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Crowdsourcing delivery: New interconnected business models to reinvent delivery

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Abstract: *In the last two years, a new industry is born. Social delivery aims to reinvent delivery by crowdsourcing. Several startups have been founded, with divergent destinies. We examined 18 startups in the industry based on available public documentation. We contribute toward gaining a better understanding of stakeholder value creation in the industry. We introduce a typology of existing business models helping to stress the inherent limitations of the industry. Then, based on the Physical Internet concept, we propose a paradigm change in that nascent industry. Crowdsourced delivery has to become interconnected, beyond point-to-point, embedded in the Physical Internet, as one of the alternative solutions to build the Mobility Web.*

Keywords: *Crowdsourcing, crowdsourced delivery, social delivery, business model, typology, Physical Internet, Mobility Web.*

1 Introduction

Crowdsourcing is a type of participative activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task (adapted from Estellés-Arolas and Gonzalez-Ladron, 2012). As far as transportation is concerned, crowdsourcing is not new. Alternative practices have been around for some time, such as hitchhiking and carpooling. In the goods delivery domain, it has until recently been much less exploited, even though Naredi (2014) reports that a market study by muber.com revealed that 80% of travelers have transported goods for somebody else at least once.

Crowdsourced delivery is an answer to the growing expectations of customers for faster, more personalized and cost efficient delivery service. It exploits technological potential (geolocalization, mobile apps) and the social trend of sharing and collaboration (Rifkin, 2014). For two years, crowdsourced delivery has been bursting. Several start-ups have been launched and some have attracted millions in investment. Currently leading are Posmates and Deliv that have respectively acquired investments totalling more than 22 and 14 million US\$ (Lawler, 2014a ; Lawler, 2014b).

Development of e-commerce is a key reason for the situation. From a business perspective, the shipping price is a frequent obstacle to online purchase; and brick-and-mortar stores suffer from the competition of online stores. They search for a way to equal the comfort of shopping from home. From a societal perspective, the number of single parcel deliveries is growing. The required logistics services have environmental impacts (pollution, noise, traffic jam, etc.), which are gaining a growing attention in the public's eye.

Major players are experimenting new delivery services. The same-day delivery is tested by Amazon, Google and eBay. In November 2013, eBay acquired Shutl, a same-day delivery start-up, for its online platform and algorithm (Wohlsen, 2013).

Walmart is running several projects. The Walmart To Go same-day delivery program is a partnership with Fedex. It is currently tested in 25 stores. Walmart is also exploring how in-store customers could deliver packages on their way home to online buyers. Customers who accept to deliver packages would receive a discount on their purchases (Barr and Wohl, 2013).

Walgreens has partnered with TaskRabbit, an online platform for outsourcing simple tasks. Here is how TaskRabbit works. For example a person confined to home is requesting delivery of her medication specifying a preferred time. The task is then published on the Task Rabbit platform and can then be accepted and fulfilled only by a preapproved person. Medication is delivered by the selected person (Cabebe, 2014).

In September 2013, DHL launched the MyWays Platform. It facilitates last-mile deliveries in Stockholm through crowdsourcing. An app allows individuals requiring flexible deliveries to connect with commuters who accept to transport parcels along their daily routes for minimal fee (Post&Parcel, 2013).

For Brick-and-mortar stores crowdsourced delivery is a competitive advantage against online retailers. Start-ups like Deliv, WunWun or Zipments are offering services that enable customers to place orders from home and to be delivered at the hour of their choice. With crowdsourced delivery, local shops can annihilate the ecommerce advantage of buying from home. They are best positioned to marry the tangible experience and immediacy of physical retail with the simplicity of online selling, by offering one-hour or same-day delivery.

Beyond Amazon, eBay and Google, numerous start-ups are launched. They aim to create disruptive business models, based on their low cost structure and the power of the community, in order to propose delivery services that are more efficient and cheaper. "Ship outside the box" as Barnacle, one of the start-ups, is stating. The claimed objective, to reinvent delivery, warrants closer analysis, especially given little scientific literature is available.

This exploratory paper aims at having a better understanding of the crowdsourced delivery industry and at contributing to its evolution. More specifically:

- Understand the benefits of crowdsourced delivery for the stakeholders of the industry.
- Propose a typology of the current business models in the crowdsourced delivery industry.
- Analyze the limitations of the crowdsourced delivery business models and the obstacles to their growth.
- Discuss how interconnected crowdsourced delivery embeds in the Physical Internet, enabling to overcome current limitations and opening avenues of opportunities.

The paper is organized as follows. In section two, we describe our methodology and examine the businesses of the sample. In section three, we analyze the gains for the stakeholders. Then we analyze the components of business models in section four and propose a typology of business models in the industry in section five. We discuss in section six the inherent limitations of the crowdsourced delivery model, and the obstacles to the growth of the businesses of the industry. In section seven, based on the seminal concepts proposed by Montreuil (2011) we will discuss how crowdsourced delivery can be embedded in the Physical Internet, as one of the alternative solutions to build the Mobility Web. Finally, in section eight, we provide conclusive remarks and propose avenues for further research.

