Enhancing Grocery Shopping in Saudi Arabia

SELP 695 Systems Engineering Integrative Project

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Overview

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Background

- Saudi Arabia is the largest importer of agricultural products among the six Gulf Cooperation Council (GCC) countries.

- In 2013, the number of food retail outlets in Saudi Arabia was estimated at 40,435 stores, an increase of 15 percent over their number in 2012.
Background

- The total value of food sales at these outlets was estimated at about $40 billion in 2013, an increase of 10 percent over the previous year.

- The significant rise of new supermarkets in Saudi Arabia is most likely because of factors such as the dramatic increase in the country’s population.
Problem statement

- Grocery stores close four times a day for prayers
- Making it sometimes impossible to get everything at once
Problem Statement

Prayer Time Closing Hours

8:00am  10:00am  12:00pm  2:00pm  4:00pm  6:00pm  8:00pm  10:00pm

- Opening hours
- Prayer time

Per Day: 1 h, 20 mins
Per month: 40 hours
Per year: 20 Days
Problem Statement

- Going shopping becomes more of a hassle than a pleasant experience because of the extreme heat.
Problem Statement

- Women are not allowed to drive.
- Communication problem between the house holders and the foreigner workers.
System Requirements

- The system shall have a non verbal method of communication between the house holders and the grocery stores.
- The system shall be able to deliver grocery's to the customers location in no more than 2 hours.
- The system shall be able to offer a pick up service for the customers.
- The system shall maintain utmost security, ensuring safe data and credit card numbers and house addresses.
Stakeholders Description

- Supermarkets
- Grocery Shoppers - These are the main stakeholders of the system
- Private Contractors - These can vary from people who work in the supermarkets or the people who deliver the grocery.
- Ministry of Commerce - This division of the government is responsible for enforcing rules and regulations of supermarket hours and offerings
Goals

The goal of this project is to create a mobile application/web for grocery shopping, it will create a new dynamic that will not only be attractive to the young busy professionals but also to their elders who are fed up with a system that showed its limits.
Current System

- Personal drivers are meant to do the grocery shopping

- The father makes it as a family activity.
Literature Review - China

- E-commerce was already pretty developed in China in late 2008
- Yihaodian company had both virtual stores with images of products on shelves but also groceries displayed in urban public

Virtual Stores

Displayed in urban public
Literature Review - UK

- Great Britain is home to the largest online food retailer in the world
- The leading company named Ocado has grown to be the best online supermarket in the UK
- The company combine both a warehouse-based model operating from purpose-built picking centers, without any physical shops
Literature Review - US

Successes

Gopher Grocery, has seen steady growth thanks to its use of a just-in-time business model

Failures

Webvan was founded in 1996. It went bankrupt in 2001. Money spent on infrastructure was far exceeding sales growth.
Alternative Solutions

**Online Super markets**

- Each supermarket retailer in KSA creates a mobile application that offers delivery and pick up service to the neighborhood around each branch.

- Example: Safeway supermarket will have its own application, in which users can log on, shop online and then expect their groceries to be delivered to their home or they can pick it up from the nearest branch.
Alternative Solutions

**Warehouse Delivery**

- A warehouse which stores all the goods and products. This system *only offers delivery services* to the customers through the web or mobile application.

- Example: Webvan placed a $1 billion (USD) order with Bechtel company to build its warehouses, and bought a fleet of delivery trucks. This solution cost a lot of money.
Alternative Solutions

Partnership with Grocery Markets

- All supermarkets interested will partner with one company that has one application and website that offers delivery and pick up service to the neighborhood around each branch under 2 hours.

