

PRICE PARITY AND PROCUREMENT EFFICIENCY: A COMPARATIVE STUDY OF GEM AND COMMERCIAL E-MARKETPLACES

A PROJECT REPORT

Submitted by,

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*Under the guidance of,
Dr. Debasmita Mishra
in partial fulfillment for the award of the degree of
BACHELOR OF TECHNOLOGY*

**IN
COMPUTER ENGINEERING,
(Artificial Intelligence and Machine Learning)**

At



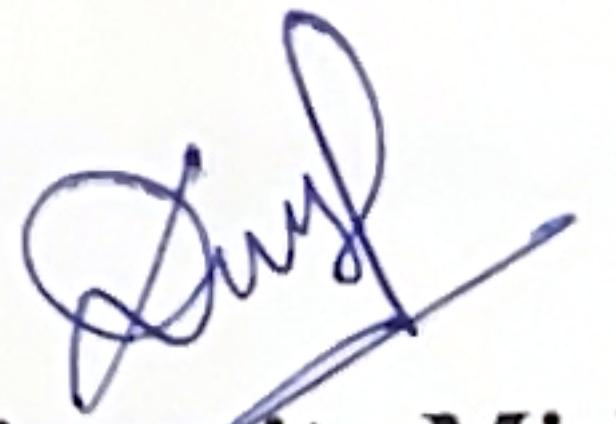
**PRESIDENCY UNIVERSITY
BENGALURU**

MAY 2025

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ENGINEERING

CERTIFICATE

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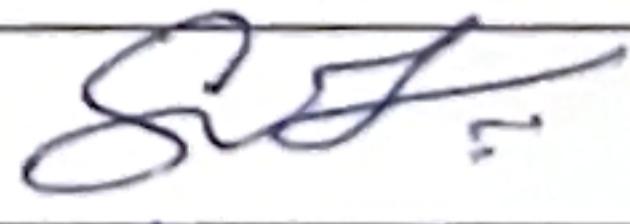
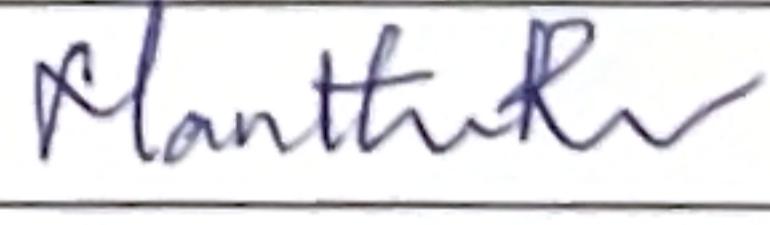
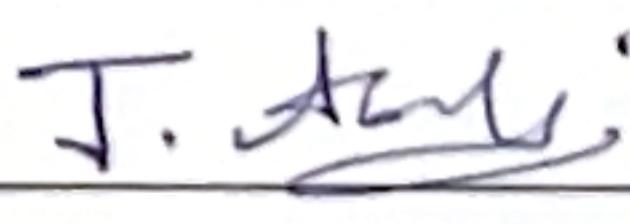
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DECLARATION

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ABSTRACT

The purpose of this work is to make a detailed study of the price comparative analysis between India's Government e-Marketplace (GeM) and well-known private e-commerce sites such as Amazon and Flipkart. By employing a combination of Python and Django to develop a smart system, we were able to retrieve and analyze the latest prices from these platforms automatically. Besides the price tag, the application also takes into account various other factors such as discounts, shipping charges, credibility of the vendors, and the benefits of ordering in bulk. The chilling facilities like the price alerts, the visual displays that are user-friendly, and the smart filters make the system a user-friendly one, in that it helps in the smooth operation of the government buyers and allows them to quickly make the right purchases. Our results gained from recent Economic Survey data demonstrates that mostly GeM provides its customers with a better deal to the extent of 9.5% to 15% off on office supplies and electronics in comparison with other private platforms. Nevertheless, the situation is not clear-cut, as there are occasions when Amazon and Flipkart are the ones who are in the lead, particularly in the case of the most fashionable gadgets and the delivery of the goods in the shortest time possible. Finally, this project would like to present the policymakers and the procurement staff with a practical device which can be used for wiser purchasing; further, it will also be of great help in revolutionizing the digital hub of India and making it more open, effective, and rivalrous in the process.

ACKNOWLEDGEMENTS

First of all, we are indebted to the **GOD ALMIGHTY** for giving me an opportunity to excel in our efforts to complete this project on time.

We express our sincere thanks to our respected dean **Dr. Md. Sameeruddin Khan**, Professor of C - Engineering and Dean, Presidency School of Computer Science and Engineering and to Presidency School of Information Science, Presidency University for getting us permission to undergo the project.

We express our heartfelt gratitude to our beloved Associate Dean **Dr. Mydhili Nair**, Presidency School of Computer Science and Engineering, Presidency University, and **Dr. Gopal krishna Shyam**", Head of the Department, Presidency School of Computer Science and Engineering, Presidency University, for rendering timely help in completing this project successfully.

We are greatly indebted to our guide **Dr. Debasmita Mishra**, Assistant Professor and reviewer **Dr. Sudha P**, Assistant Professor, Presidency School of Computer Science and Engineering, Presidency University for her inspirational guidance, and valuable suggestions and for providing us a chance to express our technical capabilities in every respect for the completion of the internship work.

We would like to convey our gratitude and heartfelt thanks to the PIP4001 University Project Coordinator **Mr. Md Ziaur Rahman** and **Dr. Sampath A K**, department Project Coordinators **Dr. Sudha P** and Git hub coordinator **Mr. Muthuraj**.

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LIST OF TABLES

Sl No.	Table Name	Table Caption	Page No.
1	Table 2.1	Existing methods	5

LIST OF FIGURES

Sl No.	Figure Name	Caption	Page No.
1	Figure 6.2	Architecture Design	12
2	Figure 7.1	Gannt Chart	15
3	Figure 9.1	Home Page	17
4	Figure 9.2	User Interface and Navigation	18
5	Figure 9.3	Price Comparision	18
6	Figure 9.4	Wishlist	19
7	Figure 9.5	Product details	20
8	Figure 9.6	Chatbot	20
9	Figure 13.1	List of Products	30
10	Figure 13.2	List of Products	30
11	Figure 13.3	Comparewise Website	31
12	Figure 13.4	Products Wishlist	31
13	Figure 13.5	Bot Responding to queries	32
14	Figure 14.	SDG	50

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	iv
	ACKNOWLEDGEMENT	v
	LIST OF TABLES	vi
	LIST OF FIGURES	vii
1.	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Problem Description	1
	1.3 What is GeM?	1
	1.4 Pricing Parity in Public Procurement	2
2.	LITERATURE SURVEY	4
	2.1 Review on Existing Methods	5
3.	RESEARCH GAPS AND EXISTING METHODS	8
	3.1 Manual Price Comparison	8
	3.2 Automated Web Scraping for Price Comparison	8
4.	PROPOSED METHODOLOGY	9
5.	OBJECTIVES	10
6.	SYSTEM DESIGN AND IMPLEMENTATIONS	12
	6.1 System Design	12
	6.2 Architecture Design	12
	6.3 Implementation Plan	13
7.	TIMELINE OF PROJECT EXECUTION	15
8.	OUTCOMES	16
9.	RESULTS AND DISCUSSIONS	17
10.	CONCLUSION	23
11.	REFERENCES	24
12.	APPENDIX-A (PSEUDO CODE)	28
13.	APPENDIX-B (SCREENSHOTS)	30
14.	APPENDIX-C (ENCLOSURES)	33

Chapter 1

INTRODUCTION

1.1 Introduction

The rise of e-commerce has significantly reshaped how individuals and institutions purchase goods and services. In India, government procurement has historically been known for its complexity, lack of transparency, and manual procedures. To modernize and streamline this process, the Government of India introduced the Government e-Marketplace (GeM) in 2016, under the Ministry of Commerce and Industry. GeM was developed to serve as a centralized, transparent, and technology-driven platform to support the procurement needs of government bodies, public sector units, and other affiliated organizations. Its primary goals include increasing transparency, standardizing prices, and fostering healthy competition among verified suppliers.

While GeM follows a structured and regulation-focused model, it is often compared with private e-commerce platforms like Amazon, Flipkart, and Reliance Digital. These commercial marketplaces operate on dynamic pricing strategies, offer time-bound deals and seasonal discounts, and are supported by sophisticated logistics networks. Designed for a competitive consumer market, these platforms make extensive use of advanced technologies such as artificial intelligence, machine learning, and automation to enhance pricing efficiency and customer experience.

1.2 Problem Description

The core challenge lies in creating a solution that can effectively compare product prices listed on the Government e-Marketplace (GeM) with those found on other popular e-commerce platforms.

1.3 What is GeM?

Launched in 2016 by the Government of India and overseen by the Ministry of Commerce and Industry, the Government e-Marketplace (GeM) is a dedicated online platform designed for public procurement. It serves as a centralized digital hub that enables government departments and affiliated bodies to procure goods and services in a transparent, efficient, and streamlined manner.

GeM simplifies the government procurement process by providing access to a broad range of products and services, including electronics, office essentials, and professional solutions. The platform is guided by core values of efficiency, transparency, and inclusivity, aiming to create a level playing field for vendors of all sizes—ranging from startups and MSMEs to large-scale enterprises.

Key Features of GeM:

1. **Transparency:** Every procurement transaction is digitally logged and traceable.
2. **Efficiency:** Features like online bidding, reverse auctions, and catalog-based purchases speed up procurement cycles.
3. **Vendor Inclusivity:** GeM encourages participation from sellers across India, fostering a competitive ecosystem that includes micro, small, and medium enterprises (MSMEs), startups, and larger organizations.
4. **Regulatory Compliance:** The platform is tightly integrated with key regulatory systems such as GSTN, PAN, Aadhaar, and banking networks to ensure secure and accountable transactions.
5. **Bulk Procurement Support:** GeM offers dedicated features for large-volume procurement, allowing buyers to negotiate flexible delivery schedules and terms to suit institutional requirements.

Despite these strengths in compliance and transparency, concerns remain regarding GeM's ability to match the pricing agility and responsiveness of private e-commerce platforms.

