**Title:** *Shedding light on Kirana Stores with an auto-scalable and low cost analytics solution*

**Overview of idea:** The solution objective is to have a seamless and convenient way of capturing the sell out information from the Kirana stores to manage the store operations in effective way. The analytics solution aims to create meaningful Micro segments based on Store’z activity captured through POS data and Camera data. The data is then merged to give signals on Tableau around the store’s operations efficiency in terms of inventory management, Promotions effectiveness and resource management.

**Solution Overview/Architecture:**

The system that should be designed/developed must be minimalistic yet functional. It should be functional because the shopkeepers generally shun away from complex PoS that has additional space and technology overheads. However, we need it functional to shed light into the kirana black box keeping in mind the vagrancies with which the stores operate in India. It should also be fault tolerant and be flexible to work in an environment where power and network connectivity fluctuations are the norm.

Keeping all the above constraints in mind, the solution that is being proposed by us is a Raspberry Pi system (encased inside a protection cover), with camera module and wireless barcode scanner. Network connectivity can be attained with either WiFi (mobile hotspots) or even USB internet dongles. Raspberry Pi by default comes with expandable SD cards for capturing\storing the bar scan data and video data for analytics.

The system will be programmed such that the data upload will happen either real-time (depending on network factors) or be stored offline – which will then be downloaded by the Unilever representative during shop visits – if the kirana store operates in a place with flaky/no network connectivity.

**Technology Aspects:**

The proposed Raspberry Pi system (with camera, barcode scanner and USB internet) will talk to the datacenter in a serverless environment (AWS Lambda). This is the ideal way to get things done at this scale (>50,000 kirana stores) without worrying about compute, storage or memory requirement. Another advantage with this approach is that Unilever need not commit high amount upfront for a very hi-end server without knowing the actual usage statistics. It would also be highly secure since Raspberry Pi will not have any residing code but REST APIs which will make all the required functionality possible.

The data store (either object based or/and block based) will also be provisioned on the cloud with support for visualization (mostly Tableau) after the required data analysis have been completed.

Please find the screenshot attached for the high-level solution architecture diagram.

**Data Readiness for Analytics: Uploaded in the excel sheet “Data Readiness for Analytics”**

**Data Analytics:**

**Types of Analytics which can be done using the POS and Camera data is,**

1. **Store Micro Segmentation: Gives a summary around the performance of the store compared with other stores (Can be at ZIPCODE/ Location Level and for different time period). This analysis includes creation of following metrics**
   1. **Store Segment Based on Revenue, SKU Basket Size and ASP**
   2. **Store Segment Based on visiting Customer Profiles**
   3. **Seasonality information of the Store(Daily/Weekly/Monthly)**
   4. **Most Sold Categories Across Different Time Period**
   5. **Fill Rate of Each Shelf**
   6. **Ideal Time across Different Time Period**
   7. **Waiting Time and Average hours spent**
   8. **Promotion Effectiveness**
2. **Real Time Order Management Visibility: Gives the current operations metrics for each Store.**
   1. **List of Base Order SKUs**
   2. **Order cycle for the Store for each SKU excluding Promotional Effects**
   3. **Order Quantity of the Store for each SKU excluding Promotion Effect**
   4. **Shelf Activity relation with Shelf Fill rate**
   5. **Relationship of Order Cycle with Fill Rate of Each Shelf**
   6. **Relationship of Order Quantity with Fill Rate of Each Shelf**
3. **GAP Analysis: Focused on Anomaly detection to identify Gaps.**
   1. **GAP between Sell-in seasonality data with Store Seasonality data**
   2. **GAP between Sell-in Base Order SKU with Store Focus SKU ( Categories)**
   3. **GAP between Sold Quantity vs Sell-in**
4. **Store Operations Management: Risk assessment ahead of the time to create signals around store operations performance and action.**
   1. **Store Level Demand Forecasting**
   2. **Shelf Fill rate Based Inventory Calibration(Reorder Point, Exact Quantity and Promotion Recommendation)**
   3. **Capture Geo Location of Sales Person to track Fulfilment or Order**
   4. **Shelf Display Recommendation for Each Store**
   5. **Market Basket Recommendation for Each Store**
   6. **Recommendation based Store Segment (Customer Profile based)**
   7. **Resource Management based on seasonality and waiting time**

**Impact:**

1. Increase in revenue due to better stock Management
2. Increase in revenue due to better Product Management
3. Decrease in Cost due to better resource Management
4. Increase in Revenue due to better promotion planning across Stores and Products