

# Human-Centered Digital Solutions for Economic Development: A Case Study from Jamaica

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## Abstract

This article presents a case study in developing a digital inventory and order management system for a Jamaican microenterprise, L.A.R. Farmers Export Limited. Using a human-centered and context-aware design approach, the project addresses the inefficiencies of paper-based workflows in a resource-constrained setting. Grounded in ICT4D literature, it outlines how localized, low-barrier software can support economic resilience and operational sustainability in the Global South.

## Methodology

This project employed a human-centered, participatory approach. Through qualitative engagement with L.A.R. Farmers Export Limited, including observation and informal interviews, the developers identified operational pain points in inventory, order processing, and data retrieval. The design process adopted principles from contextual design and agile iteration, emphasizing modularity, file-based storage, and simplicity of use. Implementation was done in C, chosen for its procedural clarity and direct file handling capabilities. The development process was guided by action research methodologies typical in ICT for Development (ICT4D) practices, prioritizing appropriateness and responsiveness to local context (IDEO.org, 2015; Donner, 2008).

## Background

L.A.R. Farmers Export Limited is a sea moss business located at Old Harbour (Mobile Business), St. Catherine, Jamaica, owned by Lowenzo Robinson. Established in 2020, the organization was created to meet the growing demand for high-quality sea moss products in both local and international markets. Lowenzo Robinson, with a deep passion for sustainable agriculture, recognized the potential of sea moss as a natural source of nutrition and wellness, which led to the founding of this enterprise. The business not only aims to provide customers with premium sea moss but also plays a significant role in supporting local farmers and promoting sustainable practices. This commitment to the community has contributed to the economic development and well-being of the region, making L.A.R. Farmers Export Limited an essential part of the local agricultural landscape.

The company's ability to scale its export activities hinges on having efficient systems to track inventory, process orders accurately, and fulfill shipments promptly. As international buyers increasingly demand consistency, traceability, and timely communication, digitization becomes not just a convenience but a competitive necessity. A digital order and inventory system ensures that L.A.R. Farmers Export Limited can meet international

standards, produce export-ready reports on stock levels, and comply with documentation requirements in overseas markets. Furthermore, digital systems can enhance trust and reliability with foreign partners and facilitate eventual integration with e-commerce or third-party logistics platforms.

### **Problem Context**

At L.A.R. Farmers Export Limited, the day-to-day operations revolve around the efficient management of customer orders and product delivery. Customer orders are placed via phone. The sales representative writes the order details down. Then invoices or receipts are handwritten for customer confirmation. The reliance on paper documentation extends to inventory management, creating a system that is entirely paper based. While this operational flow supports a traditional approach to customer service, it also presents challenges in terms of efficiency and organization. Each piece of paper must be carefully managed to avoid errors and ensure accurate record-keeping, which can be time-consuming for the staff. This reflects common barriers in digital transformation across developing economies, where small businesses remain locked in analog systems due to limited access to infrastructure or digital literacy (Donner, 2008; Avgerou, 2008).

### **Problem Description**

The current paper-based system at L.A.R. Farmers Export Limited presents several challenges that can be addressed through programming and automation:

#### **1. Order Processing**

- Orders are handwritten, leading to inaccuracies.
- The process is time-consuming and can delay service.
- Lack of automation causes delays in order completion.

#### **2. Inventory Management**

- Manual recording leads to frequent errors.
- Missed sales opportunities due to stock inaccuracies.

#### **3. Invoice and Fee Calculation**

- Manual calculations often lead to billing errors.
- Handwritten invoices cause customer confusion.

#### **4. Customer History and Reporting**

- Past orders are hard to retrieve from paper files.
- Sales analysis is manual, inefficient, and error-prone.

These operational inefficiencies align with broader findings that ICT adoption in SMEs can enhance performance but is often constrained by capacity and contextual relevance (Qiang et al., 2009; Heeks, 2010).

## **Functional and Non-Functional Requirements**

### *Functional Requirements:*

- Record customer orders with full details.
- Store and retrieve orders and customer records.
- Track and update inventory levels, notify on low stock.
- Search products and include secure user login.
- Add new users and update product availability.

### *Non-Functional Requirements:*

- Menu-driven interface with clear instructions.
- Process up to 20 orders per session efficiently.
- Provide clear input error messages.
- Maintain a detailed system event log file.

The system's design, which uses simple text files and authentication, reflects appropriate technology principles that prioritize low-resource and high-utility tools (OECD, 2021).

## **Conclusion**

This project demonstrates the value of human-centered, context-specific digital interventions for small enterprises in developing economies. By addressing specific workflow inefficiencies through modular digital tools, the system has the potential to make L.A.R. Farmers Export Limited more efficient and adaptable. Beyond technical success, the project highlights the role of youth-led innovation in local economic development. Future iterations could benefit from integration with mobile platforms and analytics dashboards to further support decision-making and scalability.

## **Code Repository**

The complete source code and documentation for the LAR Inventory Manager can be found at: <https://github.com/daisykremer876/LAR-Inventory-Manager>

## **Academic and Internet References**

1. IDEO.org. (2015). The Field Guide to Human-Centered Design. IDEO.  
<https://www.designkit.org/resources/1>
2. World Bank. (2016). World Development Report 2016: Digital Dividends.  
<https://www.worldbank.org/en/publication/wdr2016>
3. Qiang, C. Z.-W., Clarke, G. R. G., & Halewood, N. (2009). The Role of ICT in Doing Business. In Information and Communications for Development 2009: Extending Reach and Increasing Impact, World Bank.
4. UNCTAD. (2021). Digital Economy Report 2021: Cross-border data flows and development. [https://unctad.org/system/files/official-document/der2021\\_en.pdf](https://unctad.org/system/files/official-document/der2021_en.pdf)
5. OECD. (2021). The Digital Transformation of SMEs. <https://www.oecd.org/digital/sme/>
6. Heeks, R. (2010). Do Information and Communication Technologies (ICTs) Contribute to Development? *Journal of International Development*, 22(5), 625–640.
7. Donner, J. (2008). Research Approaches to Mobile Use in the Developing World: A Review of the Literature. *The Information Society*, 24(3), 140–159.
8. Avgerou, C. (2008). Information Systems in Developing Countries: A Critical Research Review. *Journal of Information Technology*, 23(3), 133–146.