2 Methodology

A total of 26 businesses were identified in the online press. Eight (8) were eliminated: 5 were no longer operating (Deliverwithme, Deliverish, Deliver.it, DeliveryCrowd, GoFellow) and one business serviced only Russian speaking clients (Carryandcash). For the latter, the language proved to be an issue. Our final sample counts 18 businesses: Barnacle, Bistip, Deliv, Easybring, Friendshippr, Instacart, Kanga, mmMule, Muber, Parcelgogo, PiggyBee, Postmates, Rideship, Shutl, Stuff2Send, TaskRabbit, WunWun, Zipments. Table 1 provides some key facts and figures about the businesses in the sample.

Table 1 – Facts and figures about companies in the sample

Barnacle “Ship outside the box” United-States	gobarnacle.com ATR*: 980,222	Founded in April 2013 Over 5000 drivers
Bistip “Gat anything from everywhere” Indonesia	bistip.com ATR*: 606,911	Founded in March 2011 9688 routes Most active trip route: Singapore-Jakarta Transactions value: \$180, 293,
Deliv “Delivery. Shortened” United-States	deliv.co ATR*: 398,705	Founded in 2012 Raised nearly US\$12,4 million since 2012 Partnered with four mall operators (running 660 centers across the US)
Easybring “Every movement” Norway	easybring.com ATR*: 412,901	Founded in 2011 15,000 people have signed up to its website in Norway 14,000 delivery requests a year Plan to launch in Sweden and in the UK
Friendshippr “Your friends will get it” United-States, operations in Dubai and UAE	friendshippr.com ATR*: 1,631,426	Founded in 2013 Received \$670,000 from angel investors in Dubai
Instacart “The best way to shop for groceries” United-States	instacart.com ATR*: 24,296	Founded in 2012 Operates in 10 US cities. Plan to be in 17 by the yearend. 50 fulltime employees 1000 independent shoppers (couriers)
Kanga “Together, we deliver” Atlanta	getkanga.com ATR*: 1,009,554	Founded in March 2014 Raised \$1 million in Seed funding
mmMule “Get anything you want, from anywhere in the world by	mmmule.com ATR*: 984,407	Founded in 2010 Not-For-Pofit organization

rewarding a traveller for delivering it” Australia		
Muber “Find anything you want delivered, personally” United-States	muber.com ATR*: 828,574	Founded in April 2013
ParcelGoGo “We do deliveries within the Harare area” Zimbabwe	parcelgogo.com ATR*: 5,343,340	Founded in 2014
PiggyBee “Eco-friendly shipping by travelers” Belgium	piggybee.com ATR*: 935,547	Founded in April 2012 1,200 active users 25,000 fans on Facebook Available in 9 languages
Postmates “Everyone’s favourite delivery service” United-States	postmates.com ATR*: 87,153	Founded in 2011 Total funding is \$22 million Operating in New-York, San Francisco, Washington, Chicago and Seattle Postmates' mission is to become the on-demand delivery infrastructure for every major city in the world 20,000 restaurants on the platform
Rideship “Get a ride, give a ride, for your packages, pets, even yourself”	rideship.com ATR*: 3,855,786	Founded in 2012
Shutl United Kingdom	shutl.com ATR*: 279,979	Founded in 2008 Launched in the US in February 2013 Acquired by eBay in October 2013
Stuff2Send “A smarter way to send. Delivered.” United Kingdom	stuff2send ATR*: 5,545,871	Founded in 2009 6281 carriers
Deliver Now – TaskRabbit United States	taskrabbit.com/deliver-now ATR*: 15,149	Launched in 2012 Partnership with Walgreens 9307 delivery tasks in SF Bay Area
WunWun “On-Demand Delivery from Every Place in Your City” United States	wunwun.com ATR*: 432,774	Founded in November 2012 Operates in Manhattan and Brooklyn
Zipments “Deliver your way” United-States	zipments.com ATR*: 489,737	Launched in May 2011 Operates in New York, San Francisco, Seattle Now serving Vancouver 200 delivery boys in SF, 35 in Seattle, 50 in NY

* ATR: Alexa Traffic Ranking is a valid rough estimate of a site popularity (Bakeri, 2012)

We used a four-step methodology:

1. Data collection is based on an extensive public document review including articles, companies’ websites, blogs, YouTube videos, etc.
2. Description of the business models is based on the collected information. A comparative table enabled the identification of patterns within the business model.

3. Proposition of a typology of business models is based on the identified patterns.
4. Comparison with literature on the Physical Internet in order to assess and position the crowdsourced delivery concept and conclusion.

3 Gains of crowdsourced delivery for stakeholders

We here examine the gains offered by crowdsourced delivery to customers, retailers and society at large.

