DIGITAL ASSIGNMENT- 4
Lean Start-up Management

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Ans 1:

Introduction:

One of the biggest challenges for countries in the current climate of COVID-19 is to get real-time visibility into what is happening. Governments and health organizations lack insight into the real-time status of the disease, the exact number of patients and the spread of cases around regions and countries. Similarly real-time visibility into the logistics network is challenging supply chain companies.

Due to COVID-19, a black swan event, supply chains are struggling with logistical bottlenecks from restrictions on the flow of goods, increasing the importance of transportation and negatively affecting freight capacity. Lockdowns of cities/countries and border crossings are causing disruptions for shippers as well as confusion around actual status at multiple locations. Limited labor workforces at warehouses and distribution centers, as well as at brokers and logistics service providers, are causing delays at pickup and delivery locations.

Some options or recommendations to improve supply chain-

Identify the use cases where real-time transportation visibility technology can help you create better insights in your current transportation network and provide predictive insights going forward to prepare for other supply chain disruptions. Utilize real-time transportation visibility platforms to get better visibility of bottlenecks at borders and in cities, as well as of inventory in transit to distribution centers (DCs) or to stores. Use technology tools such as real-time transportation visibility to predict when and where labor issues might occur, causing misalignment between transportation and the loading/unloading locations. This might cause rerouting of products direct to stores.

In this assignment, we will describe scenarios showing the value of real-time transportation visibility and how these technologies can help companies better protect themselves from issues around the network and gain better insight into estimated product delivery times such as milk whose self life is minimal.

Literature Review:

1: Communities of Autonomous Units for Pickup and Delivery Vehicle Routing-
Communities of autonomous units are being developed for formal specification and semantic analysis of systems of interacting and mobile components. The autonomous units of a community are rule based, self-controlled, goal-driven, and operate and move in a common environment. They employ communities of autonomous units to model the dynamic pickup and delivery problem with the general idea to demonstrate their suitability for a range of logistic tasks. A system of autonomous units forms a community provided with a common environment where the units interact and may have an overall goal. The autonomous units of a community apply transformation rules to the common environment in a self-controlled and goal-driven manner.

2: Design and Development of a Portable Disinfectant Device-
The novelty of this device lies in its innovative design that combines spraying of sanitizing liquid and UV light-based disinfection methodologies. For this, the device uses two separate

disinfection systems: the pump-nozzle assembly for spraying the disinfectant, and UV-C radiations to increase the virus kill efficiency. This device will be the first of its kind using UV-C radiations and a disinfectant sprayer in a common header in a portable device format. This portable disinfectant device will be able to disinfect the surfaces, wherever used. UV-C radiations of 222-254 nm wavelength have been used for the current application. This device has been specifically developed to disinfect non-living things.

3: Influence of COVID-19 on Manufacturing Industry and Corresponding Countermeasures from Supply Chain Perspective-

It is critical for the recovery of manufacturing industry against COVID-19 by analyzing its impact from supply chain perspective and exploring corresponding countermeasures. Firstly, this paper studies the initial impact caused by worldwide spread of the coronavirus, such as production disruption of raw material and spare parts, unsatisfied market demand due to setbacks in logistics, increasing bankruptcy risk for small and medium sized enterprises (SMEs), and demand fluctuation enlargement. Secondly, the aftershock of COVID-19 is analyzed. With the trend of regionalization and digitalization, two-step countermeasures are proposed to help the recovery of manufacturing industry within the pandemic and better prepare for the post-COVID-19 world from supply chain perspective.

4: A Secure QR Code System for Sharing Personal Confidential Information-

QR codes are being used increasingly to share data for different purposes. In information communication, QR code is important because of its high data capacity. However, most existing QR code systems use insecure data format and encryption is rarely used. A user can use Secure QR Code (SQRC) technology to keep information secured and hidden. In this paper, we propose a novel SQRC system which will allow sharing authentic personal confidential information by means of QR code verification using RSA digital signature algorithm and also allow authorizing the information by means of QR code validation using RSA public key cryptographic algorithm. We implemented the proposed SQRC system and showed that the system is effective for sharing personal confidential information securely.

