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ApniSabzi: A Digital Solution to Fresh Produce Street Vending Problems in Pune District

Bushra Sayyed[1], Azreen Maulavi[2], Shakila Siddavatam[3]

[1,2]Master's Student, Department of Computer Science, Abeda Inamdar Senior college, India
[3]Head of Department, Department of Computer Science, Abeda Inamdar Senior college, India

Abstract
Street fruit and vegetable vendors in urban metropolitan cities in India, especially within the Pune district, encounter several challenges, among them legal limits, discriminatory visibility, traffic congestion, constant harassment by the authorities, insufficient infrastructure, e.g., sanitation and storage facilities, irregular income, limited credit, and cutthroat competition in popular locations. Grocery delivery apps went further in excluding traditional street vendors by completely avoiding them and creating dark stores for speedy deliveries. As a result, local street vendors are getting marginalized by society.
To solve these problems and challenges faced by local street vendors, we developed the web application "ApniSabzi," a digital solution to fresh produce street vending problems in Pune district.
It has a vendor dashboard that displays available products, a user-friendly consumer interface for searching and purchasing, and a built-in billing system. The vendor is expected to deliver the order within minutes because of the locality-based approach.
This paper describes the ApniSabzi platform design and development, covering its system architecture, technologies, and basic functionality.

Keywords: Urban Cities, Pune District, Pune Municipal Corporation (PMC), Local Street Vendors, Fresh Produce, Fruits and Vegetables, Vending Challenges, Digital Marketplace, Digital Solution, ApniSabzi, E-Commerce, Web Application.

1. Introduction

1.1 Problem Statement

The conventional means of accessing fresh fruits and vegetables from street vendors in the Pune district present several challenges to local street vendors as well as consumers.
These vendors, who typically trade from handcarts or pushcarts—popularly known as "hath gadi" in the local language- are confronted with many issues, including legal constraints, discriminatory visibility, traffic congestion, constant harassment by officials, a deficiency of proper infrastructure, irregular income, limited availability of credit, intense competition in popular spots, and the issue of fruits and vegetables being wasted due to exposure to sunlight and rain. The problem for these street vendors is exacerbated by the prevalent use of grocery delivery apps that ignore and exclude neighborhood vendors directly by creating their own dedicated dark stores. Local sellers are being driven to the periphery because of the rise of grocery delivery apps, especially those who vend fresh produce on pushcarts.

1.2 Significance

The lack of a location-based web presence enables vendors to struggle and maintain their businesses. A

web solution could bridge the gap between customers and vendors, providing convenience and efficiency.

1.3 Proposed Solution

ApniSabzi, a web solution that can empower street vendors and transform their business. ApniSabzi will help vendors list their products, determine prices, and manage orders more efficiently. Customers can browse vendor offers, such as fruits and vegetables, and place orders smoothly through the online web application, receiving their orders within minutes due to our locality-specific methodology.

2. Literature Review

Street vending is a crucial industry in the urban economy of India, generating livelihoods for a significant majority of the populace and providing commodities and services at affordable prices to city residents. Street vendors dealing in fresh fruits and vegetables are confronted with a variety of challenges impacting their sustainability and role in the urban environment. This literature review addresses the research that is currently available on these topics.

The challenges encountered by street vendors in Pune. They include the uncertainty of vending points, the inability to handle unsold stock because of lack of storage, and clashes with residents and authorities. Additionally, the research identifies harassment from encroachment departments and unfair behavior in the form of bribery [1]. The study, carried out through a survey of 379 street vendors working in the 15 wards of the Pune Municipal Corporation, also finds that there are large numbers of vendors who are lacking skills and poor migrants [1].

A wider insight into the plight of vegetable street vendors in India in general. As not targeted in Pune alone, the article identifies the cause as limited access to credit, inadequacies of storage and transportation facilities, as well as susceptibility to disruptions along the supply chains. It also emphasizes the need for government intervention to bolster the sustainability of these vendors [2].