- This solution would ideally carry a booth in every supermarket partnered with the application/website with at least two personal shoppers.
Analysis of Alternative Solutions (AoA)

Solutions to be compared are the following:

- Online Super markets hosting their own system for online shopping
- Warehouse delivery
- Developing partnerships with supermarkets for a collective shopping experience
Measurements of Effectiveness (MoEs)

1. Communication & Coordination - evaluates the system's efficiency in effectively carrying out the designated task.
2. System Reliability - evaluates the system’s reliability during operation.
3. System Cost - evaluates the system’s cost from start up to operation.
4. System Robustness - evaluates the system’s robustness against any external influence.
5. System Upgradeability - evaluates the system’s upgradeability in terms of its capability for technological advancement.
6. System Security - evaluates the system’s safety whether it regards the users or administrators.
## Summary of MoEs

<table>
<thead>
<tr>
<th>MOEs</th>
<th>Warehouse Delivery</th>
<th>Online Supermarket</th>
<th>Baqala</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication &amp; Coordination</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>System Reliability</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>System Cost</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>System Robustness</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>System Upgradeability</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>System Security</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>
Partnerships with Supermarkets (Baqala)

- Offers a solution for the busy young professionals, elderly people, females who cannot afford drivers, and for the workers who are suffering from the lack of language.

- It will make people shop better and healthier since the people can read the reviews on each product from other customers.

- It will increase profit for the grocery stores and the system will make the grocery stores able to understand exactly what their customers need.

- Win-win situation where the customer and the retailer are satisfied.

- The crowd sourced model eliminates the need for costly infrastructure such as warehouses, delivery trucks and full-time drivers.
System Requirements Agreement with Baqala

- The selected solution agrees with the system requirements stated above
  - Baqala has a non-verbal method of communication between the shoppers and the grocery stores through means of the application and website
  - Baqala will be able to deliver groceries to the customers location in no more than 2 hours
  - Baqala will offer a pickup service for customers
  - Baqala will maintain utmost security, ensuring protection of credit card numbers and personal information
User Interface

1. The system will be Available both via web browser and mobile application.
2. The system will locate the user location to identify at least 3 of the nearest partner markets by distance.
3. The system will Estimate the time for when the order will be ready for pick-up or delivery.
4. The system will offer to Browse or search through these store’s.
System Architecture Design

- System Requirements

- The system shall be able to view the list of Grocery stores associated with our application.
- The system shall offer to provide map user location view.
- The system shall offer to browse through grocery items and place an order online.
- The system shall be available for users 24/7.
- The system shall provide time schedule for pick up and delivery.
- The system shall be able to have the option to pay cash on delivery or pick up.
Block Definition Diagram (BBD)
Internal Block Diagram (IBD)
High Level Model OV-1
Risk Management

1) Partnership
2) App crash
3) Over time delivery
4) Quality
5) Cost
6) Security
7) Cultural
8) Lack of driver availability
Risk Management -
(1) Partnership

- Partnerships might not necessarily be appealing to supermarkets in terms of adding a Pick-up both and sharing database using API.

  - **Result:**
    - No pick up service
    - Increase in time delivery
    - Inaccurate inventory

  - **Action:** Deliver groceries without partnership (no pick up)
Risk Management - (2) App Crash

- As with any other software application, code has vulnerabilities to failure
- Restarting the application might take care of the issue
  - **Result:** Fairly large impact on the user experience
  - **Action:** User info will be saved in the user account
Risk Management - (3) Overtime Delivery

- When there are humans involved in the system, there is bound to be human error.
  - Result: Losing the confidence in the system’s users
  - Action: Increase delivery guys
Risk Management -
(4) Quality of products

- Managing a big number of shoppers who will be picking the products, such as fruits and vegetables can be a challenge
- Preferences still vary among different consumers, leading to the risk that the products received may not meet one’s expectation.

- **Result:** Losing customers
- **Action:** Immediately replacing poor quality with better quality
Risk Management -
(5) Cost of development exceeds budget

- Proper management of the budget and production of the application should be controlled

- **Result:** During operation if cash flow is low, then operations can be scaled down to a target location or audience and regain strength.