## 5: Autonomous Vehicles: Autodriver Algorithm and Vehicle Dynamics-

A given road can be expressed mathematically in a global (or world) coordinate frame. Following the road can be substituted by following the loci of its curvature center and turning at the right circle of curvature. Considering that a vehicle in motion is always in turn about an instantaneous rotation center relative to the ground, an autonomous vehicle capable of following a given path by coinciding the rotation center of vehicle at every moment on the curvature center of the road could be designed. The dynamic reactions of the vehicle influence its path of motion and make its rotation center to depart from the desired path of the curvature center of the road.

Delivery Methodology:

A prime-mover with a chassis of 5 t carrying capacity will be used. On this standard chassis three types of body may be placed according to requirements:

  i.   a closed uninsulated chamber for UHT and sterilized milk;
  ii. a closed insulated chamber for all pasteurized milks, except for delivery to vending machines;
  iii. an insulated milk tank for deliveries of pasteurized milk to vending machines.

In this it is assumed that a daily production of 10 000 to 100 000 litres will be distributed within a square 10 km × 10 km.
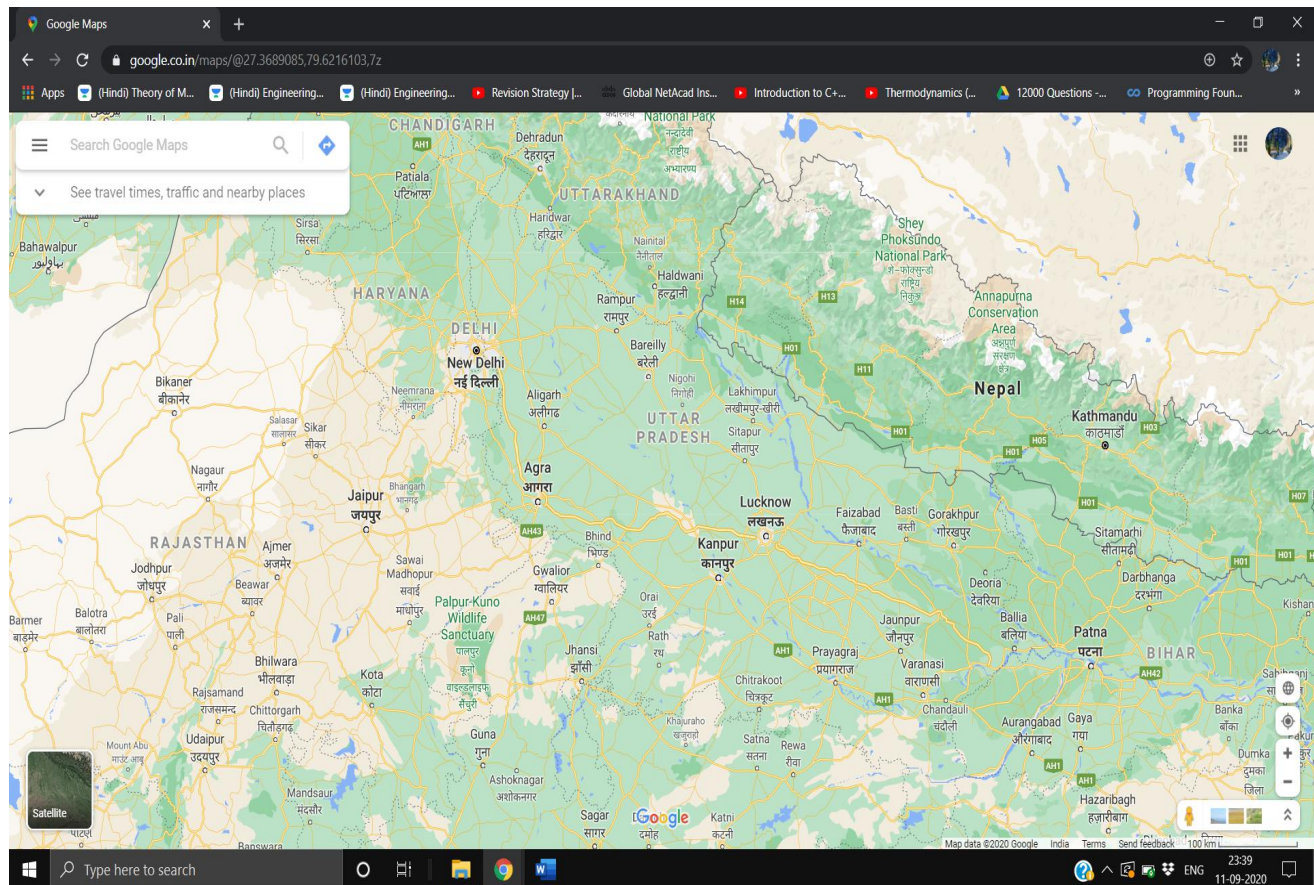
An area of 100 km is assumed and the milk is transported in the pandemic times to the Kanpur city from nearby villages and cities in the pandemic of corona.