The critical contribution street vendors make to the Indian economy through offering low-cost goods and services to a vast population and creating employment opportunities, especially for the urban poor [3]. Our project enhances current work by developing ApniSabzi, an online marketplace with new features for addressing vending issues experienced by urban city local street vendors of fresh produce (fruit and vegetables), focused on the Pune district and locations under the Pune Municipal Corporation (PMC). ApniSabzi is a technology-enabled solution that extends vendor management systems so that local street vendors are able to post their produce with ease, put prices on it, and take orders through an e-commerce web platform. It simplifies customers' access to fresh fruits and vegetables, providing them with simplicity in browsing through the produce of local vendors and ordering with ease. Our location-based solution, can get customer orders delivered in minutes, representing a significant advancement in online solutions for the fresh produce industry in the Pune market.

3.Methodology (Development Process)

3.1 Design of Research

To develop a well-organized structure for analyzing and implementing a technology-based solution for solving the issues of local street vendors in urban cities like the Pune district, this research undertakes a design and development approach. The methodology focuses on the cyclic improvement of an online platform, named ApniSabzi, by integrating theoretical frameworks from existing studies, best e-commerce practices, and advancements in web development technologies. Through methodical designing, developing, and testing of the web application, the research aims to create a scalable and effective digital

marketplace specifically tailored for vendors selling fresh produce, such as fruits and vegetables in Pune district, while addressing their vending challenges.

3.2 Information Gathering

- **Secondary data**

This involved a critical reading of scholarly journals, research papers, and newspaper articles. These studies provided insight into the situation of street vendors, emerging trends in the economy, and the overall policy environment affecting small-scale vending.

- **Technical Research**

A detailed review of best practices of hyperlocal e-commerce platforms was conducted to select suitable technologies, security models, and UX methods. The investigation guided the platform's scalability, API development, and database performance and made it ensure it served the needs of vendors dealing with fresh produce like fruits and vegetables.

3.3 Architecture of the System

MERN stack consisting of MongoDB, Express.js, React, and Node.js was employed as the environment for development due to its scalability, effectiveness, and compatibility with real-time data processing.

4.Design and Implementation

4.1 System Architecture

The ApniSabzi system architecture is a three-tier architecture and includes:

Frontend (client-side): A React.js-based responsive web application with independent vendor and customer interfaces.

Backend (server-side): An API powered by Node.js and Express.js dealing with order processing, billing, product listing, and authentication.

Database (MongoDB): Holds product listings, order information, vendor information, and billing information.

- **System workflow**

1. The authenticated customer can access the web interface to see the fruits and vegetables being offered by vendors.
2. The product listings and inventory levels are updated by the authenticated vendor.
3. Customer orders trigger the backend to receive an API request.
4. The backend processes and authenticates the order by updating the database.
5. The customer is provided with an electronic bill upon successful order placement.
6. The order information is provided to the vendors to fulfill.