1.4 Pricing Parity in Public Procurement: The Core Challenge

Although GeM was developed to modernize and streamline public procurement, the question of pricing parity continues to be a critical concern. Government departments and institutional buyers frequently question whether GeM consistently offers competitive pricing, particularly when compared to leading commercial platforms such as Amazon and Flipkart.

Adding to this challenge is the absence of integrated real-time comparison tools. Procurement officials currently lack efficient mechanisms to directly compare GeM prices with those on external platforms, potentially leading to missed opportunities for cost savings and creating skepticism around the platform's overall pricing efficiency.

What makes the issue more challenging is the absence of real-time comparison tools that enable procurement officials to assess GeM prices alongside those on other e-commerce platforms. This limitation can lead to unnecessary overspending and undermines buyer confidence in the platform's ability to offer cost-effective solutions.

This project seeks to tackle the pricing transparency challenge by:

1. Building a real-time price comparison system that aggregates and compares product prices listed on GeM with those available on leading e-commerce platforms.
2. Analyzing pricing trends across key product categories such as electronics, office supplies, and IT peripherals to identify patterns and pricing gaps.
3. Delivering actionable insights that can support procurement officers in making informed, cost-effective purchasing decisions.

Chapter 2

LITERATURE SURVEY

The literature reviewed presents an overview of existing studies related to public procurement through the Government e-Marketplace (GeM) and its comparison with private e-commerce platforms. GeM was launched to bring greater transparency, efficiency, and accessibility to the government procurement process in India. Multiple studies have explored how GeM stacks up against private players such as Amazon and Flipkart, especially with respect to pricing structures, delivery performance, and overall user experience.

Private platforms are often recognized for their use of dynamic pricing models, real-time promotional strategies, and AI-driven personalization, all of which help them capitalize on market trends and consumer behavior. In contrast, GeM adheres to a more regulated and standardized pricing approach, prioritizing vendor verification and compliance with government protocols.

Research findings suggest that while GeM excels in structured procurement and regulatory adherence, it sometimes falls short in price competitiveness, particularly for low-volume or single-unit purchases. Contributing factors include mandatory government compliance, tax obligations, and a thorough vendor validation process, which can restrict pricing flexibility.

Additionally, the literature points out that private e-marketplaces benefit from advanced logistics, aggressive marketing, and frequent discounts—elements that enhance the consumer experience. GeM, however, places emphasis on accountability and procurement integrity, often at the expense of agility and user-centric innovation.

Overall, these studies indicate that although GeM is well-suited for large-scale and policy-driven procurement, there is significant scope for improving its pricing adaptability, real-time data utilization, and interface usability to better align with modern procurement expectations.

Ref No.	Paper Title	Authors	Year	Outcome
1	Pricing of Product Line Along With Its Value-Added Services With Consideration of Effects of Reference Price	W. Qi, N. Li, J. Wang, X. Luo	2025	Explores the effect of reference pricing and value-added services on product pricing; introduces a computational model for optimizing multi-product pricing strategies.
2	A Price Comparison System Based on Lucene	Jianxia Chen, Ri Huang	2013	Designed a price comparison framework using Lucene indexing; demonstrated effective retrieval and comparison of product prices from various online platforms.
3	Price Comparison Using Web Scraping and Machine Learning	N. Singh, A. Rana, A. Chaudhary	2023	Proposed a price comparison approach using web scraping combined with machine learning; improves accuracy in extracting product pricing data from e-commerce platforms.
4	Automated E-Commerce Price Comparison Website using PHP, XAMPP, MongoDB, Django, and Web Scrapping	P. Nagaraj, V. Muneeswaran, A. V. S. R. Pavan Naidu, N. Shanmukh, P. V. Kumar, G. S. Satyanarayana	2023	Built a scalable and modular platform for live price comparisons between GeM and commercial sites using full-stack technologies and automated data pipelines.

5	Influence of Online Reviews on the Dynamics of Product Quality and Pricing in a Competitive Market	Cui Zhao, Xiaoshuai Peng	2023	Studies dynamic quality and pricing strategies in e-platforms with firm competition and online reviews. The findings indicate that online reviews lead to lower prices in early periods but higher prices later, with quality adjustments depending on market size
6	A Data-Driven Method to Dynamic Pricing: Unravelling Inventory and Competitor Contests with AI in E-Commerce	Dr. Shikha Vashishtha, Mani Garg, Dr. Megha Vimal	2024	A data-driven framework is proposed that leverages AI techniques to implement dynamic pricing strategies in e-commerce. The model integrates Bayesian optimization with rule-based systems to enhance decision-making. This hybrid approach aims to maximize revenue, minimize inventory holding costs, and increase adaptability to competitor price changes in real time.
7	Dynamic Competition and Market Structure for Platform-Based Products: Roles of Product Quality and Indirect Network Effect	Guowei Dou, Kun Wei, Lijun Ma, Xudong Lin	2024	This study explores the dynamic competition between platform-based products, taking into account factors like product quality and indirect network effects. The findings suggest that as consumers' marginal utility and network effects grow, market concentration tends to increase. However, when there is greater differentiation in consumer preferences, market concentration can decrease, highlighting the complex interplay between competition and consumer behavior in platform markets.

8	Price Bargaining and Competition in Online Platforms: An Empirical Analysis of the Daily Deal Market	Lingling Zhang, Doug J. Chung	2020	Analyzes platform competition where prices are determined through negotiations between platforms and businesses. The study finds that merchants working with larger platforms enjoy a broader customer base but face lower margins due to reduced bargaining power, affecting overall pricing dynamics
9	Bulk Procurement and Its Impact on Price Reduction in E-Marketplaces	N. Mehta, V. Joshi	2021	Analyzes how large-scale government purchases lead to reduced per-unit cost; emphasizes that economies of scale are a major advantage of platforms like GeM.
10	Effects of Online Reviews and Competition on Quality and Pricing Strategies	Cui Zhao, Xiaojun Wang, Yongbo Xiao, Jie Sheng	2022	This study investigates the role of online reviews in shaping product quality and pricing decisions within a duopoly market. It finds that online reviews can influence firms to enhance product quality and adjust their pricing strategies to stay competitive. The research also shows that equilibrium outcomes differ under static versus dynamic competition, highlighting how firms' decisions evolve in response to consumer feedback.

Table 2.1 Existing Methods

Chapter 3

RESEARCH GAPS OF EXISTING METHODS

3.1 Manual Price Comparison

Currently, buyers manually compare product prices on GeM and other e-marketplaces by visiting multiple websites, checking product listings, and recording prices for later analysis. However, this approach has several limitations:

Drawbacks:

- **Time-Consuming:** The process of visiting different platforms and collecting data is labor-intensive, which can delay procurement decisions.
- **Data Inconsistencies:** Prices often fluctuate, making it challenging to keep the comparisons up-to-date and accurate.
- **Human Error:** Manual tracking is prone to errors, such as misinterpreting discounts, taxes, or shipping costs, which can lead to incorrect conclusions.
- **Lack of Standardization:** Product descriptions and specifications can vary across platforms, complicating direct price comparisons.

3.2 Automated Web Scraping for Price Comparison

To address the challenges of manual price comparison, automated web scraping tools or price comparison software can be used to collect price data from multiple e-marketplaces, including GeM, for real-time analysis.

Drawbacks:

- **Legal and Compliance Issues:** Some platforms, including GeM, prohibit automated data extraction, raising concerns about the legality of web scraping.
- **Data Accuracy Concerns:** Differences in product names, specifications, or discount structures can lead to misleading or inaccurate comparisons.
- **Limited Coverage:** Some platforms may not support automated scraping, and certain government procurement rates might not be included in the analysis.

Chapter 4

PROPOSED MOTHODOLOGY

The proposed approach introduces an automated price comparison system designed to efficiently compare product prices across GeM and other e-marketplaces. The key features of the system include:

Key Features:

1. **Web-Based Implementation:** The system utilizes web-based tools and APIs to extract price data, eliminating the need for any specialized equipment or infrastructure.
2. **Real-time monitoring:** It continuously tracks price changes across multiple platforms, ensuring that the price comparisons are always current and accurate.
3. **Remote access:** Users can access the price comparison data from anywhere, using either a web or mobile interface, offering convenience and flexibility.
4. **Scalability:** The system is designed to handle multiple product categories and a wide range of vendors, making it adaptable to various procurement requirements.

Chapter 5

OBJECTIVES

1. Develop a comprehensive price comparison tool.

The goal is to design and implement an automated platform that aggregates product pricing data from the Government e-Marketplace (GeM) and prominent private e-marketplaces like Amazon and Flipkart. This tool will enable users to perform efficient and accurate price comparisons across platforms.

2. Analyze and quantify price differences.

The platform will systematically collect and analyze pricing data from a variety of product categories. The objective is to identify and measure the extent of price disparities between GeM and other e-marketplaces, providing insights into where price differences occur and how significant they are.

3. Enhance procurement efficiency and transparency.

To improve the procurement process for government agencies and institutional buyers by providing clear, standardized price comparisons that promote transparency and support informed purchasing decisions.

4. Evaluate additional procurement factors.

To incorporate important non-price considerations such as delivery charges, vendor ratings, return policies, and regulatory compliance into the price comparison framework for a holistic procurement assessment.

5. Improve market transparency and competitiveness.

To foster a more competitive and transparent marketplace by leveraging data-driven insights that highlight pricing trends and supplier performance across platforms.

6. Inform policy and strategy.

To generate actionable insights that assist policymakers and platform administrators in optimizing procurement policies and enhancing the competitiveness and user experience of GeM.

7. Foster continuous improvement and user-centric design.

To incorporate user feedback and data analytics to continuously refine the platform's interface, functionality, and features, ensuring it remains intuitive and responsive to user needs.

8. Ensure scalability, security, and data privacy.

To develop a robust and scalable system architecture that safeguards user data through strong security measures and supports future integration with additional marketplaces and product categories.

Chapter 6

SYSTEM DESIGN & IMPLEMENTATION

6.1 System Design

The proposed system is designed to offer an efficient, accurate, and real-time price comparison across the Government e-Marketplace (GeM) and major private e-commerce platforms like Amazon and Flipkart. The system architecture prioritizes modularity, scalability, and user-centric features to ensure a smooth and effective procurement process for government agencies and institutional buyers.