UV Steriliser: For sterilising the milk vending machine it will be fitted with a Uv steriliser which will be used for killing the corona virus after each dispensing of milk.

The UV sterilizer will utilize a germicidal fluorescent lamp that produces light at a wavelength of approximately 254 nanometers (2537 Angstroms). The machine with the bacteria/algae passes over the bulb (or around the bulb if a quartz sleeve is used) and is irradiated with this wavelength. As the light penetrates the virus, it mutates the DNA (genetic material), preventing growth/multiplication of the organism.

Refrigeration System in Milk:

We will be using a refrigeration system mounted on the delivery truck for delivery of the mik.

Milk must be cooled from 98 degrees F. (37 degrees C.) to storage temperature, typically about 38 degrees F., to preserve its quality. The cooling process involves removing 56 BTUs of energy from each pound of milk (27 kilojoule per kg). Typically, a refrigeration system does this by using a special refrigerant fluid to remove heat from the milk and "reject" the heat (usually) into the outside air.

The basic refrigeration system is made up of a refrigerated bulk tank, a refrigeration compressor unit and an air-cooled condenser unit. There are several technologies that can be added to the milk cooling systems on dairy farms to reduce the refrigeration requirements or to capture waste heat for pre-heating water:

Refrigeration heat recovery (RHR) units will make a refrigeration system more efficient by collecting heat that would normally be wasted to the air and using it for water heating. An RHR unit captures heat from the system refrigerant and transfers it to water, preheating it before it enters a water heater.

Scroll compressors are 15 to 20% more efficient than traditional reciprocation compressors yet have fewer moving parts and are only slightly more expensive than reciprocating compressors. Scroll compressors have been used in the dairy industry with good results for over 15 years. If you are purchasing a new bulk tank or replacing a failed reciprocating compressor, you should specify that the compressors be a scroll type. The additional investment is a modest cost for the improvement in efficiency.

Well Water Precoolers are heat exchangers that use well water to cool the milk before it reaches the bulk tank. Properly sized, they can reduce milk cooling costs by up to 60%, assuming 55°F well water. Undersized water lines and water system capacity are the two largest reasons that precoolers do not perform up to their potential.

Nodemcu ESP8266 wifi module- NodeMCU is a low-cost open source IoT platform. It initially included

firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. It can be connected to various devices and created wifi spot and those devices can be controller using apps like blynk and using wifi of android mobile phone.

Relay Module- The relay module is a separate hardware device used for remote device switching. With it you can remotely control devices over a network or the Internet. Devices can be remotely powered on or off with commands coming from ClockWatch Enterprise delivered over a local or wide area network. You can control computers, peripherals or other powered devices from across the office or across the world. The Relay module can be used to sense external On/Off conditions and to control a variety of external devices. The PC interface connection is made through the serial port.

Power supply- You have 3 possibilities for a power supply of the NodeMCU:
Operate the NodeMCU on the 3.3V input with 2.5V to 3.6V
Operate the NodeMCU on the VIN input pin with a voltage between 7V and 12V
Use a USB cable with 5V. A diode prevents current from the 5V input to the USB connection flows. The built-in voltage regulator has a maximum power reserve of 300mA for external expansions at 5V input voltage.

Technology used:

The milk dispensing machine would be fitted with a Nodemcu device with an IOT device that can work according to an application which will be installed on a device of the customer

.The customer can select the variety of milk and the amount of milk and can pay digitally by using debit card , credit card upi apps and other applications.