- **System Architecture Diagram**

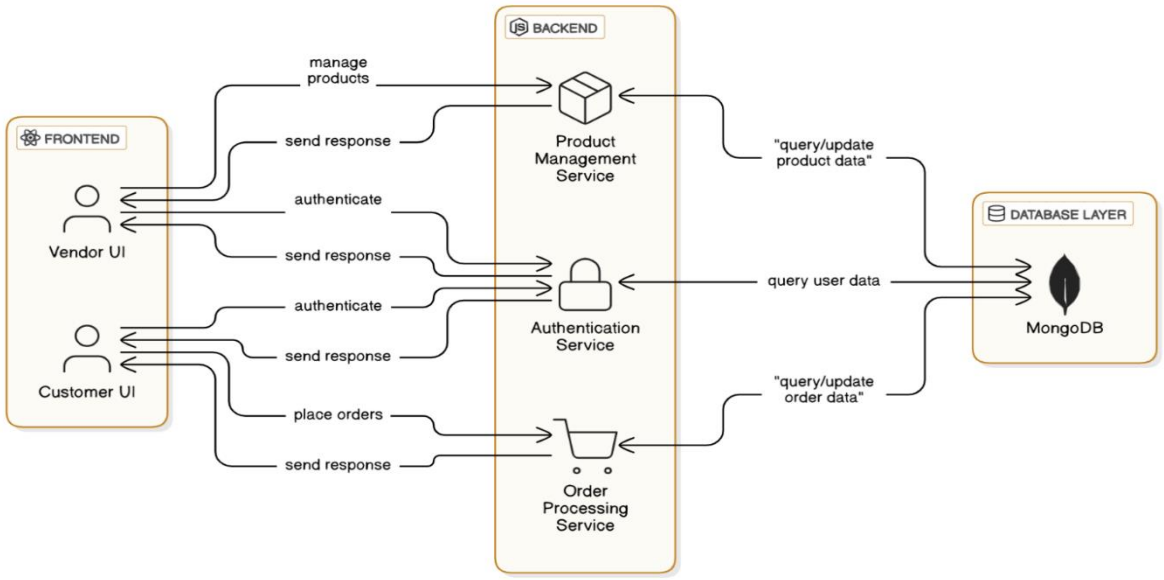


Figure 1 System Architecture of ApniSabzi

4.2 Technologies Used

The ApniSabzi system is constructed on a modern technology stack to ensure scalability, performance, and security. Table 1 enumerates the main technologies used at each level of the system.

Table 1 Technology Stack for ApniSabzi

Component	Technology Used
Frontend	React.js, HTML, CSS libraries, JavaScript
Backend	Node.js, Express.js
Database	MongoDB
Authentication	JSON Web token (JWT)
API Communication	REST API

4.3 User Interface (UI) & Screenshots

The ApniSabzi website is built with an easy-to-operate interface in order to allow smooth navigation to vendors, buyers, and admins. The user interface is of a responsive kind, which is accessible from both desktops and mobile phones. The major design principles are ease, simplicity, and effectiveness for improving the experience of the users.

4.3.1 User Interface Overview

There are a number of role-based interfaces in the system:

- **Homepage**: Provides an overview of the site including features, register/login options.
- **Sign up Page**: New customers can register themselves to ApniSabzi. **Login Page**: A common page for admins, customers, and vendors to log in.
- **Vendor Dashboard**: Allows vendors to add products, manage them, analyze inventory, monitor orders and fulfil them.

- **User interface**: Provides customers to view products which were added by vendors, add them to their carts, order them, and get invoices.
- **Admin Panel**: Adds vendor, manages customer and vendor accounts, tracks orders, and keeps platform configurations up to date.

4.3.2 UI Screenshots

The following figures illustrates the key UI screens of ApniSabzi application:

Figure No.	Description
Figure 2	Homepage displaying an overview of the site including features, register/login options.
Figure 3	Sign up page for registration of new customers
Figure 4	Common Login page for vendor, customers and admin
Figure 5a	Vendor dashboard – Add Products
Figure 5b	Vendor dashboard – Manage Products
Figure 5c	Vendor dashboard – View inventory
Figure 6a	User Interface- Available Products page
Figure 6b	User Interface- Shopping Cart
Figure 7a	Admin Panel- Dashboard
Figure 7b	Admin Panel-Add new vendor

