**NMIMS Global Access School for Continuing Education (NGA-SCE)**

**SEMESTER 3**

**Course: Emerging Technologies: IoT, Augmented Reality, Virtual Reality**

**Internal Assignment Applicable for April 2023 Examination**

**QUESTION 1**

**VROOM Introduction:**

* The U.S. used automotive market is the largest consumer product category, generating approximately $841 billion from sales of approximately 40 million units in 2019. The industry is highly fragmented, with over 42,000 dealers and millions of peer-to-peer transactions. However, the industry still needs to rely more on an outdated dealership model.
* The traditional dealership model involves limited selection, lack of transparency, high-pressure sales tactics, and inconvenient hours. These shortcomings have caused many consumers to circumvent the dealer and transact independently, creating a large peer-to-peer market for used vehicles.
* However, the peer-to-peer market comes with its own set of challenges for both buyers and sellers, entailing home visits by strangers, lack of secure payment methods or identity checks, difficulty researching available vehicles, and lack of verified vehicle conditions.
* Presented with these alternatives, most consumers are dissatisfied with the current automotive buying and selling experience. Additionally, E-commerce Penetration in the U.S. Used Automotive Market is Just Beginning and is poised to grow.
* Purchasing a used vehicle enables a consumer to obtain a fully reconditioned vehicle at a higher standard of luxury or with highly sought-after features for the same dollar amount as a new, lesser-model vehicle. In this shifting market, used is the new “New.”
* Vroom is an end-to-end ecommerce platform for used vehicles that offers a better way to buy and a better way to sell used vehicles. In this strategy story, we will analyze the business model of Vroom and how does Vroom work and make money.



**What is Vroom? How does Vroom work?**

Vroom, founded in 2013, is a New York City-based used car retailer and e-commerce company that lets consumers buy, sell, and finance cars online. Vroom takes a vertically integrated, hybrid asset-light approach, leveraging the benefits of national scale and local efficiency, reinventing all vehicle buying and selling phases, from discovery to delivery and everything in between. Vroom’s platform encompasses

1. **E-commerce:** In contrast to legacy dealerships and the peer-to-peer market, Vroom provides consumers with a personalized ecommerce interface to research and select from thousands of fully reconditioned vehicles. Vroom offers transparent pricing, real-time financing, and nationwide contact-free delivery to buyers. To sellers, Vroom provides attractive market-based pricing, real-time price quotes, and convenient, at-home vehicle pick-up.
2. **Vehicle Operations:** Vroom is scalable and vertically integrated operations underpin Vroom’s business model. Vroom strategically sources inventory from consumers, auctions, rental car companies, original equipment manufacturers (“OEMs”), and dealers. In Vroom’s reconditioning and logistics operations, Vroom deploys an asset-light strategy that optimizes a combination of ownership and operation of assets by it with strategic third-party partnerships.
3. **Data Science and Experimentation:** Vroom relies on data science, machine learning, A/B, and multivariate testing to continually drive optimization and operating advantage across Vroom’s ecommerce and vehicle operations.

**How does Vroom work for buyers?**

1. **Browsing Vroom’s Inventory:** Vroom’s platform allows customers to browse an inventory of thousands of vehicles and filter by make, model, mileage, color, and other factors.
2. **Purchase process:** Following vehicle selection, customers promptly receive a call from a member of Vroom’s customer experience team to answer any questions and to help the customer finalize the transaction.
3. **Selecting Value-Added Products:** As the customer completes the purchase process, the customer experience representative explains the value-added product options, including extended warranty and insurance policies.
4. **Getting Delivered:** The last step in the customer journey involves arranging vehicle delivery. Customers select the location and timing of delivery along with any specific delivery instructions, and Vroom arranges the delivery with its network of third-party carriers.

**How does Vroom work for Sellers?**

1. **Sellers describe cars:** Sellers start by providing a VIN. From there, the customer confirms or updates information about the vehicle, including information such as make, model, and mileage. Vroom’s data analytics tools appraise the value of a vehicle based on the answers provided.
2. **Sellers Get Offer:** Upon receiving a customer’s application for an appraisal, Vroom runs the vehicle information through Vroom’s central vehicle database to generate a competitive appraisal based on market demand, estimated reconditioning costs, depreciation, and other factors that impact the retail and wholesale value of the vehicle.
3. **Vroom Picks It Up, and sellers Get Paid:** After a customer has accepted Vroom’s purchase offer on their vehicle, a customer can arrange payment and at-home vehicle pick-up free of charge, using Vroom’s network of third-party logistics operators.