Cost Estimate:
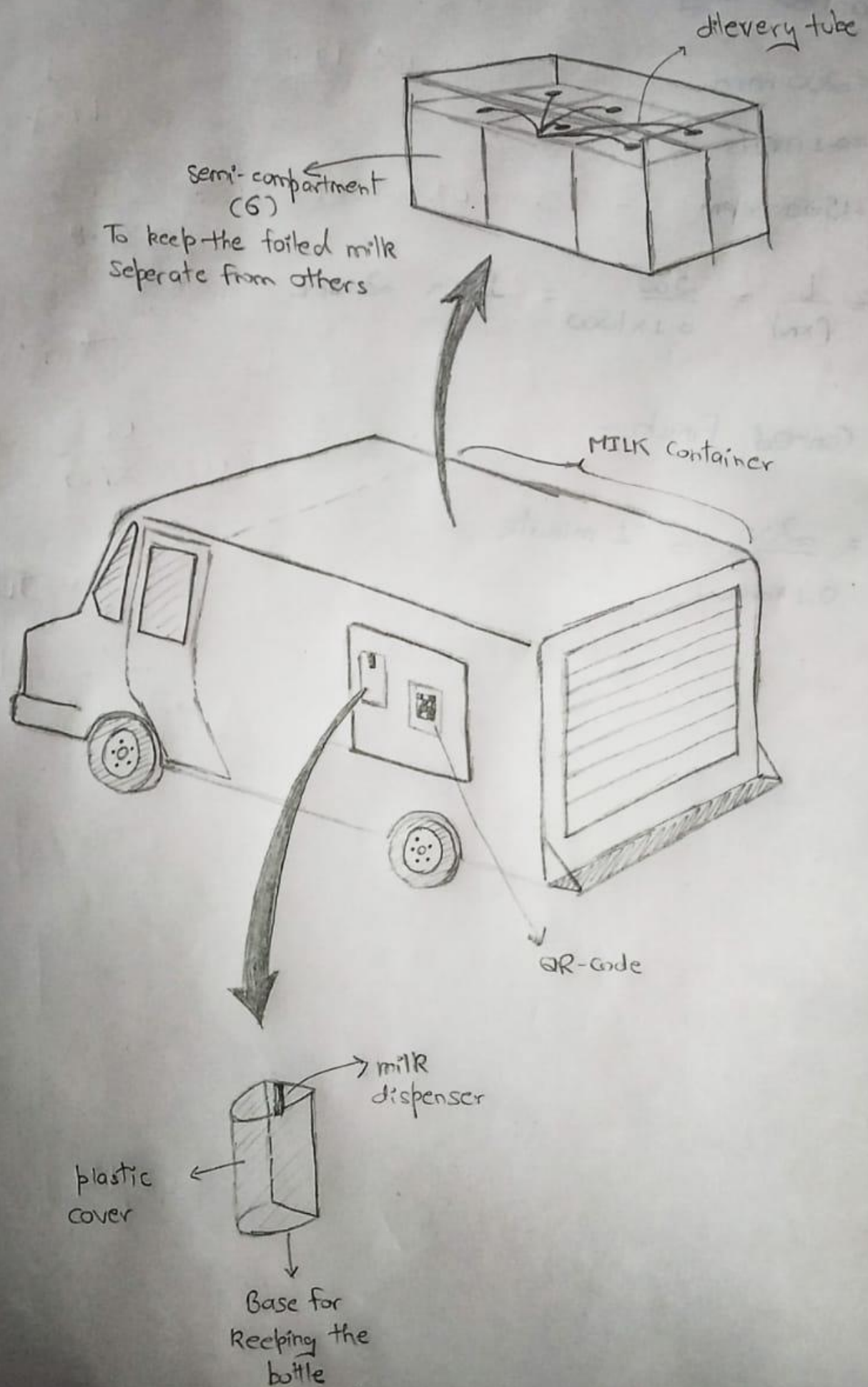
1: 5t truck (Tata Ace): 55000rs

2: UV Sterilizer: 10000rs.