Figure 2: Homepage of ApniSabzi

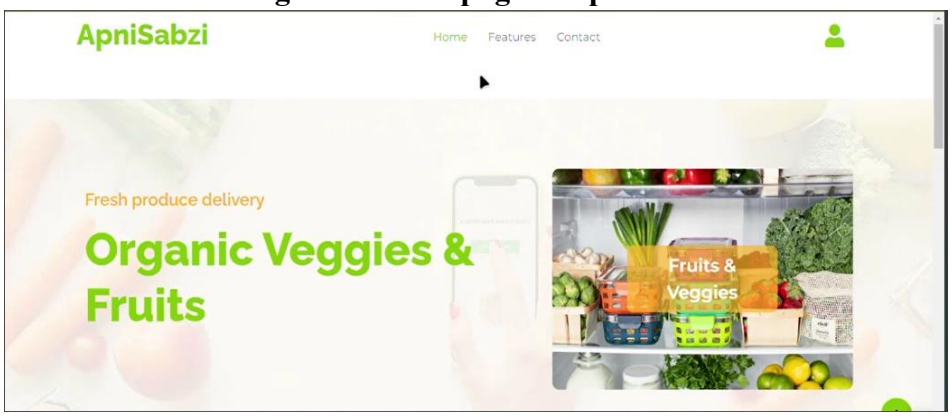


Figure 3: Register/Signup page

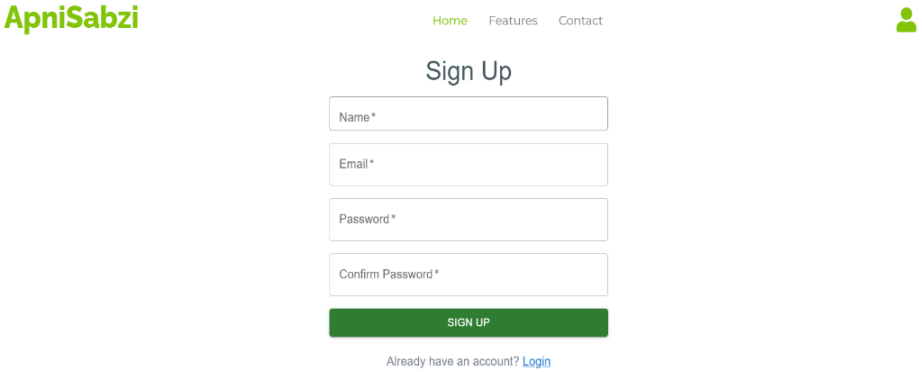


Figure 4: Common Login Page

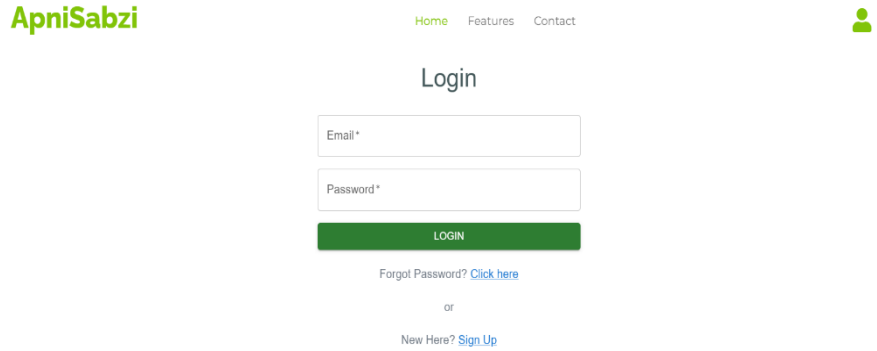


Figure 5a: Vendor dashboard – Add new product

