**Project Design Phase**

**Problem – Solution Fit Template**

|  |  |
| --- | --- |
| Date | 18 February 2026 |
| Team ID | LTVIP2026TMIDS47801 |
| Project Name | Smart Sorting: Identifying rotten fruits and vegetables using transfer learning |
| Maximum Marks | 2 Marks |

**🌱 Problem–Solution Fit Template**

**The Problem–Solution Fit**

**We identified a major challenge experienced by growers, wholesalers, and logistics teams:  
the inability to consistently and rapidly screen fruits and vegetables for spoilage.**

**Current manual inspection methods are inefficient, subjective, and often too slow to keep up with the demands of modern distribution.**

**Our project offers a deep learning-powered visual inspection system that leverages transfer learning with ResNet to automate defect detection, minimize human error, and improve overall product quality and profitability.**

**🎯 Purpose**

**✅ Enable producers and supply chain operators to detect and separate defective produce with speed and confidence using an intuitive AI solution integrated into their regular workflows.**

**✅ Promote widespread use by ensuring the system works on low-cost devices like standard Android smartphones and does not require constant internet access, making it practical for both urban and rural environments.**

**✅ Enhance engagement and trust by crafting clear, relatable messaging around reducing waste, protecting revenue, and assuring freshness, connecting with users’ priorities and concerns.**

**✅ Deepen loyalty and adoption by directly addressing common issues such as unreliable visual checks, labor-intensive sorting processes, and avoidable spoilage losses, while delivering a simple and effective alternative.**

**Template:**

### 6. CUSTOMER CONSTRAINTS

* Limited access to high-quality imaging equipment
* Seasonal income fluctuations affecting purchasing decisions
* Resistance to adopting unfamiliar technology

**USTOMER CONSTRAINTS**

* Limited access to high-quality imaging equipment
* Seasonal income fluctuations affecting purch**6. CUSTOMER CONSTRAINTS**
* Limited access to high-quality imaging equipment
* Seasonal income fluctuations affecting purchasing decisions
* Resistance to adopting unfamiliar technology
* asing decisions
* Resistance to adopting unfamiliar technology

**6. CUSTOMER CONSTRAINTS**

**What limits their ability to take action?**

* Low budget or cash flow issues
* Lack of digital literacy or AI knowledge
* Poor internet connectivity in rural areas

**6. CUSTOMER CONSTRAINTS**

**What limits their ability to take action?**

* Low budget or cash flow issues
* Lack of digital literacy or AI knowledge
* Poor internet connectivity in rural areas

fd

**5. AVAILABLE SOLUTIONS**

* Visual checks performed by supervisors or quality controllers
* Mechanical graders that separate produce by size or shape
* Handheld devices for spot-checking freshness (often costly)

### 1. CUSTOMER SEGMENT(S):

### Mid-sized commercial growers

### Fresh produce distributors and packhouses

### Export companies handling perishable goods

9. PROBLEM ROOT CAUSE:

* Limited availability of cost-effective and easy-to-use quality inspection technologies
* Overreliance on manual labor, often lacking specialized training or expertise
* **Li9. PROBLEM ROOT CAUSE:**
* **Limited availability of cost-effective and easy-to-use quality inspection technologies**
* **Overreliance on manual labor, often lacking specialized training or expertise**
* **mited availability of cost-ef9. PROBLEM ROOT CAUSE:**
* **Limited availability of cost-effective and easy-to-use quality inspection technologies**
* **Overreliance on manual labor, often lacking specialized training or expertise**
* **fective and easy-to-use quality inspection technologies**
* **Overreliance on manual labor, often lacking specialized training or expertise**

**9. PROBLEM ROOT CAUSE:**

* Limited availability of cost-effective an**9. PROBLEM ROOT CAUSE:**
* Limited availability of cost-effective and easy-to-use quality inspection technologies
* Overreliance on manual labor, often lacking specialized training or expertise
* d easy-to-use quality inspection technologies
* Overreliance on manual labor, often lacking specialized training or expertise

**.4. JOBS-TO-BE-DONE / PROBLEMS:**

* Minimize the time and effort required for quality inspection of produce
* Lower overall labor expenses associated with manual sorting

**7. BEHAVIOUR**

* Conduct visual inspection and manual sorting of each fruit or vegetable
* Hire temporary workers during peak harvest periods to manage increased workload

### 8.CHANNELS OF BEHAVIOUR

* 1. **ONLINE**
  2. Explore agricultural tips and tutorials on platforms like YouTube
  3. **8.2 OFFLINE**
  4. Join local farmer gatherings, agricultural fairs (Krishi melas), and workshops
  5. Connect with cooperative societies and agricultural input suppliers

**BEHAVIOUR**

**8.1 ONLINE**

* **Explore agricultural tips and tutorials on platforms like YouTube**
* **View demonstration videos on smart farming technologies and AI tools**
* **Participate in online forums and social media groups for farmers**

**8.2 OFFLINE**

* **Join local farmer gatherings, agricultural fairs (Krishi melas), and workshops**
* **Connect with cooperative societies and agricultural input suppliers**

**8.2 OFFLINE**

* Attend farmer meetups, Krishi melas (**8.2 OFFLINE**
* Attend farmer meetups, Krishi melas (agri fairs)
* Visit cooperative societies or agri-dealers
* Government training centers
* )
* Visit cooperative societies or agri-dealers
* Government training centers

### ****3. TRIGGERS****

High product returns due to poor quality

Customer complaints or health concerns

**4.EMOTIONS:BEFORE/AFTER:**

| **Stage** | **Emotion** |
| --- | --- |
| **Before** | **Anxious, fatigued, frustrated, uncertain, fearful of losses** |
| **After** | **Empowered, calm, assured, satisfied, confident in technology** |

**10. YOUR SOLUTION**

**Smart Sorting: AI-Powered Freshness Detection for Fruits & Vegetables**

* Leverage transfer learning with MobileNetV2 to accurately identify early signs of spoilage
* Integrate with mobile and web applications for real-time camera-based scanning