rating



## Top 5 products with the highest stock quantity and their stock status



## VI. SUMMARY AND RECOMMENDATION

### Market Concentration and Vendor Diversity:

Graph 1 highlights a concentrated market share among the top 7 vendors, with a substantial portion of revenue attributed to the top 3 vendors (DOVICE, TOO, and job 10). The company should prioritize diversifying its vendor portfolio to mitigate risks associated with dependency on a few dominant players, ensuring a more resilient and sustainable supply chain.

### Optimized Inventory Management:

Graph 2 showcases the top 5 products with the highest stock quantity, all of which are currently in stock. The company appears to have effectively managed its inventory, maintaining optimal stock levels for these high-quantity products. However, continuous monitoring of stock levels and demand patterns is recommended to avoid potential overstocking.

**Category-driven Sales Performance:**

Graph 3 emphasizes the sales performance across various product categories, with Electronics, Home and kitchen, and Clothing and accessories contributing significantly to overall revenue. The company should capitalize on the strong sales performance in these categories but also consider expanding its product offerings into under-represented categories to diversify revenue streams and capture a broader market share.

The overall insights suggest positive performance and ample inventory but also indicate potential risks related to market concentration and overstocking. A balanced approach is crucial. The company should leverage its strengths but actively address the identified risks through strategic measures to ensure sustained growth and mitigate potential challenges.

**Actionable Recommendations:**

Diversify vendor portfolio to reduce dependence on specific suppliers. Implement robust inventory monitoring systems to optimize stock levels based on demand. Explore opportunities in categories with lower representation to expand the product portfolio. Establish customer feedback systems to gather insights for continuous improvement in products and services.

By implementing these actionable recommendations, the company can enhance its market resilience, adapt to changing dynamics, and foster long-term success in a competitive landscape.