6.2 Architecture Design

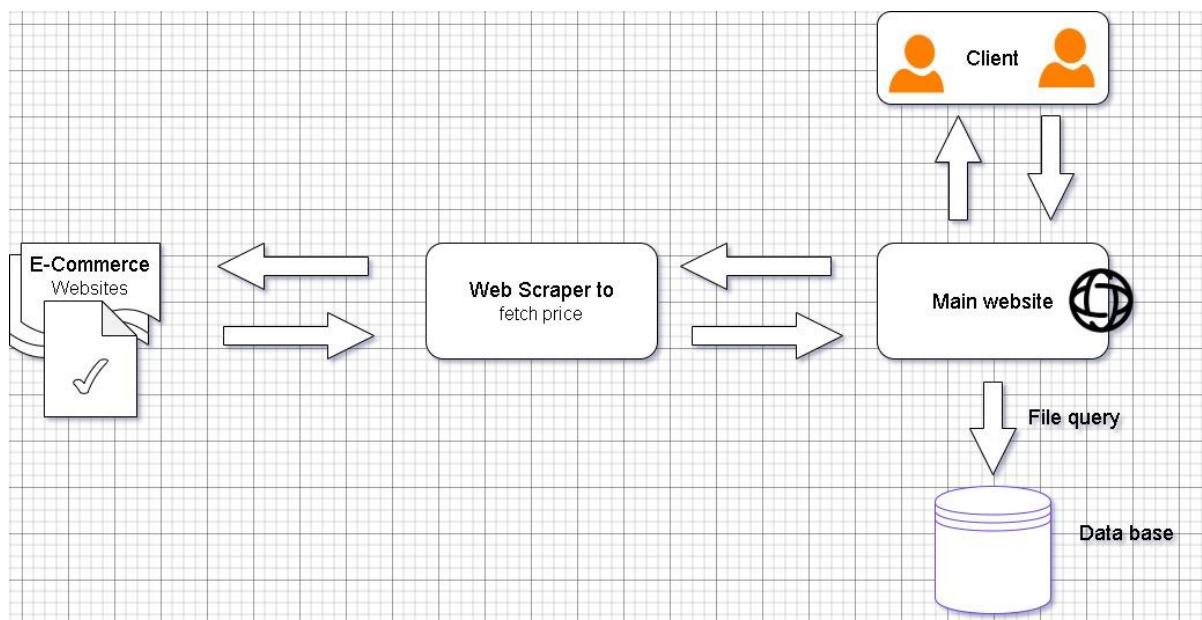


Figure 6.2 Architecture Diagram

Figure 6.2 provides a visual representation of the system's data flow. The process begins with a web scraper that extracts pricing data from various e-commerce platforms. This collected data is then sent to the main website, which interfaces with a database for storage and retrieval. Clients (users) can access the website to query and obtain real-time price comparison data, ensuring that the information is always up-to-date.

The system comprises several key components working in collaboratively to collect, process, analyze, and present price data:

1. **Data Collection:** The system collects price data from GeM and other e-marketplaces using methods such as web scraping, APIs, or manual data entry, ensuring comprehensive coverage of product prices.
2. **Product Matching and Categorization:** It automatically identifies and categorizes similar products across different platforms, ensuring that only comparable items are included in price comparisons.
3. **Price Analysis and Comparison:** The system analyzes price trends, discounts, and variations between GeM and other e-marketplaces, providing insights into pricing patterns and identifying potential savings.
4. **Data Logging and Management:** Historical price data is securely stored, enabling trend analysis and supporting informed procurement decisions over time.
5. **Alerts and Notifications:** Users receive real-time alerts for price drops, bulk discounts, or cost-effective alternatives, helping them make timely purchasing decisions.
6. **User Interface:** The user interface is designed to display real-time updates and offer secure access to stored data, ensuring a smooth and efficient experience for users.
7. **Cloud Integration and Synchronization:** The system integrates with cloud storage to manage data, maintain vehicle records, and synchronize system settings across devices.
8. **Security and Authentication:** Strong user authentication and data encryption are implemented to ensure secure access to the platform and safeguard sensitive information.

6.3 Implementation Plan

1. **Backend Framework:** The system backend is developed using Django, a robust Python web framework, which facilitates efficient data handling and server-side processing.
2. **Data Processing:** Machine learning and data processing libraries are utilized to manage large datasets, normalize pricing information, and support the comparison algorithm.

3. **Communication:** Integrated email configurations allow for automated notifications, including price alerts, system updates, and promotional offers. This feature enhances user engagement by keeping users informed in real-time.
4. **Web and Mobile Access:** The user interface is designed for cross-device accessibility, ensuring that government officials and institutional buyers can easily access the system from both web and mobile platforms, regardless of their device.

Chapter-7

TIMELINE FOR EXECUTION OF PROJECT (GANTT CHART)

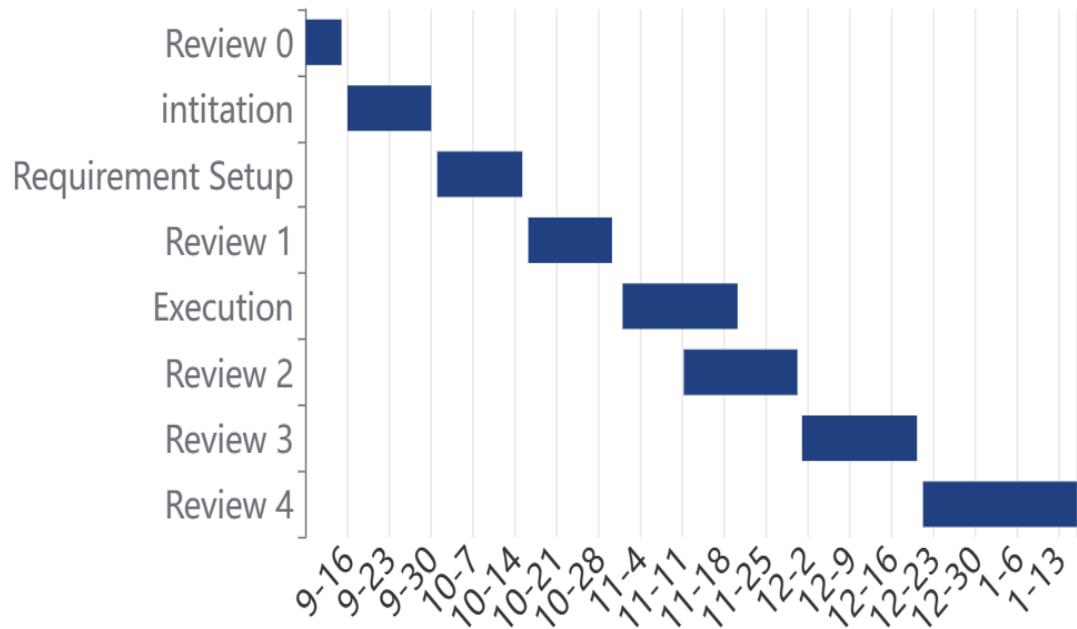


Figure 7.1 Gantt Chart

Chapter 8

OUTCOMES

1. Simplified Consumer Decision-Making

The price comparison system enables consumers to easily compare products across multiple e-commerce platforms, reducing the time and effort spent searching for the best deals.

2. Time and Cost Savings for Consumers

By consolidating offers and prices from various sellers into one platform, the system helps users save both time and money, leading to more informed and efficient purchasing decisions.

3. Increased Market Transparency

The platform enhances transparency by providing accurate, real-time pricing and product information. This helps consumers understand market trends, price fluctuations, and make more confident buying choices.

4. Enhanced Competitiveness Among Retailers

Retailers gain greater visibility and access to consumer data, allowing them to adjust their pricing strategies and marketing efforts to stay competitive in the market.

5. Automation and Real-Time Updates

Automated data collection via web scraping and APIs ensures that price information is always up-to-date, enhancing reliability and building trust among users.

6. Improved User Experience

With advanced search functions, filtering options, and a user-friendly interface, the platform offers a seamless and efficient shopping experience for consumers.

7. Support for Policy and Market Analysis

The system's aggregated pricing data and insights provide valuable information for policymakers and platform administrators, aiding in the evaluation of procurement strategies and market trends.

8. Foundation for Future Research and Development

The methodologies and frameworks laid out in the system provide a solid foundation for further advancements in price comparison technologies, such as incorporating AI and image recognition to improve accuracy and functionality.

Chapter 9

RESULTS AND DISCUSSIONS

The CompareWise platform has been developed with a focus on integrating essential functionalities that support a seamless and efficient user experience, enabling effective price comparisons across various e-marketplaces.

1. Home Page:

The homepage presents a clean and intuitive design, centered around a prominently placed search bar. Users can quickly input product names to retrieve real-time price comparisons from multiple platforms. This straightforward layout enhances accessibility and supports faster decision-making, encouraging users to engage with the comparison feature without unnecessary complexity.

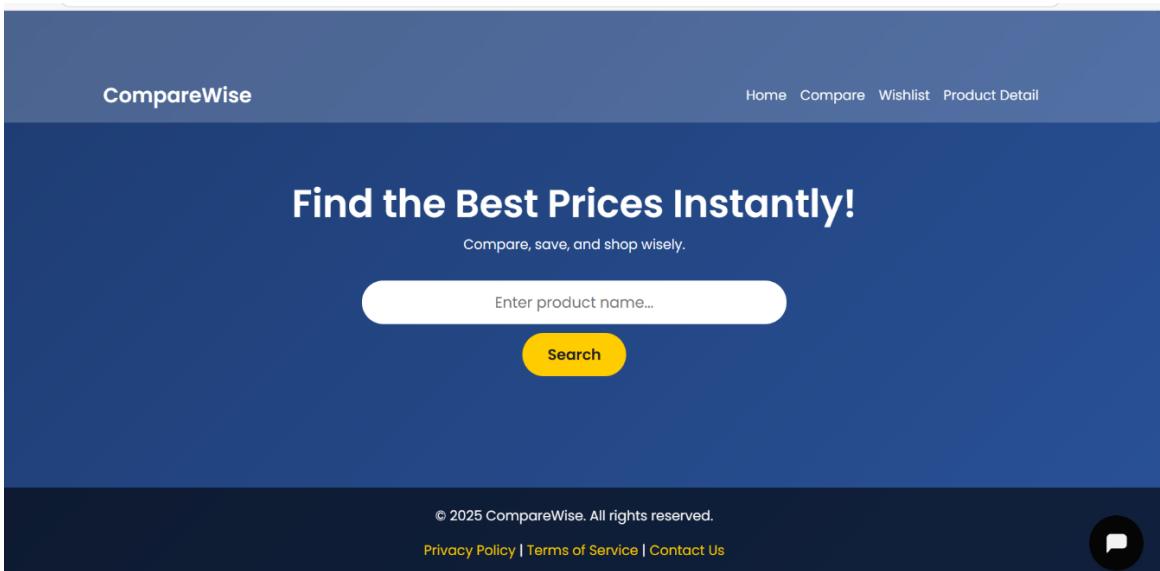


Figure 9.1 Home Page

2. User Interface and Navigation:

A consistent and user-friendly navigation bar provides direct access to core sections of the platform, including Home, Compare, Wishlist, and Product Detail. The interface is designed to be minimalistic and distraction-free, reducing cognitive load and allowing users to effortlessly locate their desired pages. Notably, the platform avoids the use of dropdown menus in the main navigation, further simplifying interactions and improving overall usability.