- **Action:** Scale down operation and limit to target local markets

![Risk Matrix Diagram]
Risk Management - (6) Security

- users sometimes feel insecure to share their credit card numbers and house address
  - **Result:** losing the confidence in the system’s users
  - **Action:** Pay cash in delivery or pick up
Risk Management - (7) Cultural

- Not every person is willing to embrace new technology
- Lack of acceptance from the older generation to shift from the traditional grocery shopping to online grocery shopping

  - **Result:** Less demand on the system which will effect the revenue

  - **Action:** Error correct and request feedback for improvements
Risk Management -
(8) Lack of driver availability

- If the demand is high and more delivery drivers are required
  - **Result:** The system will bottleneck and delivery times can take a severe hit in reliability
  - **Action:** Limit the number of orders coming in to the system
## Cost Analysis

<table>
<thead>
<tr>
<th>Items</th>
<th>Units</th>
<th>Monthly Cost per Unit</th>
<th>MONTHLY TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developers (Full Stack, Frontend, Backend, UI)</td>
<td>15</td>
<td>$6,000</td>
<td>$90,000</td>
</tr>
<tr>
<td>Dedicated Server Rental</td>
<td>20</td>
<td>$400</td>
<td>$8,000</td>
</tr>
<tr>
<td>Grocery Baqala Station (Booth, Hardware)</td>
<td>50</td>
<td>$1,500</td>
<td>$75,000</td>
</tr>
<tr>
<td>Grocery Shoppers</td>
<td>100</td>
<td>$1,920</td>
<td>$192,000</td>
</tr>
<tr>
<td>Independent Contractors – Grocery Deliverers</td>
<td>100</td>
<td>$200</td>
<td>$20,000</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>$385,000</strong></td>
</tr>
</tbody>
</table>
Lean in System

Value: from the standpoint of the end customer is time saved (convenience) and accurate selection of groceries.

Value Stream: All steps that relate to steps that streamline accurate selection of groceries getting to the consumer quicker are value-creating steps.

Flow: Steps that add little to no value should be either combined or removed altogether to tighten the sequenced flow.

Pull: because of the partnership established with supermarkets the system never requires its own inventory so pull is successfully achieved.

Perfection: Perfection using Lean enablers

"Use Lessons Learned from Past Programs for Future Programs"

Respect for People: encouraging and empowering people by listening to what they have to say.
Lean in System - categories of waste

▶ **Overproduction** - By not having our own facility or inventory we expect to save millions in startup. Instead of warehouses and truck drivers.

▶ **Waiting** - Instead of ordering groceries online for delivery to your home, you can have the company gather and bag your order and place it for pick-up.

▶ **Transportation and Defects** - This problem is a pure waste for both sides, the customers and supermarkets due to lack of communication and lack of language.
Current State VSM

Start

Find Store
10 min

Find Items
1 Hour

Store Checkout
5 min

Transferring
Items to House
5 min

End

Drive back
10 min

Transferring
Items To Car
5 min

Total time = 1 Hour and 35 minutes
Future state VSM

Start

Download Application
1 min

Find store location
1 min

Search for items
15 min

Registration
2 min

Checkout
2 min

End

Total time = 21 minutes
Time Saved = 1 hour, 14 minutes
Conclusion

- The project focuses on finding the best solution to solve the ongoing problem of grocery shopping in Saudi Arabia.
- Creating Baqala system will eliminate the time wasted for the consumers and super markets.
- Based on extensive analysis and comparisons, Partnership with grocery stores is the most elegant solution that addresses the issue of the current system.
- Online retailing industry continuously growing, the time may be right for a big and diverse expansion in online grocery formats.
Lessons Learned

- Considering every aspect of a new startup and understanding the unknown risks
- In order to have a successful service, one must do all research that concerns past failures. Learning through past mistakes is very useful in trying to avoid problems
- Surveys are very important in order to understand and improve all services, as well as improve customer service and satisfaction.
Thank You

Questions?
References


12. Lean Thinking 1, SELP 660, Mech 660. Oppenheim