**How does Vroom make money? What is the business model of Vroom?**

**For Buyers:**

* **Enormous Selection of Inventory:** By making purchasing decisions based on data rather than intuition, Vroom can offer a wide selection of vehicles that excite Vroom’s customers.
* **Consistent High Quality:** All of Vroom’s vehicles pass Vroom’s detailed inspections and meet Vroom’s proprietary Vroom Reconditioning Standards, which result in high-quality used vehicles.
* **Comprehensive and Transparent Vehicle Information:** Vroom eliminates bait-and-switch risk through high-resolution photography and detailed product descriptions on Vroom’s platform, which show Vroom’s customers every aspect of Vroom’s vehicles from all angles, and provide third-party vehicle history reports on all of Vroom’s vehicles.
* **Market-based Pricing:** Vroom prices its vehicles using data science and algorithms, ensuring that buyers receive attractive, market-based, no-haggle pricing.
* **On-Demand Shopping and Contact-Free, Convenient Delivery Experience:** Vroom offers customers the ability to shop for their desired vehicle from any location.

**For Sellers:**

* Ease of Use: Sellers are not required to visit a dealership, and there is no cost to submit a vehicle for sale.
* On-Demand Appraisals: Vroom utilizes its extensive data insights and experience across thousands of transactions to generate a purchase offer that reflects a competitive market-based price, providing customers with a fast and easy customer experience.
* No High-Pressure Tactics: Vroom keeps all purchase offers open for two days or 250 miles. This process allows customers to shop, compare and analyze the sale of their vehicle from the convenience of their home to ensure they are getting the best value, eliminating pressure to take a deal on the spot.
* Contact-Free Vehicle Pick-ups: Vroom’s customers enjoy the convenience of national, at-home contact-free vehicle pick-ups free of charge within days of accepting Vroom’s offer.

**Marketing Strategy of Vroom:**

* Vroom operates a multi-channel marketing strategy that includes both national brand and digital performance marketing. Vroom leverages various digital performance channels, including automotive aggregator sites, to generate demand for Vroom inventory by VIN.
* Vroom also runs a national brand campaign through TV and online media. Vroom has more than doubled the total brand leads to Vroom’s website, which means a customer began their journey by going straight to Vroom’s website, meaningfully increasing Vroom’s sales mix of direct brand leads.
* Because brand leads convert at a higher rate than all other marketing channels, Vroom believes that the continued growth of the national brand marketing campaign and an increasing mix of brand leads will improve Vroom’s marketing efficiency.
* Vroom analyzes visitor traffic and customer interaction with its platform to identify and correlate visitor behavior with sales conversion. Vroom’s analytics enables it to measure and monitor the ROI generated by Vroom’s marketing placements, which it then uses to optimize placement and spending across marketing channels to balance sales velocity and profitability.

**How does Vroom make money?**

The business model of Vroom makes money through the sale of used vehicles and value-added products. Vroom sells vehicles directly to consumers primarily through Vroom’s Ecommerce segment as a licensed dealer and through wholesale channels, which provide a revenue source for vehicles that do not meet Vroom’s Vroom retail sales criteria. Additionally, Vroom makes money through the retail sale of used vehicles and value-added products at Houston-based Texas Direct Auto or TDA.

* 1. **Retail Vehicle Revenue**: Vroom sells vehicles through its ecommerce platform and TDA. Retail vehicle revenue includes vehicle sales and delivery charges (if any). Retail sales made up 80% of the revenue generated by Vroom in 2021.
  2. **Wholesale vehicle revenue**: Vroom sells vehicles that do not meet its Vroom retail sales criteria through wholesale channels. Vehicles sold through wholesale channels are acquired from customers who trade in their vehicles when purchasing from Vroom, from customers who sell their vehicles to Vroom in straight-buy transactions, and from the liquidation of vehicles previously listed for retail sale. Wholesales made up 16% of the revenue generated by Vroom in 2021.
  3. **Product revenue**: Vroom generates revenue by earning fees on sales of value-added products to its customers in connection with vehicle sales, such as fees earned on customer vehicle financing from third-party lenders and fees earned on sales of other value-added products, such as vehicle service contracts, GAP protection, and tire and wheel coverage.

**QUESTION 1 ENDS**

**QUESTION 2**

**Introduction:**

Indian retail industry has emerged as one of the most dynamic and fast-paced industries due to the entry of several new players. It accounts for over 10% of the country’s gross domestic product (GDP) and around 8% of the employment.