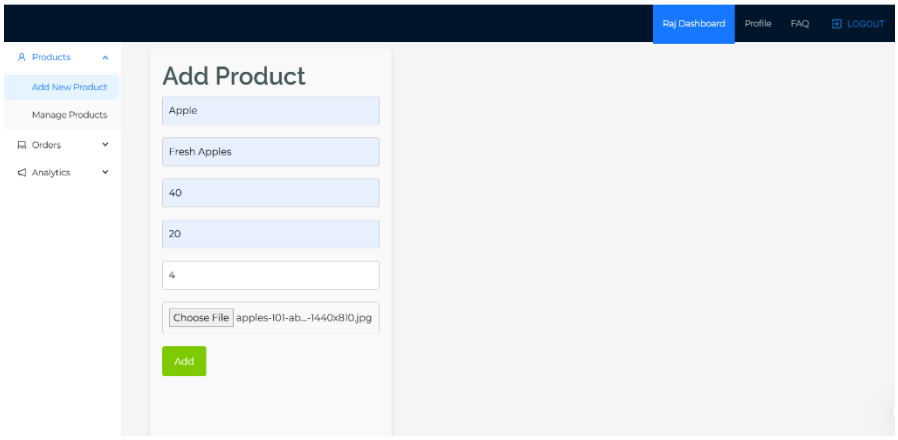


Figure 5b: Vendor dashboard – Manage products

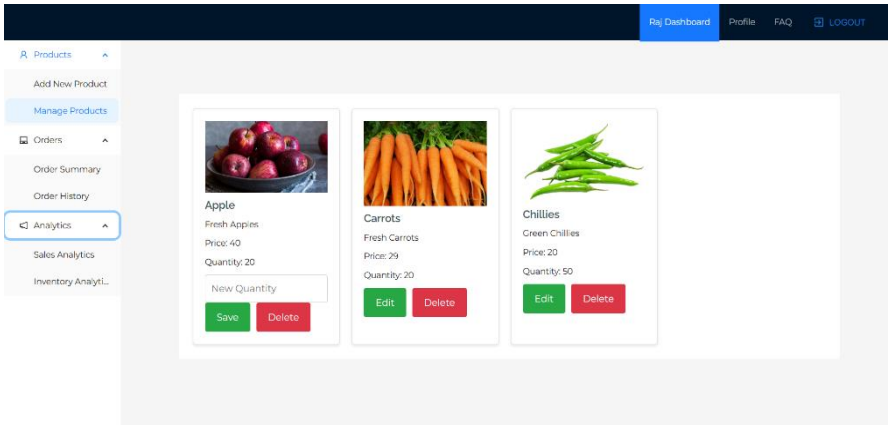


Figure 5c: Vendor dashboard– View inventory

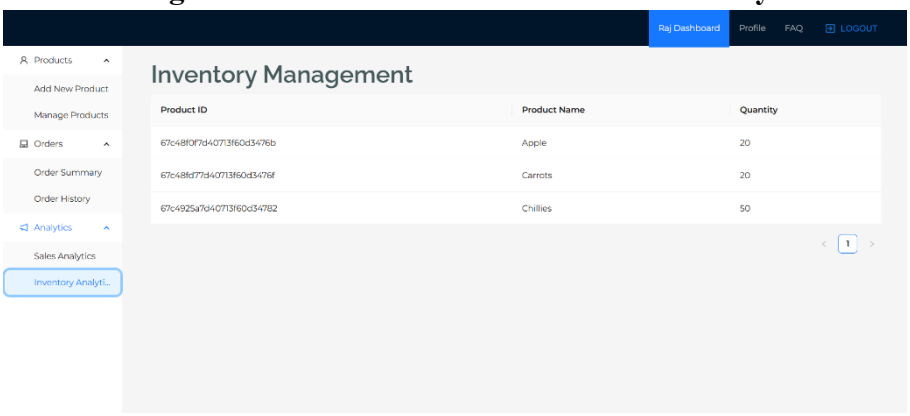


Figure 6a: User Interface- Available Products page