3.1 Gains for the customers

Crowdsourced delivery promises four benefits to the customer.

Speed.

As Deliv states with its slogan “Delivery. Shortened”, speed of delivery is a central feature of the promise. Intra-urban one-hour delivery service is offered by the most promising start-ups (Deliv, Kenga, TaskRabbit, WunWun,, Zipments, etc.).

The processes of traditional companies in the parcel logistics industry like FedEx or DHL, propose only one delivery tour per day. In the crowdsourced delivery model, the intra-urban or interurban delivery is immediate if a carrier is available. The power of crowdsourcing is supposed to create a huge pool of carriers. The claim is that the probability to have one available carrier within a short delay is very high.

Personalization.

In crowdsourced delivery, each parcel is managed individually. A high level of personalization is made possible regarding time schedules, management of unexpected situations. In most companies, carrier and customer can contact one another in order to adjust the delivery process. For example, they can agree on giving the parcel to the neighbour, or on rescheduling, especially when a customer needs to leave in a hurry. In crowdsourced delivery, convenience is the key factor.

As Barnacle explains, “*Our drivers will work with you to arrange a delivery schedule and provide special care for your transportation needs* » (gobarnacle.com).

Access to new products

Crowdsourced delivery provides access to products that were not accessible before in the following cases:

- When the seller (retailer or restaurant) is not selling online or has no delivery service.
- When products are sold in foreign places and are not available for sale online. This niche is occupied by mmmule, muber and Piggybee. Muber explains: “*Ever wanted an item not locally available? Or probably you could not buy it because of expensive shipping costs? Post your request online and find your personal courier to buy and deliver it for you at affordable prices*” (muber.com).
- When delivered goods are unique, oversized or fragile and not accepted by traditional courier companies. Rideship.com promises: “*Get a ride for your packages, pets, even yourself*”. The

following emotional story demonstrates the power of crowdsourced delivery. A family located on the west coast fell in love with a dog living in a shelter on the east coast. Yet pet transport services, costing in some cases more than two thousand dollars, seemed a definitive obstacle, until the family tried Rideship. The request was posted on the website and a trucker, traversing the United States, proposed to transport the dog for just US\$300. A week later the family met the trucker and the dog at a highway service area near their home (Blachman, 2013).

Price.

Low prices are a selling point. Rideship questions: “*Need to ship a package pronto but want to avoid those outrageous “express” and “priority” costs?*” (rideship.com/pages/about).

Same day shipping is proposed by the crowdsourced delivery companies for the same price as standard shipping. Deliv.com announces on the homepage of its website: “*If you’re offered same-day delivery for the price of 3-5 day shipping, you’d be delighted. Obviously*” Zipments compared prices for a 10-lbs parcel delivery. The price was 79,17 US\$ for a next-day service with UPS, US\$8,99 for UPSGround service (3-5 days), and US\$ 2,99 for US Postal mail service (3-12 days), versus 9 US\$ for a same-day delivery with Zipments.

Intra-urban deliveries typically start between 3,99 US\$ and 10 US\$ with incremental charges for rush service, larger/heavier loads, and longer distances to travel. Additional fees are applied. Postmates adds a 9% service fee to the purchase price of the items. Also, financial fees are added when an escrow service is used.

WunWun has a different business model. The delivery is free for purchases over 10 US\$. The company makes money through prices negotiated with stores. When the order does not involve a store — for example, picking-up food from a restaurant, having someone picked up from the airport for you, or having someone pickup your dry cleaning - there is a 20 US\$ fee.

A survey by BCG (2013) provides a better understanding of the relative influence of the four points (speed, personalization, access to new products and price). It shows that free delivery, lower prices, free returns, faster delivery options and opportunity to specify delivery windows are more important to surveyed consumers than same-day delivery. Same-day delivery may be a niche market, yet most promising start-ups target this niche and therefore jeopardize their success for the future. To succeed, the crowdsourced delivery business model needs to reach a critical mass. It requires lots of carriers to insure a fast service and lots of customers to feed the carriers.

What remains to be determined is whether the niche is large enough to reach critical mass. Things may change. The affluent Millennials are consumers aged 18 to 34 with household incomes exceeding US\$150,000. These consumers are accustomed to immediate access: 56% are more likely to purchase same-day delivery than the average online consumer.

3.2 Gains for retailers

Online retailers can lower the delivery costs, which are a frequent obstacle to online purchase. For example, M. LaFrance, vice-president of logistics and supply chain solutions at 1800flowers.com, New York, explains: “*Deliv’s crowdsourced model allows for more driver flexibility and increased package densities from other retailers which will drive down the company’s costs*” (Saettler, 2014).

Click-and-mortar retailers can better compete with online retailers, and widen their markets. For example, leading mall owners have signed on with Deliv in order to provide same-day delivery for customers who order online or purchase in store. This offer opens the door to a disruptive business model innovation within the retail industry. As an industry expert states: *“The idea of using your stores not only as a showroom or a retail center, but also as a mini distribution center, is somewhat new to the business”* (Borchersen-Keto, 2014).