India is the world’s fifth-largest global destination in the retail space. India ranked 73 in the United Nations Conference on Trade and Development's Business-to-Consumer (B2C) E-commerce Index 2019.

India is the world’s fifth-largest global destination in the retail space and ranked 63 in World Bank’s Doing Business 2020.

The sizeable middle class and nearly unexplored retail market in India are the main enticing factors for international retail behemoths seeking to move into newer markets, which will help the Indian retail business, grow more quickly. The urban Indian consumer's purchasing power is increasing, and branded goods in categories like apparel, cosmetics, footwear, watches, beverages, food, and even jewelry are gradually evolving into business and leisure that are well-liked by the urban Indian consumer. The retail sector in India is expected to reach a whopping US$ 2 trillion in value by 2032, according to a recent analysis by the Boston Consulting Group (BCG).

The main application of IoT in retail is **uniting the merchandise, the store, and the customers into one efficient chain for the benefit of all**. Connected devices can track consumer behavior, predict trends, prevent theft, and help monitor the condition of other electronics.

**Digital/IOT USES:**

The advent of technology in the retail space has disrupted the traditional business models, having transformed the earlier rules of engagement to a “Physical” experience with an in-built mechanism to understand the customer needs like never before. This has been made possible through continuous consumer interaction with digital platforms wherein reviews, suggestions and AI based product assortments have made in-store digitization possible, shaking up the entire structure in which the retail industry operates. These techniques have now allowed the retailers to influence consumer behavior, as they can now connect with the consumers at all possible touch points.

Technology is now considered to be the major factor in driving engagements and experiences in consumer is shopping journey. It is enabling retailers to acquire new customers, engage better with existing customers thereby increasing sales and to reduce the cost of operations. As customers become more aware, retailers are compelled to respond using data driven technologies to meet the growing expectations. Emerging technologies like AR, VR, Artificial intelligence, IoT, bots, drones, cloud platforms etc. have thereby, become indispensable in enhancing the buyer’s journey.

To further this experience, retailers are coming up with various innovative technologies, which have been in demand, supported by growing consumer consciousness and greater preference for choice and convenience.

**Some of these technologies are discussed below:**

* + 1. **Smart Shopping Carts:** Many retailers have started introducing smart shopping carts and self- checkout options to achieve new benchmarks of convenient shopping experience. These carts serve as a direct response to online shopping, as they guide consumers to their products in their shopping list.
    2. **New Payment Gateways:** With the advent of online payment companies or FinTech companies, touchless commerce through contact less payment methods have increased exponentially. With the rise of internet and other payment methods including net-banking, online cash transfers, mobile wallets, single touch payments, payment through scanning code, etc. have shown an exponential increase in the country.
    3. **Immersive Technologies:** While online players are rapidly embracing the concept of experience-based shopping using AR/VR, especially in fashion & lifestyle and beauty & personal care products, many offline stores are also following the suit by implementing this technology in their stores. These stores are redefining convenience for consumers. In these stores, consumers are required to just walk in, choose their preferred products from a wide range of assortment through a virtual inventory. Then enter the trial room and try all the outfits via virtual mirror without actually having to perform all these tasks. This combination of technology in stores are facilitating seamless experience to the consumers. The buying experience is engaging and unique in value for the consumers.

1. **AI & Bots:** With excitement around artificial intelligence running high, customers are getting more and more comfortable communicating with robots. AI’s impact on retail in future will grow in the area of smart speakers and catboats. These voice-activated virtual assistants will be involved in majority of all business to consumer interactions. Retailers in future need to tap this obsession around AI to provide a better-personalized experience to their customers.
2. **Enhancing in store experience:** Robots are being used to enhance shopping experience for customers by welcoming them at any outlet, guiding and helping them around the store and making it hassle free for customers.
3. **Social Commerce:** Going forward, the technology will continue to change the rules of engagement. With consumers getting more demanding with time, getting their brand noticed amid all the noise will be a huge challenge for retailers in the future. Significance of ‘S-commerce’ or social commerce will significantly increase in the lives of today’s connected consumers. Consumers on social networking sites, while sharing their experiences and stories on the web, giving ratings, writing reviews and recommendations, will post more and more pictures and videos of products or brands.

**Conclusion:**

Having realised the scope of mass digitization of the retail ecosystem, retailers are required to proactively take steps to fine tune their day to day operations to achieve enhanced customer value. Therefore, retailers need to invest funds towards revitalising the customer experience to build loyalty and stem churn by providing individualised experiences at scale.  
With the above and given the great potential in the Indian retail, the future holds a very exciting and rewarding time for all stakeholders in the retail industry.