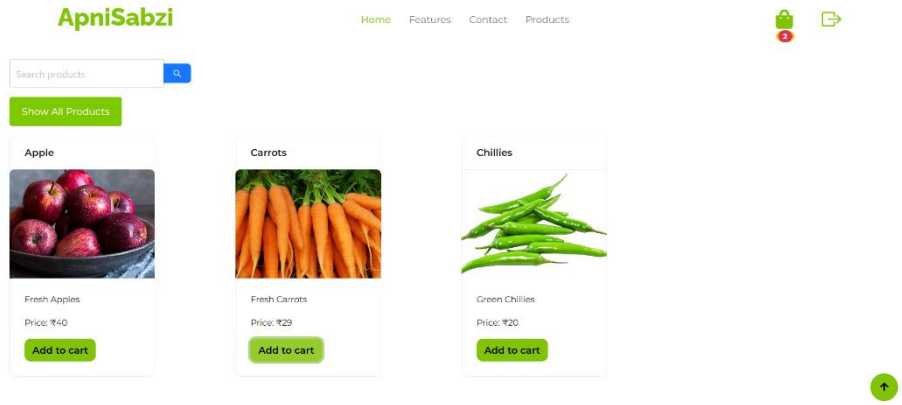


Figure 6b: User Interface- Shopping Cart

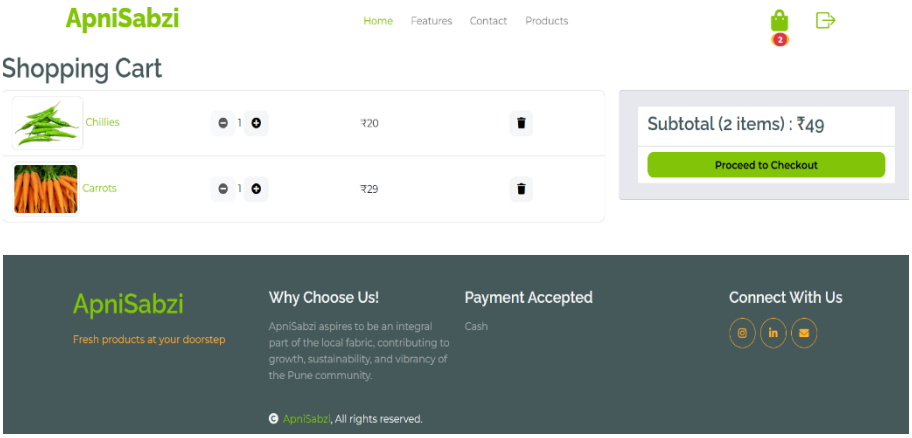


Figure 7a: Admin Panel- Dashboard

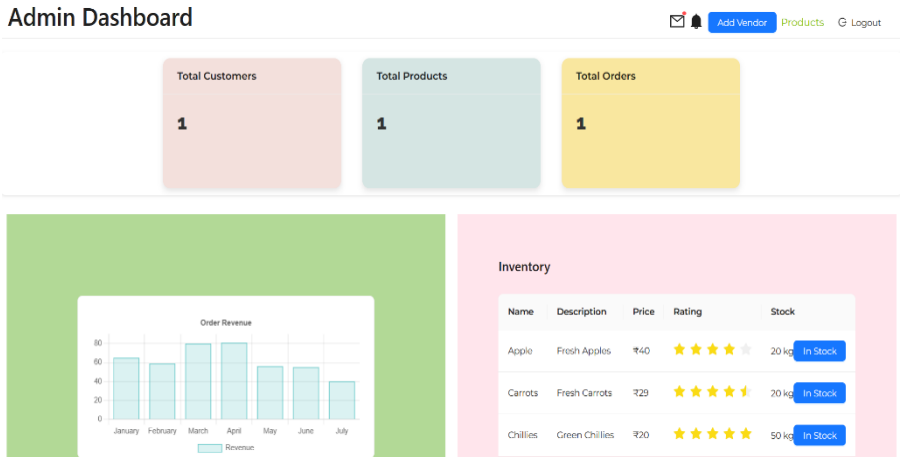
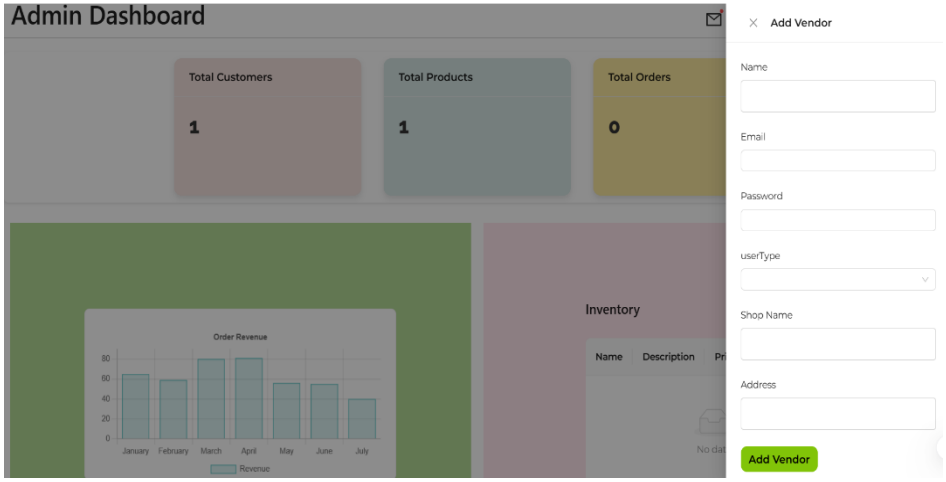