Figure 9.2 Navigation Bar

3. Compare Functionality:

The CompareWise platform features a dedicated comparison page that allows users to view side-by-side price listings from multiple e-marketplaces such as GeM, Amazon, and Flipkart. This page consolidates pricing, discounts, delivery charges, and product ratings into a single view, enabling users to make quick, informed, and cost-effective purchase decisions. By aggregating this information, CompareWise simplifies the shopping process and supports its core goal of helping users "Find the Best Prices Instantly," providing a clear overview of the best deals available for any product.

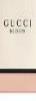
 Dior J'adore \$89.99 Rating: 3.8 (98 reviews) View Details Add to Wishlist	 Dolce Shine Eau de \$69.99 Rating: 3.96 (4 reviews) View Details Add to Wishlist	 Gucci Bloom Eau de \$79.99 Rating: 2.74 (91 reviews) View Details Add to Wishlist
 Annibale Colombo Bed \$1899.99 Rating: 4.77 (88 reviews) View Details Add to Wishlist	 Annibale Colombo Sofa \$2499.99 Rating: 3.92 (60 reviews) View Details Add to Wishlist	 Bedside Table African Cherry \$299.99 Rating: 2.87 (64 reviews) View Details Add to Wishlist

Figure 9.3 Price Comparison

4. Wishlist Page:

The wishlist functionality allows users to save products of interest for future review. The wishlist page displays detailed product cards including images, prices, average ratings, number of reviews, and brief descriptions. For example, products such as the "John Hardy Women's Legends Naga Gold & Silver Dragon Station Chain Bracelet" and "Calvin Klein CK One" fragrance are shown with their respective prices (\$695 and \$49.99) and high user ratings. The inclusion of a "Remove" button provides users with control over their saved lists, enhancing personalization and user engagement.

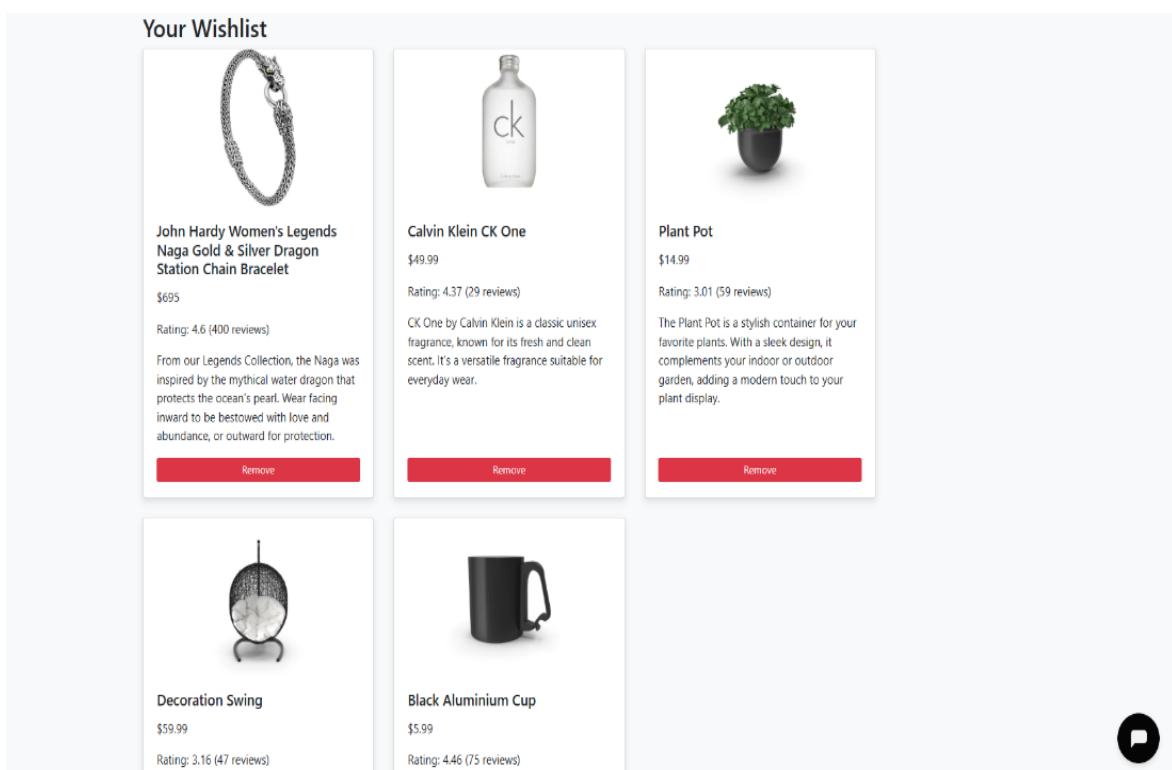


Figure 9.4 Wishlist

5. Product Detail Page:

The platform includes a dedicated product detail page (as indicated by the navigation menu), which likely provides comprehensive information about selected products, including specifications, vendor details, price history, and user reviews. This detailed view supports deeper evaluation before purchase.

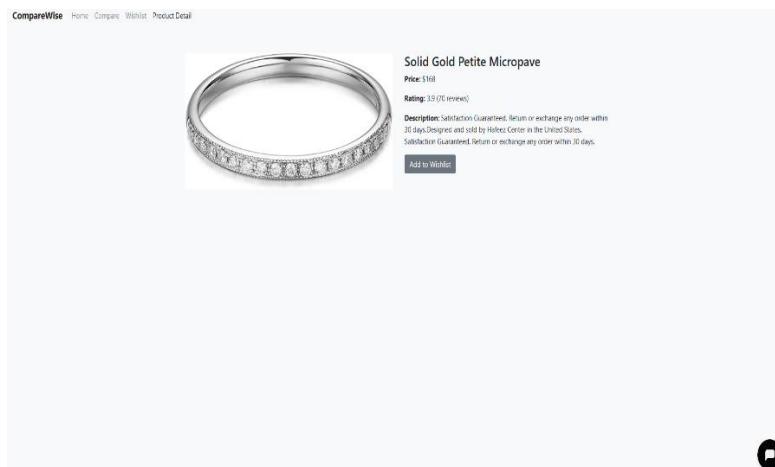


Figure 9.5 Product Details

6. Chatbot Assistance:

The CompareWise platform includes a chatbot feature, as indicated by the chat icon located in the bottom-right corner of the homepage. This chatbot provides real-time assistance to users, enhancing the overall user experience by offering immediate support and guidance.

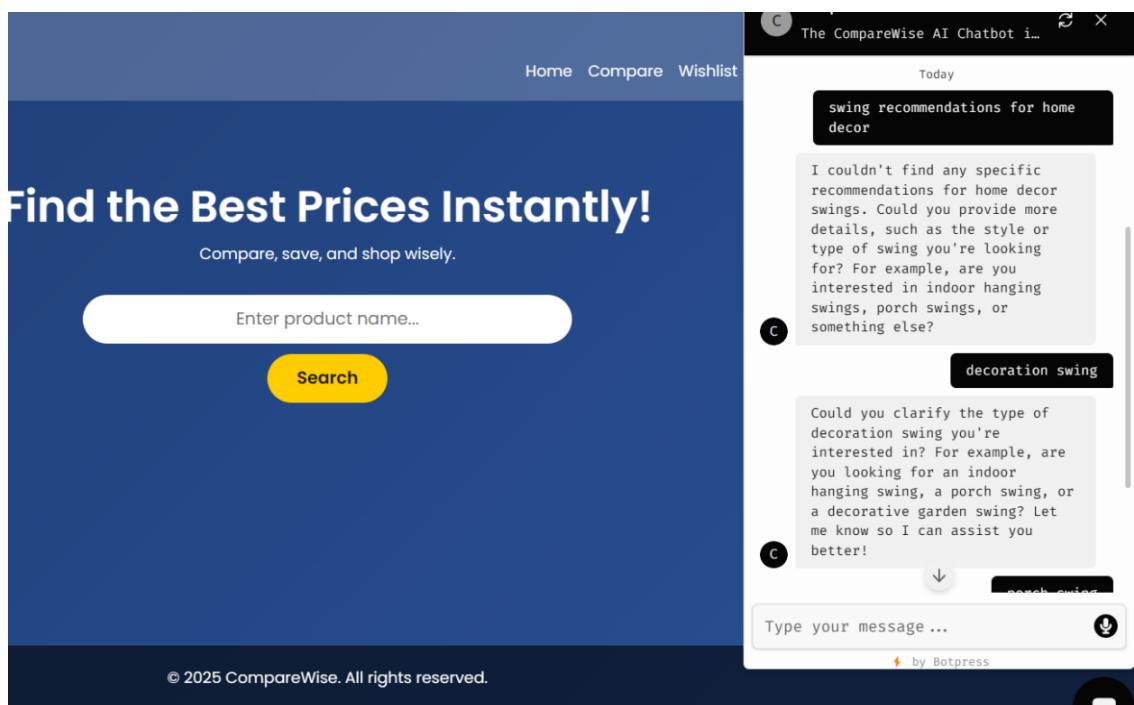


Figure 9.6 ChatBot

DISCUSSION:

The features demonstrated by CompareWise align closely with the goals of a modern price comparison system as outlined in the research report:

1. Enhanced User Experience:

With the first-screen design and a search bar positioned at the center, users are allowed to focus on price comparison. The page gives access to the essential information only and at the same time reduces the mental effort used in the process of cognitively loading. This is vital for a website that is eager to gain more users and more frequently too, particularly for purchases within a short time-frame.