**QUESTION 2 ENDS**

**QUESTION 3 - A**

Singapore is the **smartest city in the world**, according to **the IMD’s inaugural Smart City Index.**

Its Smart Nation initiative was launched in 2014 by **Prime Minister Lee Hsien Loong,** and three years later benefited from a government injection of **SGD$2.4 billion** (then equivalent to US$1.73 billion). The aim is to create a city powered by **digital innovation** and **technology** that responds to citizens’ ever-changing needs.

## 5 ways Singapore is transforming its urban landscape:

### **1. Mobility as a shared community experience -**

Land is at a premium in high-density Singapore, where just 12% has been set aside for transport infrastructure.

To optimize transport efficiency, utilizing sensor technology, the Agency for Science, Technology and Research (A\*Star) has created an **autonomous fleet** to help the city’s elderly and disabled residents stay mobile.

At the same time, students at the **National University of Singapore** can be ferried around campus on a self-driving shuttle.

There is more.

To help with transport optimization, public data – or ‘open data’ – is being used in a trial to facilitate transport planning. Data from fare cards to sensors in more than 5,000 vehicles, and the real-time tracking of busses, is analyzed.

The result?

**Contactless payment technology** is being used to streamline the movements and payments of the 7.5 million passengers who use public transport each day. As in an increasing number of cities, commuters can pay using contactless cards or mobile wallets.

These are just some of the many transport projects in Singapore.

The city is also running a Smart Mobility 2020 initiative, a joint venture between the Land **Transport Authority of Singapore (LTA) and the Intelligent Transportation Society of Singapore**, to enhance commuters’ travel experience by the development of intelligent transport systems.

Meanwhile, the **Travel Smart Programme** aims to more evenly distribute morning peak hour travel demand on the rail network in three ways: encouraging citizens to re-think.

* when they travel,
* how they travel (for example, switching to bicycles)
* reducing the amount they travel (encouraging working remotely).

### **2. Healthier citizens -**

By 2050, 47% of Singapore’s population will be 65 or older.

To reduce the pressure of an aging population on the city’s care services, Singapore has **digitized its healthcare system**.

**TeleHealth video consultations** offer appointments over the internet when in-person visits are not possible, while **TeleRehab** allows patients to undergo exercises in their own home – wearable Internet of Things (IoT) devices monitor patients’ progress and transmit the data to their therapist over a wireless network.

Robotics in Singapore is helping to reduce loneliness in an aging population.

How is that possible?

* **Artificial intelligence (AI)-powered ‘chatbots’** talk to the elderly, tell them about community activities, and integrate messages that promote healthy living.
* **The AI-powered  Smart Elderly Alert System** monitors and learns people’s regular movements, alerting a caregiver when something out of the ordinary occurs, and urgent care might be required.

### **3. "There's an app for that" -**

The phrase became increasingly familiar as smartphone use grew, and in Singapore, this couldn’t be more apt, as an estimated 90% of its population own smartphones.

Through **Smart Nation**, citizens can report municipal issues, hail self-driving vehicles, receive location-specific environmental alerts on air quality, temperature, and rainfall, monitor smart meter energy output, and access information tailored to young families and elderly residents – all through a network of apps.

### **4. Supporting business -**

Singapore’s Punggol Digital District merges the Singapore Institute of Technology with a business park.

This district aims to foster development in cybersecurity and IoT technologies by enabling better integration between industry and academia,

A data-sharing collaborative, the **Data Innovation Programme Office**, has also been established, to encourage transparent business interactions. Moreover, businesses that transact directly with the government can now do so through CorpPass, an online hub that enhances what the city calls **“cyber hygiene”.**

### **5. Learning to be smart -**

Singapore is educating using artificial intelligence, under its **TechSkills** **Accelerator** **programme, two initiatives – AI for Everyone and AI for Industry** – led by AI Singapore – will support the upskilling of 12,000 professionals and students in AI.

These initiatives encourage citizens to be part of the change towards the city becoming “digitally ready”, and proactively spearhead this movement.

The city also has a digital national identity system, a Smart National Sensor Platform, **and Virtual Singapore**– **a 3D digital model of the city** that can run simulations and **support future planning** – to name just a few hi-tech innovations.