Figure 7b: Admin Panel-Add new vendor



6. Discussion

6.1 Strengths of the System

- **Cost Savings on Pushcarts and Maintenance**: Vendors can save money on buying and maintaining pushcarts.
- **Product wastage**: Fresh fruits and vegetables that are prone to damage due to exposure to sun, pollution, and rain can be kept in improved condition, avoiding pecuniary loss.
- **Access to a Fixed Selling Platform**: Most vendors find it difficult to get a fixed selling area. ApniSabzi gives them a virtual storefront, not bound by space limitations.
- **More Sales and Customer Base**: Vendors can increase their customer base and sales with an online marketplace, bypassing the restrictions of street selling.
- **Drastic Reduction in Business Problems**: Vendors, according to previous research, face several operational and legal problems. ApniSabzi can reduce such problems by up to 80%, which would improve the overall efficiency of the business.
- **Greater Market Presence**: Sellers would have a better chance to compete in the market, being resilient against larger grocery delivery platforms that have a tendency to bypass small sellers.

6.2 Challenges and Limitations

- **Vendor Awareness and Training**: Vendors may require being adequately trained and informed about the benefits and attributes of the platform in a way that will enable adoption.
- **Digital Adoption Challenges with Older Vendors**: Older or technology less experienced sellers might need to move at their own pace in learning the digital platform and require further guidance and training.
- **Absence of Integrated Delivery Service**: Currently, the system does not have an integrated delivery service, such that order fulfillment is the responsibility of the vendor. This can be a disappointment to vendors that lack delivery ability.

6.3 Future Scope

- **Mobile App Development**: There could be an additional mobile application improving customer and vendor usability and accessibility.
- **Online Payment Integration**: Adding secure payment gateways will allow customers to pay online, which is more convenient and will boost sales.
- **Multilingual Support**: Multilingual support would help vendors and purchasers of various origins utilize the platform better.

7.Conclusion

Street vendors of local areas of urban cities such as the Pune district play a crucial role in supplying fresh produce, i.e., fruits and vegetables, to the residents. Nevertheless, these vendors undergo various vending difficulties, such as legal restrictions, poor infrastructure, irregular income, and the perishing nature of their goods. Moreover, the emergence of generic grocery e-commerce apps further edged them out by skipping them with directly establishing dark stores, further diminishing their chances to compete. To solve these problems, we developed ApniSabzi, an online marketplace particularly for local street vendors operating in Pune Municipal Corporation (PMC) regions. Our solution, through related work research, uses a web application to give local vendors an easy-to-access, technology-based platform to access customers, handle sales, and enhance their business stability. ApniSabzi is not a general e-commerce solution but rather a locality-centered initiative directly benefiting street vendors who sell fresh fruits and vegetables on mobile carts.

Although the platform is subject to some limitations, namely digital adoption barriers and issues of delivery, it represents a significantly innovative and impactful solution to an existing world problem.

With further improvements, such as mobile app development, online payment integration, and multilingual support, ApniSabzi has the potential to significantly transform the way local street vendors in Pune operate, ensuring their sustainability in the evolving digital economy. regular income, and the perishable nature of their products.

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