Businesses can also reduce their operating costs by using crowdsourced delivery. For example Barnacle is targeting start-ups and small businesses that *“prefer Barnacle drivers for their reliability and flexibility”* (gobarnacle.com). mmMule.com is targeting NGOs: *“Become an AngelMule and use part of your travels to deliver stuff to an organization in need”*.

Click-and-mortar retailers can also reduce the need to stock balance inventory amongst retail stores by using distant open distribution centers located at the periphery of towns or partnering with other stores (Tompkins and Loftis, 2014)

3.3 Gains for society

Crowdsourced delivery is supposed to minimize the environmental footprint and the traffic jam in cities. The number of cars is supposed to be reduced because the crowdsourcing principle is based on the utilization of “drivers already en route” (gobarnacle.com) and because the companies promote alternative transportation methods like bicycles or public transportation systems.

Two nuances have to be considered.

Firstly, the most promising start-ups are relying primarily on professional couriers or people who are dedicated to delivery, and not commuters or occasional travelers. For example, 95% of Zipments’s couriers are professionals.

Secondly, crowdsourced delivery manages parcels individually, while companies like UPS or FedEx are aggregating parcels.

Crowdsourced delivery contributes to creating wealth. It allows already-on-the-road commuters or travelers to generate opportunistic complementary revenues that help cover the costs of the journey. RideShip: *“maybe you’re already taking a trip and would like to pocket some gas money by delivering someone’s cell phone to their house or hooking their 1972 Ford up to your trailer”* (rideship.com/pages/about).

As well, it offers an opportunity for people who want to dedicate themselves to delivery, to create their own flexible job. The customized working schedule is a key benefit. As Instacart explains, *“You’ll only work during times that work for you! Just set your availability each week for days and times that fit your own lifestyle”* (instacart.com/shoppers).

4 Start-up business model components in crowdsourced delivery industry

Amit and Zott (2011) define a business model as: “a new unit of analysis, offering a systemic perspective on how to “do business,” encompassing boundary-spanning activities (performed by a focal firm or others), and focusing on value creation as well as on value capture (Amit and Zott, 2011).

The tetrahedral business model framework (Caisse and Montreuil, 2004) is used here to guide the exploration of the crowdsourced delivery industry start-ups. It is composed of four interdependent poles. Character is the essence of the business: its credo, mission, vision, values, etc. Stakeholders are the actors affected by the business (clients, employees, investors, suppliers, partners, etc.). Offers are the value proposition made to the different stakeholders (e.g.: products, services, shares, careers, etc.), Creation is the way the business operates. In the framework, all poles are linked pairwise by dyads and interlinked pole triads form faces of the tetrahedron. Each dyad and face has a purpose and subject to design and analysis as the poles.

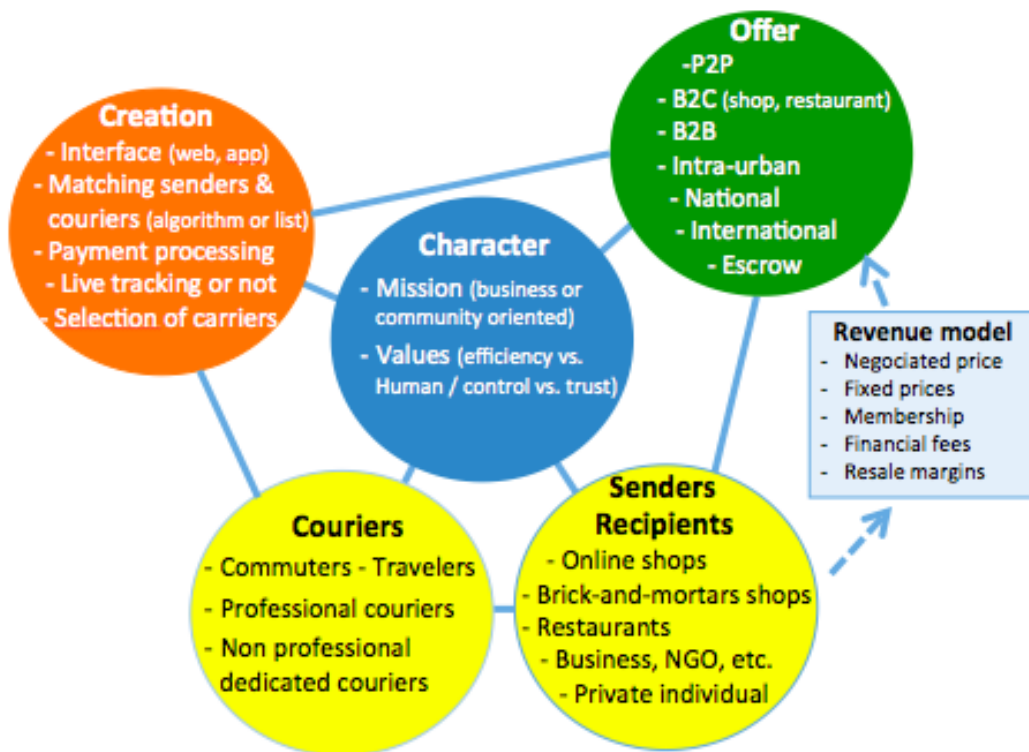


Figure 1: Components of business models in the crowdsourced delivery industry

In this paper, the business model components to be considered in the crowdsourced delivery industry are presented in Figure 1.