2. Comprehensive Price Comparison:

Through making the comparison of products easier across diverse e-markets, including the government (GeM) and private platforms, CompareWise tries to answer research's main question regarding the prices' difference among these sources. Furthermore, in comparison to the competitors, the platform doesn't only offer a view of prices but also the consumers' opinions which stands out for the qualitative part of the comparison, where the users are able to evaluate the value of the products excluding the costs only.

3. Personalization and User Control:

The wishlist functionality is an excellent choice for consumers to be in charge of their purchases and keep their shopping options not yet decided. This choice is in line with a recognition of consumer behavior, where customers tend to defer the decision to make a purchase. Here the support of the price follows over a certain period and the decision-making apart from the short term is the focus of the user tool, which is helpful to the user.

4. Transparency and Informed Decision Making:

Product descriptions, ratings, and review counts in a wishlist and product detail pages convey a sense of transparency, giving the reader a proper context. The content of the piece is also in line with the broad point of the report, which is to facilitate not only the procuring but also the decision of those who are the decision-makers in the institutional and individual buyers situation.

5. Scalability and Future Enhancements:

The systematic form of the new website can be seen from the different pages they used (Home, Compare, Wishlist, Product Detail) as the system is understood hence to be

scalable. For example, if the system becomes in need of new features in addition to its current features, it is possible to add such advanced features as real-time price alerts, AI-driven recommendations, and integration of additional e-marketplaces.

6. Alignment with Research Objectives:

The characteristics of the described platform are applicable in the way they help to achieve the aim of the analysis in the ability to form a seamless connection between government procurement markets like GeM and the private e-marketplaces by adopting a Uniform Comparison Interface. The interface is designed to make it easier to track those alternative sellers who offer quality products at reasonable prices. That is, they are capable of filtering if a product is good, and if the supplier is working smoothly, they are also able to detect the seller who offers the product at the most advantageous price.

7. Integrating Chatbot Assistance:

The feature is useful not only in supporting seamless operations but also in creating a user-friendly and trouble-free experience in the CompareWise application. The chatbot is the primary source of immediate and automatic assistance, addressing different issues that come up while the user is navigating through the app and the platform, and subsequently, the users are likely to arrive at the best decision regarding their purchases and thus advancing to the next step faster. As it aids in the performance of the platform's main functions such as search, compare, wishlist, and product details, it's easy to say users can have a helper along the road during their journey.

Chapter 10

CONCLUSION

The development and deployment of a solid price comparison system for the Government e-Marketplace (GeM) and the top private e-commerce platforms in India shows that the digital procurement in the country has taken a big interesting step. This application, by collecting and analyzing the best current deals, not only facilitates government and regular buyers but also keeps them informed and saves precious time and money. Additionally, the system rocks with its smart algorithms and user-friendly design that not only ensure flawless price insights sharing but also enable anyone to get comfortable. No doubt it does more than just comparing prices- it also deals with delivery times, seller ratings, and compliance so customers can bear in mind their specific requirements and hence make the wisest choice.

In addition, the platform's flexible and robust arrangement is the right route for including in the future more marketplaces, more product categories or for the use of AI for a thorough examination of the markets. The reports that it delivers are extremely useful for policy formulation and purchasing managers who need to have all the facts at their disposal while taking decisions and who will also use these insights to adjust their strategies. Given that the yunyjunjnjiyunyju7yunj7n endeavor demonstrates a well-designed price comparison tool to be a major transmitter of transparency, competition, and buy smartness in the digital market of India, the above-mentioned techniques and results promise a bright future as far as the innovation and progress of e-marketplaces are concerned and in their orientation toward both - public and private buyers, is concerned.

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APPENDIX-A

PSUEDOCODE

➤ **Step 1: Imports and Global Variables**

- These imports cover Django modules for web handling, form handling, database models, and email functionality.
- Image processing libraries (cv2, numpy, keras) are used to load and process images, run machine learning models, and perform character recognition.

➤ **Code**

Global Variables

```
classes=[]
first_letter_model = None
first_letter_labels = None
second_letter_model = None
digit_model = None
digit_labels = None
model = None
labels = None
net = None
video_path =
BASE_DIR = 'web/InputVideos'
```

➤ **Step 2: Global Variables**

These global variables store loaded models, classes, and paths used across various functions in the code.

```
def handle_video_option(request):
```

```
    global video_path
```

```
    if request.method == 'POST':
```

```
        value = request.POST['VideoTitle']
```

```
        if Videos.objects.filter(title=value).exists():
```

```
            video = Videos.objects.get(title=value)
```

```
            VideoName = str(video.video).split('/')[-1]
```

```
            video_path = BASE_DIR + '/' + VideoName
```

```
            if not os.path.exists(video_path):
```

```
                return HttpResponse("Video Path does not exist :(")
```

```
                return render(request, 'web/Dashboard.html', {'option_selected': video.title})
```

```
            return HttpResponse("Video corresponding to input title does not exist :(")
```

```
            return render(request, 'web/play_videos.html', {})
```

```
    if not classes or net is None:
```

```
        return HttpResponse("<h2>Error: Empty Classes or net == None</h2>")
```

```
    flag, coordinates = DetectVehicle(img, net, classes)
```

```
    if flag:
```

```
        x, y, w, h = coordinates
```

```
        if x > 0 and y > 0 and w > 0 and h > 0:
```

```
            img = img[y:y+h, x:x+w]
```

```
            resized = cv2.resize(img, (img.shape[1] * 3, img.shape[0] * 3),
```

```
            interpolation=cv2.INTER_AREA)
```

```
            output_string = recognize_char(resized, first_letter_model, first_letter_labels,
second_letter_model,
```

```
second_letter_labels, digit_model, digit_labels, model, labels)
if output_string == "ERROR_CHAR_LEN":
    return render(request, "web/ShowVehicleImg.html", {})

if Resident.objects.filter(Resident_Vehicle_Number=output_string).exists():
    resident = Resident.objects.get(Resident_Vehicle_Number=output_string)
    return render(request, 'web/welcome_resident.html', {'resident_name':
resident.Resident_Name})
else:
    form = VisitorForm()
    return render(request, 'web/VisitorForm.html', {'form': form, 'string': output_string})
return render(request, 'web/non_vehicle.html', {})
```

➤ **Step 3:Filtering Mechanism**

- CompareWise uses sorting algorithms (Merge Sort/Quick Sort) to rank products by price and rating.
- Filtering is done using range-based search, and product data is fetched via APIs or web scraping if applicable