3:Milk Vending machine: 15000rs

4:Node Mcu and control systems: 5800rs

5: Refrigeration System: 8500rs

Design:

dilevery tube

semi-compartment
(6)
To keep the foiled milk
seperate from others

MILK container

QR-code

milk
dispenser

plastic
cover

Base for
keeping the
bottle

Conclusion-

Given current conditions in 2020, restrictions on travel networks have created logistical bottlenecks, exacerbating inbound and outbound supply chain challenges. Self-isolation and forced isolation announcements have led many people to engage in panic buying, leading to empty shelves. This has placed strain on supply chains that are also struggling with logistical bottlenecks due to restrictions on the flow of goods and lack of critical personnel.

Visibility to the flow of goods has increased in importance as out of stocks and overstocks have become increasingly unacceptable for retailers. Standard pricing, promotion and trade spending discussions, which typically comprise the majority of key account manager/retail buyer conversations, are taking a back seat to more basic, survival-mode supply concerns including how to get products to the consumer. The flow of goods is similarly affected as shipments are diverted from DCs direct to retail stores or from the store to the consumer's home.

Some companies have referred to the term "turbocharge logistics flexibility." This includes many different steps companies should take to understand potential lockdown areas and how companies can continue to enable deliveries in those areas. Real-time transportation visibility technology plays an important role in helping companies assess these situations by providing valuable insights and tools to analyze and predict scenarios. Some companies already have these solutions and can start assessing and predicting impacts on their shipments. Many companies are still implementing these technologies and looking at the different capabilities these solutions can provide.

In this assignment, we proposed a solution to effectively deliver products like milk whose self life is very less. These products has to be delivered fast, sanitized and safely. We proposed various modules and methods which can be implemented to make this possible.

References-

[1] Hans-Jorg K. and Sabine Kuske, Communities of Autonomous Units for Pickup and Delivery Vehicle Routing, *International Symposium on Applications of Graph Transformations with Industrial Relevance*, pp. 281–296, 2008.

[2] Dhananjay Kumar et al, Design and Development of a Portable Disinfectant Device, *Transactions of the Indian National Academy of Engineering (2020)*, 5:299–303, https://doi.org/10.1007/s41403-020-00138-2

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Ans 2:

Finomena-2015

Founder(s): Riddhi Mittal, Abhishek Garg

Headquarter: Bengaluru

Launched: 2015

Category: Fintech

Closed in: Dec 1, 2017

Funding: The startup raised an undisclosed amount of fund as seed funding from Matrix Partners India, Kaushal Aggarwal and Harshvardhan Chamria in March 2016.

A Bengaluru-based, Fintech startup, Finomena was founded by the graduates of IIT Delhi and Stanford and the ex-employees of Facebook, Microsoft, Boston Consulting Group and Bain Capital. The startup facilitates students and young professionals in buying electronic devices and appliances by providing them with small-ticket loans. The startup provides easy installments or financing options to borrowers to purchase phones, laptops, and other consumer electronics online.

The seed funding they raised from the market all goes in vain. Other than this a setback to those investors who invested in their company and for their clients. Major competitors for the Finomena was ZestMoney, CashCare, Capital Float, and Lendingkart, and various other alternate loans startups too. They had wasted so much time on a service, which is already providing by the big Financial Institutions of the market.

It is found that the lack of funding led the company toward shutting down. The startup's success path was ceased by lack of fund and the start-up ended. Trustability is the major factor for them to work in the fintech sector. As there are banks too also providing the same services. Pre demonetization the scenario for the startup was different and post the whole scenario was just changed. The government launched their own schemes and banks are now providing the same there is nothing to differentiate in between now. When they commenced the startup may be the idea was a revolutionary one, but the scenario totally changed post demonetisation. People trust banks more than any other third party for such services. Trustability is one of the major factors where they were lacking.

WORK DISTRIBUTION

1:Shashank Shukla(18BCE2522): Introduction ,Literature Survey, Conclusion and start-up analysis

2:Harsh Vardhan Singh(18BME0030): Methodology and Technology used. Cost Estimate and Start-up analysis.

3:Lakshya Mishra(18BME0096): Complete Design of the system, Sketch of the design.