- Character pole
 - o Are the organization's mission and values business or community oriented?
- Offer pole
 - o What types of services are offered?
- Stakeholder pole
 - o Who are the senders, who are the recipients, who are the couriers?
- Creation pole
 - o How do the businesses operate?
 - o How do they interface with the customer?
- Exchange dyad, with focus on the revenue model
 - o How do customers pay for the offer?

4.1 Offer Pole

The B2C (Business to Customers) market is apparently the most promising segment today. Two situations are possible:

- The customer places an order by phone or on the web site of a retailer, a pharmacy, a restaurant, a dry-cleaner, etc. Crowdsourced delivery is an option in the online checkout process. If chosen, a task is created and managed by the crowdsourced delivery company. The strategic objective for the latter is to develop partnerships with retailers in order to generate continuous flow of tasks. For example, Deliv has signed partnerships with Foot Locker, L'Occitane, Sony, and others (<https://deliv.co/pages/stores>). Walgreens has partnered with Task Rabbit.
- The customer places an order on the website or on the app of the crowdsourced delivery company. He indicates the retailers on the website where the products are available. A task is created. The courier visits the stores, finds the requested items and delivers them. Instacart is specialised in this service to the point where couriers are named “personal shoppers”, “*smart, friendly people who enjoy shopping for groceries, meeting others, and exploring their city*” ([instacart.com/shoppers](https://www.instacart.com/shoppers)).

Other companies are targeting the P2P (Peer to Peer) market. They aim at matching people who want to send packages with people who accept to go there (dedicated carriers) or are already going there (commuters or travelers). The sender details the type of package, its dimensions, the address of pick-up and delivery specifications (addresses, time schedule, etc.). A carrier executes the task.

Crowdsourced delivery can be used by businesses, when they have to send something to a client, a partner, or else. We name it B2B. Some crowdsourced delivery companies like Barnacle or mmMule are specifically targeting this niche.

Several companies are offering escrow services in order to secure payments.

Crowdsourced delivery is offered at three geographical scales.

- Intra-urban services are the most frequent. Companies offer delivery services inside big cities where the B2C demand is the highest.
- Interurban services rely on travelers from town to town.
- Global services rely on travelers in order to connect locals who want stuff with travelers who can buy and deliver it.

4.2 Creation pole

The process is globally the same over the nascent industry.

- One customer describes a delivery to be made.
- A task is created on the platform of the crowdsourced delivery company.
- Sender and courier are matched.
- A price is fixed.
- Task is managed by the courier.
- Courier, sender and recipient can contact each others if needed.
- Recipient and sender rate the courier.

Many variations can be observed at every stage of the process. The objective of this paper is not to detail the operational aspects of crowdsourced delivery. We rather focus on key differences that are structural in business models:

- Interfaces are different. Some companies are using only websites, others, younger and more fortunate, have developed mobile applications. Some use both technologies. Mobile apps permit to use geolocation.
- Matching of tasks and courier can be automated (using an algorithm that optimizes the execution). Or, in a low-tech process, carriers and senders can register on the website. The requester chooses within a list the carrier or the task that better suit his needs.
- Some companies offer online tracking of parcels, others do not.

4.3 Exchange dyad: Revenue models

Five revenue models are present in the sample. Some company combine two of them.

Fixed price

In intra-urban B2C, P2P or B2B delivery requests can be standardized. A fixed price is possible. Base price currently vary depending on the companies from US\$3,99 to US\$10. Additional charges also vary. Depending of companies, incremental charges apply:

- for rush service,
- for larger or heavier loads that need larger vehicles,
- for longer distances,
- according to the time of day or day of week,
- when the courier has to wait at either the point of collection or the point of delivery without prior instructions,
- when the address changes,
- when the courier is required to do additional duties above et and beyond delivery to the door.

The company keeps a commission on every payment for a completed task.

Negotiated prices

When requests are customized, in particular in interurban delivery, price is not fixed, but results from a negotiation between senders and couriers. In general, senders set a target price, couriers bid and the final price is negotiated.

Zipments charges fixed prices, but it uses the bidding approach for more unusual or custom requests. The sender is routed to the delivery marketplace where price is negotiated.

As to TaskRabbit, like any other task on the platform, the workers, or "Rabbits," make bids on deliveries.

The company keeps a commission on every payment for a completed task. At TaskRabbit, the fee is 20%.