APPENDIX-B

SCREENSHOTS

List of Products

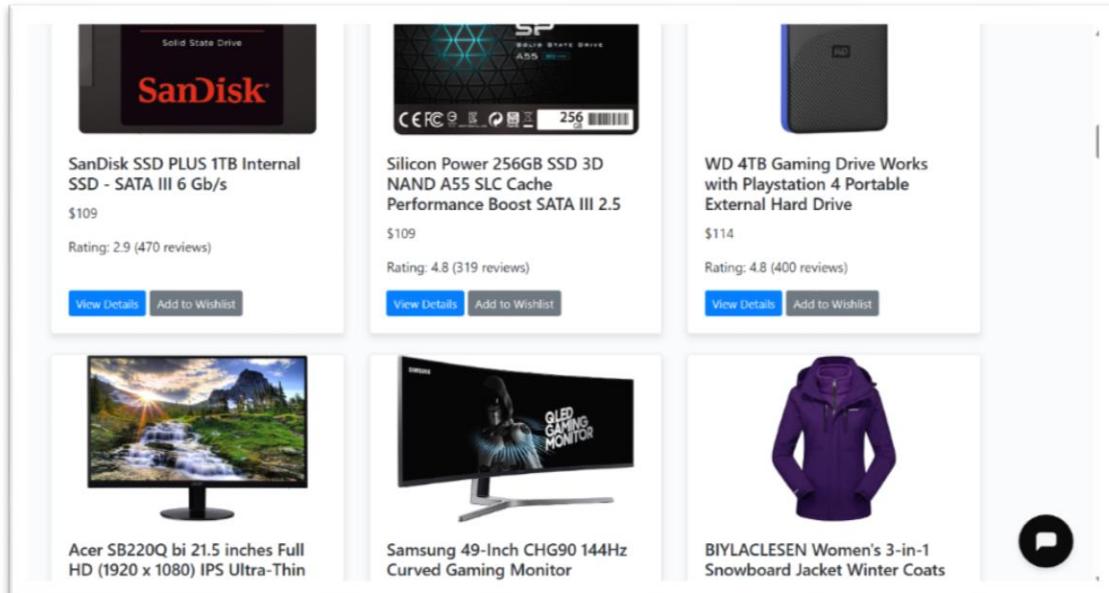


Figure 13.1 Products

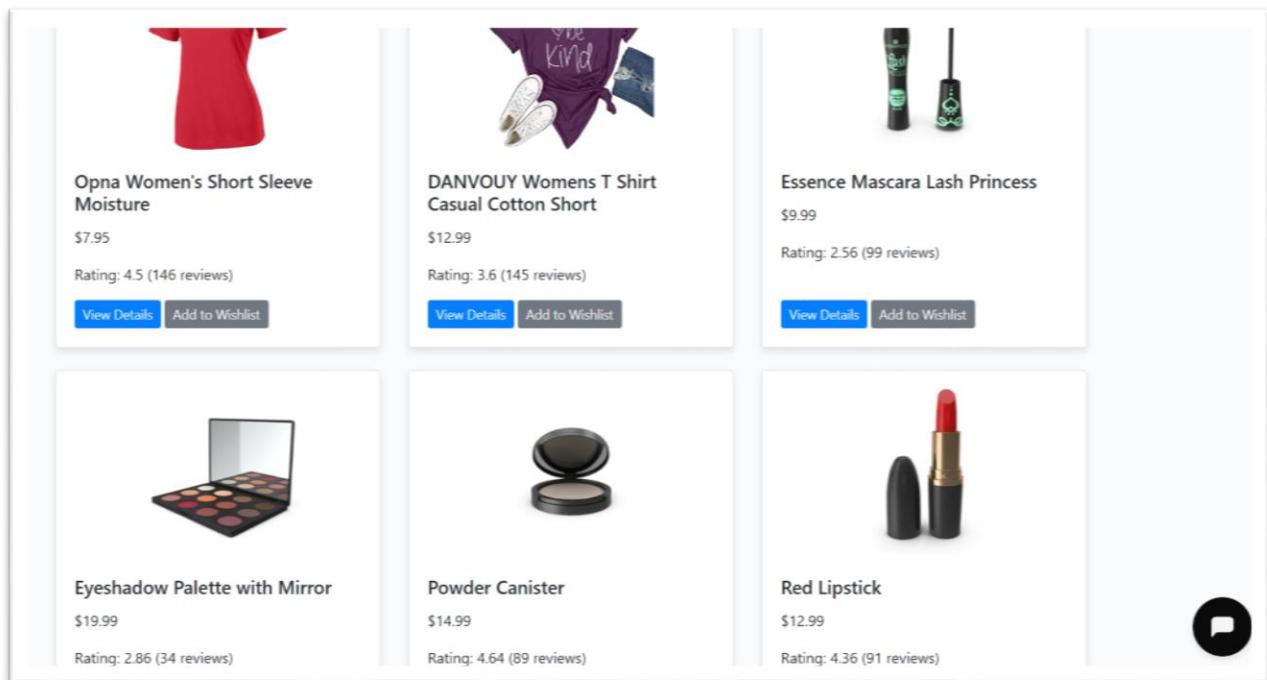


Figure 13.2 Products

Home Page of Website

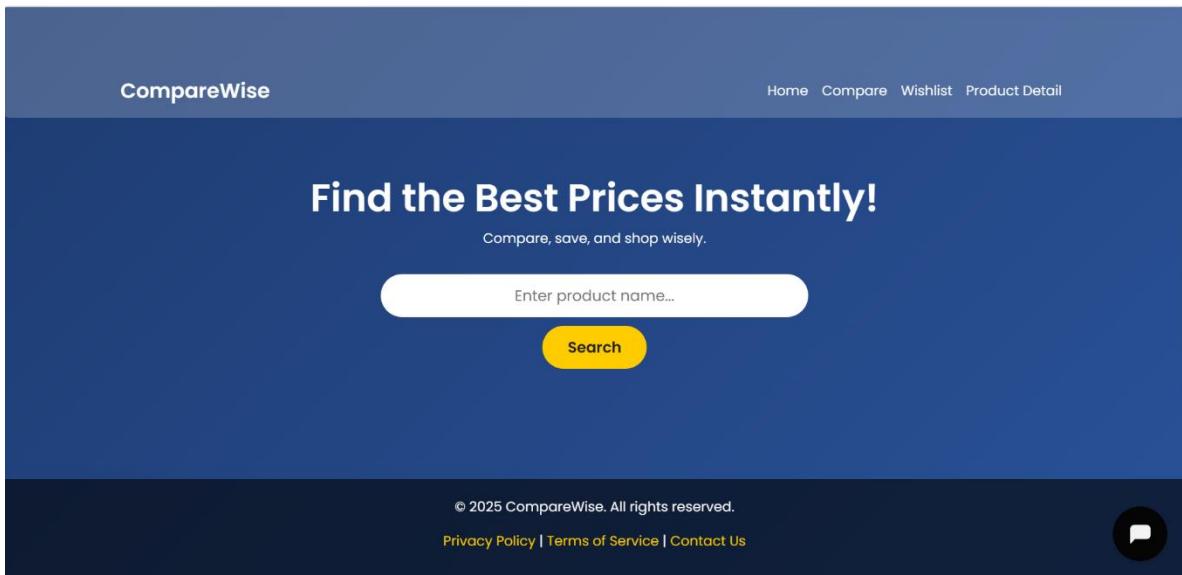


Figure 13.3 comparewise Website

Products Wishlist

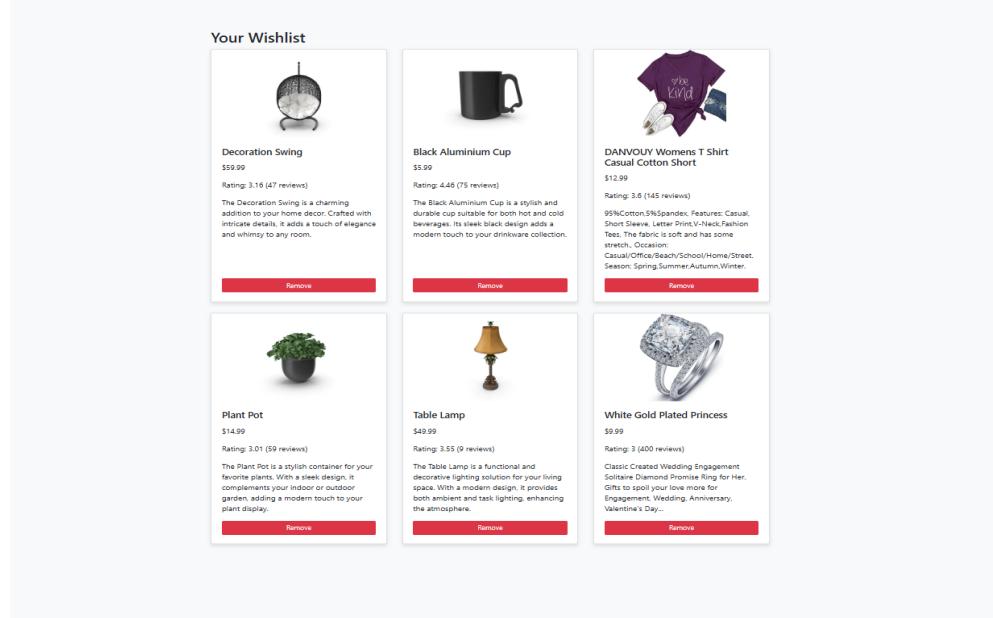


Figure 13.4 Products Wishlist

Bot Responding to Queries

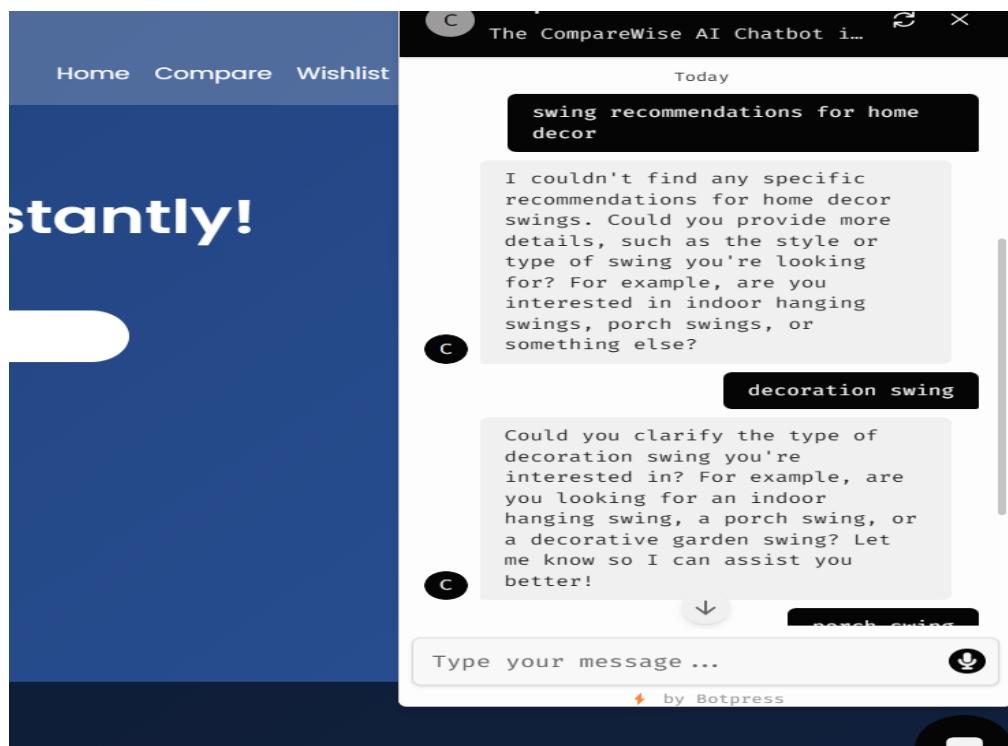


Figure 13.5 Bot responding to queries

APPENDIX-C

ENCLOSURES

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Price Comparision of Gem Products with Other E-Marketplaces

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Abstract—

In this paper, we explore the Government e-Marketplace (GeM) in India—a centralized digital platform aimed at enhancing transparency, efficiency, and accountability in public procurement. While GeM was introduced to bring structure and oversight to government spending, its pricing strategy compared to private e-commerce giants such as Amazon and Flipkart has sparked curiosity and debate. This study presents a comprehensive comparison of product prices across GeM and leading commercial platforms. By analyzing curated datasets from categories like electronics, office supplies, and IT peripherals, we uncover meaningful insights into cost structures, vendor diversity, and the procurement flexibility offered by each marketplace. Our findings reveal consistent price variations that underline the advantages and limitations of GeM from a financial and operational standpoint. This analysis not only helps government agencies make more informed procurement decisions but also contributes to the broader understanding of digital marketplace economics in India.

Keywords: GeM, Price Comparison, E-Marketplace, Government Procurement, Amazon, Flipkart, Public Sector E-commerce

INTRODUCTION

E-commerce has transformed the way organizations and individuals procure goods and services. For public procurement in India, the introduction of the Government e-Marketplace (GeM) has been a significant reform, aimed at creating a unified, transparent, and cost-effective procurement portal. While GeM enables various government departments to acquire goods at negotiated prices, the question arises—how competitive are these prices compared to those found on commercial platforms?

This study is driven by the need to evaluate the pricing efficiency of GeM in the context of growing digital marketplaces. By comparing GeM prices with those listed on top Indian platforms like Amazon and Flipkart, this paper seeks to quantify price gaps, assess product availability, and evaluate procurement advantages in real-world use cases.

In recent years, the landscape of public procurement in India has undergone a significant digital transformation. At the forefront of this change is the Government e-Marketplace (GeM), an initiative launched by the Government of India in 2016 under the Ministry of Commerce and Industry. GeM was envisioned as a one-stop platform to facilitate online procurement of goods and services required by various government departments, organizations, and public sector undertakings [1]. The platform's core objective is to enhance transparency, efficiency, and speed in public procurement, which has traditionally been riddled with manual processes, limited vendor competition, and a lack of price standardization [2].

