

Literature Review

- **Inventory Forecasting Models:** ARIMA models are effective for short-term inventory predictions, handling linear trends, while LSTM models [10] capture complex, long-term dependencies, making them superior in dynamic environments (Goyal & Arora, 2020; Cao et al., 2022).
- **Predictive Analytics in SMEs:** For SMEs, especially in emerging economies, predictive analytics reduces costs by optimizing inventory [14] and supply chains. However, barriers like limited digital literacy and data quality issues can hinder adoption (Patel et al., 2021; Khatri et al., 2019).
- **Machine Learning Benefits:** Combining models like ARIMA and LSTM has proven to enhance forecast accuracy, reduce costs, and improve resilience against demand fluctuations [17] (Singh & Kumar, 2020; Wang et al., 2020).
- **NLP (e.g., RoBERTa) in Customer Engagement:** NLP models like RoBERTa automate customer support and analyze sentiment, improving response quality and business [9] efficiency (Brown et al., 2021).
- **Digital Transformation and Digital Divide:** SMEs face challenges due to the digital divide, needing solutions that foster digital literacy and access to technology (Garg & Reddy, 2020).

The Digital Commerce Empowerment Ecosystem (DCEE) project addresses key challenges faced by small and medium-sized enterprises (SMEs), especially in emerging economies like India, by incorporating predictive analytics and digital transformation solutions to bridge gaps in digital literacy, rural payments, and inventory management. This review summarizes the relevant literature to frame the DCEE's objectives and proposed solutions.

Inventory Forecasting with ARIMA and LSTM Models

Research on predictive analytics for inventory management highlights the effectiveness of time-series models like ARIMA and deep learning models like LSTM in predicting demand and reducing inventory costs. Choi and Lee (2019) review recent advances in ARIMA and LSTM models, noting their complementary strengths—ARIMA for linear trends and LSTM for complex, long-term dependencies—making them ideal for dynamic SME environments [1]. Similarly, Wang and Zhao (2020) emphasize that machine learning models, including ARIMA and LSTM, allow businesses to optimize stock levels and minimize costs [5].

Digital Transformation and SME Empowerment

Digital technologies have proven to be pivotal in boosting productivity and market access for SMEs. The World Bank (2020) reports that digital transformation improves SMEs' competitiveness by enhancing their operational efficiency and access to digital markets [2]. In line with this, the OECD (2021) underscores the role of digital tools in transforming business processes, helping SMEs remain competitive in a digital era [6].

Predictive Analytics and Inventory Optimization

Fildes and Goodwin (2020) highlight predictive analytics as a cost-saving mechanism for inventory management, enabling businesses to make more informed stock decisions. Their findings stress the importance of using accurate forecasts to avoid over- or under-stocking, thereby reducing waste and improving financial performance [3]. Moreover, AI-driven models for

inventory management, as reviewed by Wang and Thompson (2022), enhance stock management by dynamically adjusting to demand patterns [22].

Addressing the Digital Divide in Emerging Economies

The digital divide remains a significant barrier for SMEs in underserved regions. The ITU (2021) and World Economic Forum (2020) stress digital inclusion strategies to support economic participation for rural businesses [4, 17]. Through digital literacy initiatives, UNESCO's (2020) report finds that digital skills improve SMEs' market reach, empowering them to leverage digital tools effectively [15].

Enhanced Customer Engagement and Digital Literacy

NLP models such as RoBERTa are being increasingly applied to improve customer engagement and support through automated systems. RoBERTa's capabilities for sentiment analysis and query handling enhance customer interactions, which is crucial for small businesses that may lack dedicated customer service teams [16]. Johnson and Davis (2021) discuss how digital literacy also plays a critical role in helping SMEs harness technology to improve competitiveness and sustain economic growth [18].

In summary, the literature supports the DCEE's integrative approach of leveraging predictive analytics for inventory management and enhancing digital literacy for SMEs. By combining ARIMA and LSTM models for accurate inventory forecasting and utilizing RoBERTa for customer engagement, the DCEE project aligns with global findings that emphasize digital transformation as a pathway to growth for small businesses in emerging economies.