Financial and matching fees

Companies act as escrow in order to ensure safety and assurance in two situations: when prices are negotiated between requester and courier (Bernacle, Bistip, Kanga, Muber, Rideship), and in international delivery (mmMule, Muber, PiggyBee).

Indeed the revenue model of international crowdsourced delivery companies is very fragile. Service is free. The requested is committed to reimburse the carrier who bought the order, and to reward him. mmMule lists ten types of rewards: food or drinks, local experiences, local tips and info, accommodation, language lessons, cash rewards, free equipment use, travel discounts, eternal gratitude and other (mmmule.com/wants#). In this business model, social values are central. As muber.com enthusiastically claims “*say hello to a meaningful, social buying experience delivered personally to you by just rewarding a friendly traveler*” (muber.com). Receiving fees from being an escrow is the only source of revenue for these companies.

The escrow process is as follows: “*Payments are made at the time of reservation and held in escrow. The company will disburse payment to the driver's account upon delivery confirmation*” (gobarnacle.com). The courier receives net payment, after processing fees and financial fees have been deducted. RideShip’s commission is 10%. Easybring charges what they have entitled a matching fee of 15%.

Resale margin

In the case of B2C delivery, some companies make money by marking up negotiated retailer prices. Markups vary on a store-by-store basis. Every order delivered earns the carrier a commission. The amount of the commission is based on many factors, including the number of items ordered by the customer. Some customers choose to tip too, and Personal Shoppers receive 100% of tips from customers on top of their commissions.

Instacart combines resale margin and fixed prices for delivery.

The most original and surprising revenue model is WunWun’s. The company offers delivery from stores for free. Wunwun founder, Lee Hnetinka unveils the revenue model: “*While users are able to specify particular brands or stores that they want products from, many users do not particularly care where their tea or coffee comes from. For that, WunWun has an option called “Pick for me”. WunWun has partnered with numerous retailers, and directs these purchases to them. The retailers enjoy the added business, and WunWun gets a cut.*” To prevent loss of revenues if users do specify a non-partner retailer, WunWun has partnered on both the retail and the product side. The company can nudge the users towards its partners on the product side. For example, should the customer request a “cereal”. The algorithm detects the keyword and suggests the user buys a particular brand. The suggestion can be considered as a highly targeted advertisement (Porges, 2013).

Membership.

The only company in the sample that uses membership as a revenue stream is Instacart. With Instacart Express, for US\$99 / year, all the “in the next two hours” scheduled grocery deliveries over \$35 are free.

Kanga is envisaging to develop new revenue streams like premium subscription services, value-added services, and perhaps even promotional placements for local businesses (Start-Up beat, 2014).

4.4 Stakeholder pole: Couriers

Couriers are a key resource in the business model. Their number varies depending on the company. There is however a direct correlation. The greater number of couriers, the greater the impact on crowdsourcing.

There are three types of couriers.

- Commuters or travelers are opportunist couriers, who decide to take care of a delivery task in order to reduce their costs or make their journey profitable. Those are mobilized in interurban or international delivery.
- Non-professional dedicated couriers are individuals who decide to accept some tasks. They can self-determine their schedule. For some of them, it is a part-time job in order to complement their main activity. For others, delivery has become their main source of revenues. Those are concerned by intra-urban delivery.
- Professional couriers find complementary revenues in partnering with crowdsourced delivery companies.

The types of couriers that companies are working with vary. 95% of Zipments's couriers are professional delivery people with more than four years of professional delivery experience on average. By contrast, both Deliv and RideShip work with more "lifestyle" drivers, such as graduate students, real estate agents or freelancers looking for extra income (Drake, 2013).

4.5 Character pole

Business philosophies vary widely from company to company, as illustrated in Table 2. Motivational and economic factors can be traced on a continuum illustrating that organizations can offer a more business orientation or a community orientation. The former delivery models are business oriented. Market share, profitability, Return on Investment and so forth are essential means of measurements. The Community model, illustrated by the newer players, is deeply rooted in the collaborative economy. Such players aim at being useful for their community. As mmMule explains: *"mmMule allows you to connect with likeminded people in order to get anything you want from anywhere in the world or to experience authentic, local travel experiences, not to mention make awesome new friends from around the globe."*

Table 2: Difference between business oriented and community oriented business models

Business oriented	Community oriented
Efficiency	Human touch
Control	Trust
<i>"Time is money. We give you something priceless: time. Delivery fees start at \$5. An hour of your time is worth way more than that."</i> (Postmates)	<i>"Say goodbye to expensive shipping costs; say hello to a meaningful, social buying experience delivered personally to you by just rewarding a friendly traveler."</i> (Muber)
	<i>"mmMule is a social travel network connecting locals who want stuff with travelers who can deliver it. In return for delivery travelers are rewarded with fun, local travel experiences".</i> (mmMule)

5 A typology of business models in the crowdsourced delivery industry

Comparison of the business models components of the companies in the sample reveals some patterns. We identified five types of business models in the crowdsourced delivery industry as illustrated in table 3.