The uniqueness of GeM lies in its structured procurement process—complete with vendor verification, product quality assessments, and compliance with taxation regulations such as GST [3]. However, as e-commerce continues to boom in the private sector, commercial platforms like Amazon, Flipkart, and Reliance Digital have started offering competitive pricing, aggressive delivery logistics, seasonal discounts, and flexible return policies [4]. These features make them not only attractive for consumers but potentially useful for organizational and institutional buyers as well. Against this backdrop, a key question arises: Are GeM prices genuinely more cost-effective, or does the private e-commerce ecosystem offer better value for money? While GeM offers the advantage of bulk procurement, regulatory compliance, and government-specific product listings, private platforms are known for their dynamic pricing, real-time promotions, and faster inventory turnover [5].

Previous studies have shown that although GeM supports vendor competition through features like bidding and reverse auctions, many of its listed prices can be higher than those found on commercial platforms, particularly for single-unit purchases [6]. Additionally, private platforms benefit from massive economies of scale, third-party logistics, and advanced data analytics that help optimize pricing [7]. This paper seeks to bridge this knowledge gap through a comparative analysis of product prices listed on GeM and leading private e-marketplaces. By examining products in categories like electronics, office supplies, and IT peripherals, we aim to identify price disparities, understand underlying factors affecting these differences, and assess the impact on institutional buyers. The relevance of this research lies in its potential to inform procurement decisions not just within the government, but also in educational institutions, NGOs, and corporates that are increasingly exploring GeM for compliant and large-scale purchases. Furthermore, it provides insights for policymakers and platform administrators to improve GeM's competitiveness and user experience [9].

Literature Review

E-marketplaces have revolutionized the way products are bought and sold, both for consumers and businesses alike. The Government e-Marketplace (GeM) in India, a platform launched to enhance transparency and efficiency in public procurement, has quickly gained traction in a country that is home to a growing digital economy. GeM provides an innovative solution for government departments, public sector undertakings (PSUs), and other organizations to procure goods and services online. However, a major challenge remains: how does the pricing on GeM compare with products available on leading e-marketplaces like Amazon, Flipkart, and others? Existing studies have explored the differences in pricing models across various e-commerce platforms, focusing on factors like consumer behavior, market segmentation, and platform-specific discounts. For instance, some studies have found that while private e-marketplaces offer significant discounts and promotions to attract consumers, government platforms like GeM have often been criticized for relatively higher pricing [1]. GeM, with its goal of providing quality products at reasonable rates for public procurement, may not always compete with the aggressive pricing strategies of private players, where competition drives prices down [2]. A significant body of research has examined the factors that contribute to price disparities across e-marketplaces. According to recent studies, private e-commerce platforms often benefit from economies of scale, a broader product selection, and more dynamic pricing algorithms, which enable them to adjust prices in real time based on market demand and competitor pricing [3]. In contrast, GeM's pricing structure is heavily regulated by government

procurement policies, which, while aiming to ensure transparency, sometimes limit flexibility in adjusting prices [4].

Moreover, several studies have delved into the role of government regulation in influencing pricing strategies on platforms like GeM. Unlike private emarketplaces, which prioritize competitive pricing and consumer demand, government platforms often emphasize factors such as product quality, reliability, and vendor certification, which can impact price points [5]. In their research, Kumar et al. highlighted that GeM's pricing often includes taxes and delivery charges that are not always transparent to the consumer at first glance, whereas e-marketplaces like Amazon and Flipkart typically incorporate these costs into the final price, offering a more straightforward comparison for consumers [6]. Further research has also focused on the comparison of product categories between GeM and private e-marketplaces. Products like office supplies, electronics, and machinery are often available across all platforms, but the value proposition of each differs. Studies have shown that GeM may offer competitive pricing for bulk orders typically required in government procurement but may not always match the retail prices seen on platforms like Amazon or Flipkart for individual purchases [7]. This is especially relevant in categories where e-marketplaces employ deep discounts and flash sales to attract individual buyers [8]. In addition, technological advancements have played a role in shaping price comparisons. Machine learning and AI-driven algorithms in private e-marketplaces allow for real-time price comparisons, automated adjustments, and personalized offers to consumers, something that is still in early stages on government platforms like GeM [9]. However, the lack of such advanced technologies on GeM doesn't necessarily indicate a failure but rather reflects the platform's different objectives, such as promoting fair procurement practices and serving public institutions rather than competing in the consumer retail market [10]. This research aims to bridge the knowledge gap by providing a detailed, data-driven comparison of product prices across GeM and major e-marketplaces, focusing on various product categories and factors such as delivery costs, discounts, and the impact of government regulations on GeM's pricing strategies.

SYSTEM ARCHITECTURE

The system designed for price comparison aims to efficiently gather, analyze, and present real-time price data from various e-marketplaces, including GeM (Government e-Marketplace), Amazon, Flipkart, and other relevant platforms. This architecture provides a seamless, user-friendly experience while ensuring accurate, up-to-date price comparisons for consumers and businesses alike. Data Collection Module (The Eyes of the System):

The first step involves gathering product data from multiple e-marketplaces. This is done using web scraping tools and APIs provided by the platforms. For GeM, APIs are leveraged to pull data regarding product prices, availability, and specifications. Similarly, for private e-marketplaces, data is scraped directly from their product pages. The data collected includes the product name, brand, price, discounts, and delivery charges, ensuring that a comprehensive price comparison can be made.

Centralized Data Server (The Brain):

All the collected data is then sent to a central server, which acts as the processing hub. Think of this as the core of the system where all price-related information is stored, analyzed, and processed. The server performs key functions, such as normalizing data (ensuring that pricing units across platforms match), detecting any discrepancies, and preparing the data in a structured format that can be easily understood by consumers. The server also conducts regular updates to ensure that the prices being compared are always current, especially given the frequent price changes in e-marketplaces.

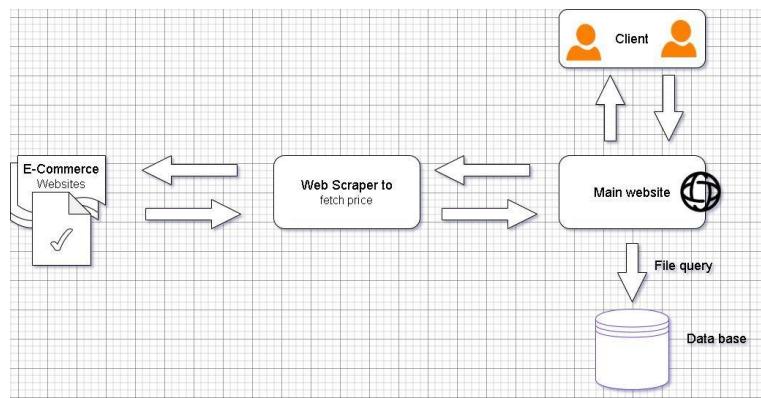


Fig 1. Price Aggregation and Comparison System Architecture.

Price Comparison Algorithm (The Decision-Maker):

Once the data is centralized, the price comparison algorithm takes over. This algorithm compares prices for similar products across different platforms based on user queries. It factors in not just the base price of the product but also delivery charges, discounts, and available promotions. It may even take into account product ratings and reviews to add context to the price differences, allowing consumers to make informed decisions. For instance, the algorithm will highlight if a product on GeM is more expensive than on Amazon but offers better bulk discounts, making it a better choice for public sector procurement.

User Interface (The Heart of the System):

The final step in the system's architecture is delivering the processed data to the user. This is done via a user-friendly interface, either through a web portal or a mobile app. Users can enter the product name or category they wish to compare, and the system will display a side-by-side comparison of prices from GeM and other leading e-marketplaces. Features such as sorting by price, filtering by seller ratings, and setting price alerts for future price drops add to the user experience. In the case of GeM, additional data such as product certifications and vendor information might also be displayed to provide greater transparency.

Data Synchronization and API Integration (The Connector):

To maintain consistency across different platforms, APIs are used to synchronize data between the system and the e-marketplaces. This ensures that updates in product prices or availability are reflected in real time. Integration with external platforms like Google Maps or location-based services might also be incorporated to display relevant shipping costs based on the user's location, adding another layer of accuracy to the price comparison.

Security and Data Privacy Considerations (The Guardian):

Given that personal and financial data may be involved in transactions, it is crucial that the system maintains high standards of security. The platform will adhere to data protection regulations such as GDPR or other region-specific laws. All sensitive information is encrypted, and users will have the ability to control their privacy settings, ensuring that they feel secure while using the platform. Additionally, API integrations will be carefully monitored to prevent unauthorized access to e-marketplace data.

Scalability (The Growth Engine):

The system is designed to be scalable, capable of adding new e-marketplaces, product categories, or features without disrupting the service. As the digital marketplace continues to evolve, this adaptability ensures that the system can grow alongside it. Whether it's adding a new marketplace like Flipkart or integrating advanced AI to predict pricing trends, the system will be flexible enough to accommodate these changes.

Feedback Loop (The Learning Mechanism):

The system continuously collects feedback from users, which is analyzed to refine the pricing algorithms and improve the user interface. This feedback loop helps ensure that the system stays relevant and user-centric, adapting to the changing needs of both consumers and businesses.

PERKS**Web Module Imports:**

The backend of the system is powered by Django and essential Python libraries. These tools ensure that the system is capable of efficiently handling large amounts of product data and delivering server responses in a quick and reliable manner. By integrating these with mysite.settings, email configurations are simplified, enabling smoother communication with users, especially for notifications like price alerts, updates, and promotions. This integration ensures that application settings are managed in one place, making the system easier to maintain and more consistent across various platforms.

Data Handling and Processing:

The system's heart lies in its ability to handle and process vast amounts of pricing data from multiple e-marketplaces. Using machine learning libraries and data-processing techniques, the system ensures that all price comparisons are accurate and timely. Data gathered from platforms like GeM, Amazon, and Flipkart is processed through automated pipelines that detect any price discrepancies and notify users in real time. This ensures that users always have access to the most up-to-date price information.