**QUESTION 3 – A**

**ENDS**

**QUESTION 3 - B**

## Challenge 1: Infrastructure -

* Smart Cities utilize sensor technology to gather and analyze information in an effort to improve the quality of life for residents. Sensors collect data on everything from rush hour stats to crime rates to overall air quality.
* Complicated and costly infrastructure is involved in installing and maintaining these sensors. How will they be powered? Will it involve hard-wiring, solar energy, or battery operation? Or, in case of power failure, perhaps a combination of all three?
* Major metropolitan areas are already challenged with replacing decades-old infrastructure, such as underground wiring, steam pipes, and transportation tunnels, as well as installing high-speed internet. Broadband wireless service is increasing, but there are still areas in major cities where access is limited.
* Funding for new infrastructure projects is limited and approval processes can take years. Installing new sensors and other improvements cause temporary – though still frustrating – problems for people living in these cities.
* Developers can help make it easier to install and utilize smart technology by considering these challenges at the very early stages of development. By beginning with the end in mind – which is the full implementation of the solution – developers and tech companies can speed up the process of making our cities smarter by implementing easy-to-install hardware.
* As an example, the City of Oshawa, in association with key stakeholders, has entered Infrastructure Canada’s Smart Cities Challenge aimed at developing smart city solutions that draw attention to local problems. Using data and connected technologies, the main goal is to collaborate with residents, businesses, and academic and civic organizations to identify common problems and create innovative projects that solve their most pressing challenges.

## Challenge 2: Security and Hackers -

* As IoT and sensor technology use expands, so does the threat level to security. This begs the question…is technology really considered “smart” if hackers can break into it and shut down an entire city.
* Recent discussion involving cyber-terror threats to vulnerable and outdated power grids has everyone a bit more concerned and skeptical about technology and security.
* Smart Cities are investing more money and resources into security, while tech companies are creating solutions with new built-in mechanisms to protect against hacking and cyber-crimes. With block chain being the topic du jour in the tech industry, many developers are looking for ways to incorporate these encryption techniques to increase security in new applications.

## Challenge 3: Privacy Concerns -

* In any major city, there is a balance between quality of life and invasion of privacy. While everyone wants to enjoy a more convenient, peaceful, and healthy environment, nobody wants to feel like “Big Brother” is constantly monitoring them.
* Cameras installed on every street corner may help deter crime, but they can also install fear and paranoia in law-abiding citizens. Another valid concern is the amount of data being collected from all the smart sensors residents are exposed to each day.
* Last year, the ACLU of Northern California did a study about privacy concerns in smart cities. In it, the organization stresses the importance of understanding the technology, identifying the types and sources of data it uses, and determining what will be done with the data collected.
* Developers can help alleviate some of the anxieties of smart city residents by adding transparency and education to their solutions. By developing with the community in mind and considering how they might respond to new technology, companies can gain trust from the people their solutions are intended to help. Of course, local government officials and community boards need to be involved in the rollout and educational aspects as well.

## Challenge 4: Educating & Engaging the Community -

* For a Smart City to truly exist and thrive, it needs “smart” citizens who are engaged and actively taking advantage of new technologies. With any new city-wide tech project, part of the implementation process must involve educating the community on its benefits. This can be done through a series of in-person town hall-style meetings and email campaigns with voter registration, as well as an online education platform that keeps citizens engaged and up-to-date.
* When a community feels like it has playing a part in the overall decisions that affect daily life, and is being communicated to in a clear and thoughtful manner, it is more apt to use the technology and encourage others to use it as well. This is key to a Smart City’s success.
* For instance, Lyon, France has launched almost a hundred projects to improve city life, such as smart power grids, citizen empowerment, and better air quality. The city is collaborating with residents, entrepreneurs, large corporations and startups to create a ‘city of tomorrow.’

## Challenge 5: Being Socially Inclusive -

* Smart transit programs that give riders real-time updates are a great idea for a bustling city. However, what if half the population of that city cannot afford to take mass transit or Uber? What about a growing elderly population that doesn’t use mobile devices or apps? How will smart technology reach and benefit these groups of people?
* It is vital that Smart City planning involves the consideration of all groups of people, not just the affluent and technologically advanced. Technology should always be working to bring people together, rather than divide them further based on income or education levels. Thinking of these communities, in conjunction with the other problems addressed in this article, will promote the overall success of a solution beyond the realm of tech-savvy users.

## Conclusion -

While most everyone can agree that smart technology has the power to make our lives much simpler – especially in highly populated urban areas – implementing that technology must be done in a carefully planned and highly secure manner. Rather than just focusing on what the solution can do, developers and tech companies must also consider how it will affect the people that come into contact with it.

**QUESTION 3 – B**

**ENDS**