Table 3: Typology of business models in the crowdsourced delivery industry

Name	Clients	Offer	Character	Couriers	Revenue model
Courier	B2C	Deliver an order from a shop, a restaurant, a pharmacy, etc. Intra-urban	Business Efficiency Control	Professional or non-professional dedicated couriers	Fixed prices
Intendant	B2C	An order is placed on the cie's website. It is the courier who purchases the article from a shop and delivers the article to the customer Intra-urban	Business Efficiency Control	Professional or non-professional dedicated couriers	Fixed prices Resale margins Financial fees
Intra-urban	P2P or B2B	Deliver a parcel Intra-urban	Business Efficiency Control	Professional or non-professional dedicated couriers Commuters	Fixed prices
National	P2P or B2B	Deliver a parcel Inter-urban / National	Business Human Trust	Travelers	Negotiated prices Financial fees
Social delivery	P2P or B2B network	An order is placed on the business website. The courier proceeds to purchase, then to delivery National / International	Community Human Trust	Travelers	Reward Barter Financial fees

6 Obstacles to the development of crowdsourced delivery

Crowdsourced delivery is facing several issues in ensuring its development. Two are crucial in determining the adhesion of customers to the concept of crowdsourced delivery: trust and service quality.

6.1 Trust

Trust building is a key success factor in every crowdsourced process. In the crowdsourced delivery process, the question is bidirectional:

- How to create trust in the sender mind?
 - o Indeed with crowdsourced delivery, a requester entrusts his parcels to an individual, more than to a company with anonymous employees like FedEx, DHL or UPS.
- How to protect couriers from hazardous or illegal substances, products?

Start-ups have explored different ways to reinforce trust between requesters and couriers.

- The most business-oriented companies have implemented rigorous selection processes for couriers. At Deliv an aspirant has to fill a questionnaire, complete in person or Skype interview, submit a copy of his licence and vehicle registration, complete a secure background check, and finally complete a short orientation program. 95% of Zipments's couriers are professional delivery people. For those servicing the national and social delivery networks, the selection process is absent. Profiling couriers is impossible. Couriers are opportunist travelers.
- Most of companies have implemented feedback systems in order to evaluate couriers in the form of a star rating and comments. Rideship explains: *"RideShip relies on user feedback to make sure our community stays populated with conscientious and reliable folks!"* (rideship.com/pages/about/). Based on the track record of every courier, a ratings system enables Deliv to give priority to the highest-ranked delivery people (Lawler, 2013).
- Couriers have personal pages or spaces on the companies' websites. This permits requesters to investigate if needed. Pages on Zipments's website are very complete with pictures, number of deliveries and rating, seniority, short presentation, etc. Muber and Barnacle uses Facebook pages. When connecting as a requester or a sender on Barnacle's website, the "Log-In with Facebook window" appears with the following text: *"To establish trust in the community, we require that drivers sign up using their Facebook accounts"*. Muber states: *"We all want to know how much degree of separation we are from our peers. Through integrating with the major FB, we let you know how much close your social circle with each other"*. (muber.com/safety)
- Companies are encouraging direct contacts between requesters and couriers through telephone and email. Muber has implemented its own secure messaging system.
- National and social delivery networks business models integrate secure online payment systems. As Muber explains: *"Requesters pay through our secure online payment system. Travelers receive payment through Muber as soon as the requester receives the item. No worries on the transactions, no awkward moment. We take care of that"*. (<https://muber.com/safety>)

- Several companies have insurances. For example, Zipments self-insures this risk up to \$250, but the firm encourages its couriers to buy additional coverage for higher-value packages.

6.2 The question of critical mass: the chicken-and-egg problem

The power of crowdsourced delivery is based on the network effect. A critical mass of couriers is needed to insure fast, flexible and cheaper delivery, and to attract customers. But a critical mass of customers is needed to attract couriers. Crowdsourced business models are less easily capable of solving the chicken-and-egg problem than traditional business models. The latter can internalize resources (for example a team of couriers) to start the wheel. Whereas crowdsourced business models need to convince both requesters and couriers. Even the major actors are having trouble. USPS suspended one pilot same-day delivery program called Metro Post due to a lack of participation from retailers. As another evidence, eBay downplayed in February the company's same-day delivery service eBay Now (Steiner, 2014).

Start-ups in the crowdsourced delivery industry are adopting different strategies to create the network effect. Courier, Intendant and Intra-urban business models focus only on big cities to access to a large volume of potential customers.

Several companies partner with high-volume retailers who see the potential of crowdsourced delivery. For example Walgreens with TaskRabbit, Deliv with four of America's largest mall operators who manage over 660 malls including thousands of retailers across the country, or mmMule with NGO.