Global Variables and Functions:

To optimize system performance, global variables and functions are set up for model loading and initialization at startup. This approach reduces load times for each request by keeping essential processes ready to run, ensuring that users don't experience delays when browsing product comparisons. Furthermore, the management of data paths for product images, descriptions, and videos is centralized, allowing for more efficient fetching and displaying of product content.

Key Functionalities:**Price Monitoring and Comparison:**

At the core of the system is the ability to track product prices across multiple platforms. The system continuously monitors GeM and private e-marketplaces, providing users with real-time comparisons. Whether it's for bulk procurement or individual purchases, the system alerts users when a product price drops or if a better deal is available on a competitor's site.

User Authentication and Session Management:

Security is a top priority. The system ensures that only authorized users can access sensitive features such as pricing history, saved preferences, or detailed comparison reports. Session-based authentication helps maintain user preferences and login states, ensuring a seamless user experience. User data is protected with secure encryption, maintaining privacy and data integrity.

Dynamic Product Management:

Users can dynamically add, update, or remove products from their comparison lists using an intuitive web interface. The platform is designed to handle frequent updates from various e-marketplaces, reflecting changes in product availability or pricing. Automated notifications via email or in-app alerts inform users of new deals or changes in product pricing.

Reporting and Analytics:

Comprehensive reporting features are integrated into the system, allowing users to generate reports on price trends, market comparisons, and purchasing recommendations. This feature is especially

useful for businesses that need detailed insights into product pricing across platforms to make informed procurement decisions. Logs are automatically generated for every user interaction, ensuring transparency and accountability in the comparison process. Error Handling and User Feedback:

To enhance the user experience, the system provides clear error messages and guidance for any issues users may encounter, such as incorrect searches or missing data. The feedback system ensures that users are promptly notified if there's an issue with their queries. Robust form validation and error handling processes prevent users from entering incorrect data, maintaining the integrity of the system's results and providing a smooth, error-free experience.

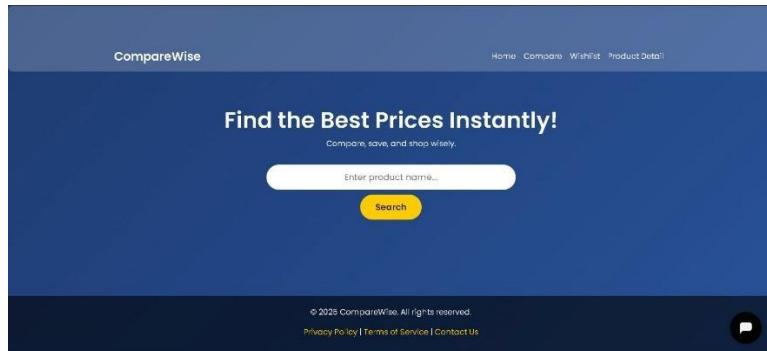


Fig 2. CompareWise – Price Comparison Website Homepage Interface

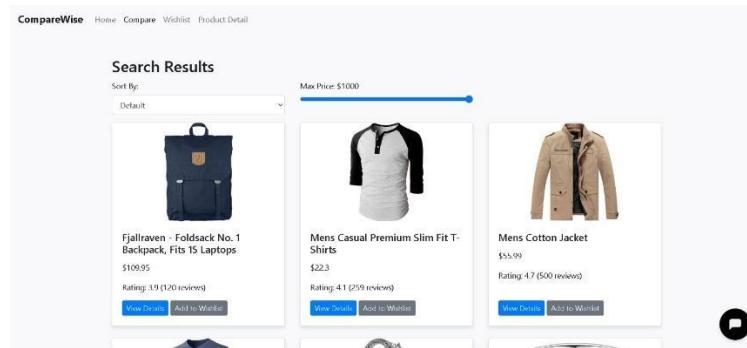


Fig 4. Search Results

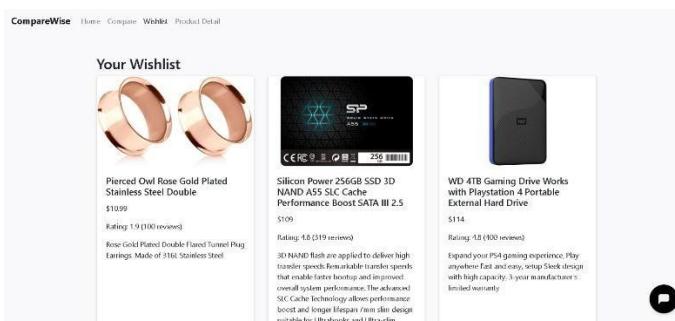


Fig 5. Wishlist



Fig 5. Product Detail

CHALLENGES

Implementing a robust price comparison system for GeM products alongside other e-marketplaces, such as Amazon and Flipkart, presents several challenges. These challenges need to be carefully addressed to ensure the smooth functioning of the platform. Key obstacles include: Technical Complexity and Integration Issues

Data Accuracy and Consistency:

Ensuring the accuracy of pricing data across different platforms can be challenging due to variations in how each e-marketplace presents product prices, discounts, shipping fees, and promotions. The system must handle these differences and maintain consistency in comparing prices accurately, especially when dealing with dynamic pricing models used by e-marketplaces [5], [12].

System Integration:

Integrating the price comparison system with various e-marketplaces, each with its own API structure and data formats, can be complex. Ensuring that data is pulled seamlessly from platforms like GeM, Amazon, and Flipkart without causing interruptions or errors is critical. This is especially challenging if there are frequent changes to the platforms' API or website structure, requiring regular updates and adjustments to the integration code [3], [27].

Scalability and Performance

Handling Large Volumes of Data:

As the platform expands to support more products and users, the volume of pricing data will grow substantially. The system must be capable of handling large datasets efficiently without compromising on speed or performance. This includes ensuring that the platform can scale to manage millions of product listings across multiple marketplaces without slowing down or causing delays in processing [15].

Real-Time Processing:

The system needs to process and compare prices in real-time, especially if users want immediate information about price fluctuations or available discounts. This requires significant computational power to process data from multiple sources, handle queries efficiently, and provide results quickly. Without optimized algorithms and powerful back-end infrastructure, delays could negatively impact user experience [28].

Security and

Data Privacy

Data

Protection:

The platform must handle sensitive user data, including browsing history, purchasing preferences, and personal details. This requires strict adherence to data protection regulations such as GDPR, which mandates secure handling of personal and transactional data. The system must also ensure that all payment information (if processed) is encrypted and securely stored [14], [19].

User Adoption and Interface Usability

User Resistance: Unauthorized access to sensitive user data is a significant concern. The platform must implement robust security measures, including encryption, multifactor authentication (MFA), and regular security audits, to protect against data breaches or cyberattacks [13]. Ensuring that only authorized users can access pricing data, transaction histories, or user preferences is paramount for maintaining trust.

User Adoption and Interface Usability

User Resistance:

While the platform offers great value in terms of price comparisons, some users may resist using it due to concerns over privacy, trust, or the complexity of the technology. For example, consumers might hesitate to share their data or may feel overwhelmed by the number of price options presented. Overcoming this resistance involves clear communication of the system's benefits and ensuring user transparency regarding data usage and privacy [16].

Interface Design:

The system must offer a simple, intuitive interface that caters to users of all technical backgrounds, ensuring a seamless experience for both tech-savvy individuals and those with minimal digital literacy. The design should be user-friendly and responsive, allowing easy navigation across different devices, whether on mobile phones, tablets, or desktops [14]. Failure to prioritize interface usability could result in poor user engagement.

Maintenance and Support

System Updates:

Continuous updates and maintenance are essential for keeping the platform functional and competitive. As e-marketplaces evolve, the system will need regular updates to ensure compatibility with new features or changes in API structures. This can be resource-intensive, requiring constant monitoring and adjustments, which may incur additional costs and planning [10].

Technical Support:

Providing ongoing technical support to both users and administrators is crucial for ensuring the smooth operation of the platform. Addressing user issues related to pricing discrepancies, navigation errors, or data processing glitches requires a responsive and knowledgeable support team. Effective support will help maintain user satisfaction and prevent frustration from impacting platform usage [13].

CONCLUSION

This research presents a practical and user-centric solution for comparing prices of GeM (Government e-Marketplace) products with those on popular e-marketplaces like Amazon, Flipkart, and others. By utilizing web scraping, API integration, and data analytics, the system provides a transparent and accurate comparison of product prices, empowering buyers—especially those from government sectors—to make informed purchasing decisions. The platform simplifies procurement by offering a centralized interface that displays updated pricing, product specifications, and seller information across multiple platforms. This not only increases price transparency but also promotes healthy competition among sellers, ultimately leading to better value for buyers. Furthermore, by

reducing the time and effort needed for manual comparisons, the system enhances procurement efficiency and reduces the risk of overspending or suboptimal choices. With an intuitive and responsive user interface, this solution is accessible to users of all technical backgrounds, making it a valuable tool for both institutional buyers and individual consumers seeking cost-effective procurement options.

FUTURE SCOPE

Looking forward, this price comparison platform holds substantial potential for advancement, both in terms of functionality and user experience. One of the key enhancements would be the integration of cloud infrastructure, which would significantly boost performance, storage capacity, and scalability—enabling the system to manage large volumes of product data and user queries efficiently. Moreover, the addition of smart filters and AI-driven recommendation engines could personalize the user experience by offering tailored product suggestions, price-drop alerts, and optimal deals based on user behavior and preferences.

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SUSTAINABLE DEVELOPMENT GOALS



Figure 14.1 SDG

The project “**Price Parity and Procurement Efficiency: A Comparative Study of GeM and Commercial E-Marketplaces**” aligns most closely with the following Sustainable Development Goals (SDG):

1. Decent Work and Economic Growth (SDG8):

Promotes inclusive economic growth by improving market access and procurement efficiency.

2. Industry, Innovation, and Infrastructure (SDG9):

Supports innovation through digital technologies and resilient e-commerce infrastructure.

3. Reduced Inequalities (SDG10):

Enhances market transparency and access for diverse buyers, including SMEs and underserved regions.

4. Responsible Consumption and Production (SDG12):

Encourages informed purchasing decisions that promote sustainable consumption patterns.

5. Climate Action (SDG13):

Helps reduce environmental impact by optimizing procurement and logistics processes.

6. Partnerships for the Goals (SDG17):

Fosters collaboration between government, private sector, and technology providers for sustainable development.