Tentative Title: Can Web 3.0 Help Commerce and Last Mile Delivery?

1. Introduction

1.1 Background and current market overview

a. Evolution of the Web: Web 1.0, Web 2.0, Web 3.0
b. Almost everything online: extra cost due to logistics (last mile delivery), waste of resources (boxes (paper, plastic) environment pollution), return cost (free return is not free for companies) – covid impact
c. Current market overview: Companies & their cost structures (Fulfillment, Logistics (shipping, sorting, middle, last mile delivery), etc.)
    i. **Temu, Shein** (Chinese company, Shein company value: $130 billion) (fulfillment cost **$0.5** per order) vs. **Amazon** (fulfillment cost **$2.5** per order), Temu, Shein (huge sales volume **10 million orders** everyday (while Amazon **1.5 million** orders per day), (Temu is planning to open up its marketplace to U.S. and European sellers | AP News) (Chinese fast-fashion rivals Temu and Shein take 'war' for US to court (ft.com)) (Shein, Temu evade U.S. tariff, human rights law imports: House report (cnbc.com)) **TikTok** Commerce – social commerce (TikTok's Takeover Of Marketing And Commerce In 2022 (forbes.com))
    ii. Other than Amazon and Walmart (with nationwide network of fulfillment, distribution, shipping and logistics), most e-businesses cannot afford fulfillment and logistics cost
    iii. Shipping and logistics cost: 4-7% increase every year (Shipping and Logistics Costs Are Expected to Keep Rising in 2022 - WSJ): UPS Labor Union, FedEx Labor Union (ground and express), 3PLs
    iv. Fulfillment cost: 3PL companies normally charge $2-3 per order plus $0.5-1 per item
    v. In case of a D2C company, $10 logistics cost (at least) for a $40 order. This is why companies are using Amazon D2C (there is no small brand D2C possible these days due to the logistics cost).

vi. **Wayfair vs Amazon**? Due to logistics cost furniture (large item, large order, container, "volume" → better cost per item), Chinese furniture manufacturers put their products in Wayfair warehouse

vii. **Shopify** gave up the fulfillment in May 2023 (sold to Flexport) even though they already invested $2.1 billion in their fulfillment system (acquired a company Deliverr (a fulfillment and last mile service provider) in May 2022. It's due to the cost and inefficiency.

viii. **Coupang (in Korea):** $1 logistics cost

- Currently, most contractors charge $2 per order. However, if the current cost increases to $4-5, Coupang will dominate the market.
- What makes it possible for Coupang to keep their logistics cost down at $1 only?
  - Note that packages can get missing, damaged, etc. during the sorting process at distribution center (or terminal)
  - Coupang: no terminal model, they even use a plastic bag instead of a box (no sorting, no conveyer belt)
  - Other companies (most if not all) go through terminals for sorting.
  - Coupang delivery coverage (delivery radius) is small (mostly Seoul).

b. Challenges:

i. Last Mile Delivery Cost (Note that Amazon last mile distance is normally a lot shorter due to many warehouses and distribution centers)

ii. In 2023, Amazon market share (38%) (Largest online retailers in the U.S. 2023 | Statista)

iii. eCommerce companies and D2C brands cannot be profitable with UPS or FedEx due to the cost $5-7 per order

iv. For most other eCommerce companies, information updates and workflow efficiency are not comparable to those of Amazon, Walmart, Apple, Shopify, Target, etc.

v. Information flow and logistics should be integrated (it's almost impossible for "different" service providers), which can be done by smart contract and web 3.0 network

vi. Web 3.0 (blockchain database with incentive system, smart contract, A.I. verification and optimization) can help solve current market problems including above-mentioned issues by the following:

- Retailers as Web 3.0 Network Peers for D2C
- Web 3.0 Craigslist Model for Returns and Reverse Logistics
- Web 3.0 Last Mile Delivery by Peers
- Fulfillment and logistics workflow efficiency by smart contract

1.2. Literature Review

2. Retailers as Web 3.0 Network Peers for D2C
    - Mingled inventory model (Amazon Patent) – FBA (Fulfillment by Amazon): Why is not active? Even in the same Amazon network, the distance between warehouses can be very long
    - Cost (time, money, labor)?? Mis-delivery (delivered to wrong locations), Missing packages (shipment losses or theft) or unexpected delay: cost, refund (customer paid express shipping)
    - Shorter last mile, smaller delivery cost (no middle mile delivery)?
    - Blockchain network + smart contract + (Shared Rides, Last Mile Delivery (UberEats, InstaCart, DoorDash, etc.))
    - Numerical experiments (number of local retailers with probabilities of disruption)
    - Possible application to NIKE (or other sporting D2C brands) with Dicks Sporting Goods (cost savings on return (logistics cost), communication time

saving for information, return and refund, revenue increase for local retailer, instead of reverse logistics)

3. Web 3.0 Craigslist Model for Returns and Reverse Logistics
    - **Large items such as bulky furniture**
    - **Cost**
    - **Wayfair** example
        - In case of damaged items (minor), customer requests a return for a new one
        - Wayfair deliver a new one without picking the damaged items due to the reverse logistics cost
        - Customer doesn't want to keep it. Throw away or call junk removing service (cost) – cost for both wayfair and customer
    - In **web 3.0** network (local marketplace), someone who needs it can get it within a small delivery radius (local residents); in a sense, **Craigslist** was based on local information platform, but it does not have logistics

4. Web 3.0 Last Mile Delivery by Peers

    - Network for Mega-Cities (no terminal no distribution center model): reduction in resource waste, cost savings (Coupang)
    - Local logistics (zone 2 or closer)
    - UniUni (UniUni • We Deliver the Goods)
        - Local network of last mile delivery
        - Peers (delivery persons) can choose the number of packages (based on destinations and time) to deliver (get $2 per package): customers pay $3
    - Delivery radius may be different for different delivery service providers
    - **Web 3.0 Joint Delivery (set covering problem based on available peers with their delivery radii) -** First mile, middle mile, last-mile delivery are all can be done by trusted peers.
    - Numerical experiments (set covering problem)

5. Fulfillment and logistics workflow efficiency by smart contract
    - Efficient workflow – cost savings, reduction of delay
    - Safe and efficient communication between participants (e.g., manufacturer vs shipper, delivery person vs. customer)
        - Example: a shipping label is created but no one is picking it up (e.g., once the shipping label is created, it should be picked up in 12 hours in case of Dick's sporting goods.)
        - Get rid of unnecessary communication time between customers and agents
    - Secure communication over contact information based on smart contract
        - When a delivery person calls, customer might consider it a spam call
    - Numerical experiments (smart contract based on time and location)

6. Conclusion