7 Crowdsourced Delivery and the Physical Internet

The crowdsourced delivery business model, as it is now, has two main limitations:

- (1) It only supports point-to-point deliveries.
 - This creates a less flexible delivery network, in particular for inter-urban delivery. Indeed, crowdsourced delivery is only possible if a courier passes by the starting point and the address of destination.
- (2) Processing the parcels individually limits the overall positive impact.

If we look at crowdsourced delivery from the conceptual perspective of the Physical Internet, opportunity is huge to overcome these limitations.

“The Physical Internet is a paradigm-breaking vision – inspired by the Digital Internet – that enables organizations to move and deploy physical products seamlessly though logistical networks like data packets move through heterogeneous equipment respecting the TCP/IP protocol of the Digital Internet in a way that is transparent to the user” (Montreuil et al., 2012)

The Physical Internet catalyzes a new era of smart interconnected logistics with order-of-magnitude gains in efficiency and sustainability. It enables the emergence of an open and global Logistics Web spanning four interlaced layers. The first involves seamlessly moving objects encapsulated in standard, smart, modular and designed-for-logistics containers through an open multimodal Mobility Web engaging numerous transport providers and open hub operators. The second allows dynamic encapsulated product deployment and storage in numerous open warehouses and distribution centers across a Distribution Web. The third layer is dedicated to designing and manufacturing objects through a Realization Web. The fourth one is about

sourcing and procuring products through an open Supply Web comprised of a vast set of certified suppliers. Finally, the fifth layer is about providing access to the functionality of objects through a Service Web, in the spirit of open car and bicycle sharing (e.g. ZipCar, Bixi) and open apartment sharing (e.g. AirBNB), but for a much wider spectrum of physical objects.

With the Physical Internet enabled Mobility Web, point-to-point and hub-and-spoke transportation are not the dominant logic anymore. Interconnected logistics is based on distributed multi-segment intermodal transportation. Distinct carriers and/or modes take charge of the transportation between open nodes. At each node parcels are routed to the next one. Simulations by Montreuil (2011), Sadilek et al. (2013) and Sarraj et al. (2014) have demonstrated the superior efficiency of distributed multi-segment delivery.

The multi-segment multi-carrier idea has been worked out by DHL and a group of German design students. The exploratory project, named bring:BUDDY, is a social web of people who carry parcels and letters for other people in their area. An algorithm analyzes the daily routes of the members and anonymously assigns parcels to people who can take them along. The parcels therefore find an optimized way through the city. It is easy to imagine how this could be applied in crowdsourced delivery. The multi-segment logic, with couriers relaying, would extend the coverage of delivery, in particular for interurban delivery.

Integration of crowdsourced delivery requirements in the design of cars, bicycles, trucks, etc. would optimize the process. Space enabling easy handling and securing of modular containers could be embedded in every vehicle. Thus, containers can pass easily from a vehicle to another, or between a vehicle and a hub.

The second key aspect of the Mobility Web is the aggregation of parcels (Montreuil et al., 2010; Montreuil, 2011). Standardized modular containers enable to aggregate smaller containers to become composed container in order to optimize handling and bulk. At each node, a container faces three options:

- the unitary or composed modular container continues its route,
- the modular container is aggregated to a bigger composed container in order to ease its handling or to be transported in a bigger vehicle, respecting the legal weight carrying limitations for both vehicle and courier.
- the composed modular container is dismantled and the smaller containers are dispatched to different routes. The smaller ones can be aggregated to containers going to the same direction.

Today aggregation of parcels is not a common practice in the crowdsourced delivery industry. Tasks are managed individually by independent couriers.

Now, imagine how the Mobility Web is to impact crowdsourced delivery in future years. Someone wants to send an object to a distant town. He connects to the online delivery platform with his computer, an app using his mobile device, or a terminal at the deposit – pick-up point. The pick-up point may be a pharmacy, a service station, an accommodation store, or a computerized locker. He enters his request: the destination, the price he is willing to pay, the preferred delivery time window, etc. An algorithm considers the request, the state of the Mobility Web at the moment and in the near future, and propose alternative solutions. The client makes his decision. The object is put into an appropriately sized modular container. The operation might be automated or manual depending of the place of the deposit point in the Mobility Web

and the volume of parcels that have to be treated. The tracking system will monitor and guide the container in the Mobility Web. In case of incident, the parcel might be re-routed. The client can track the container online anytime.

The Mobility Web is in the process of becoming reality. Crowdsourced delivery is one of the alternative viable solutions. Others include traditional logistics companies (like FedEx or UPS), truck/trailer transport companies, personal cars, public transportation systems, taxis, railway and airway transportation companies, etc.. Depending on the requirements of the delivery (nature of goods to deliver, source and destination locations, budget, delivery time window, etc.), and the configuration of the Mobility Web at the moment, an optimized configuration is built which combines definition of the multi-segmented routes and choice of the actor for each segment.

The advent of the Physical Internet and its Mobility Web enables an evolution toward interconnected crowdsourced delivery. It is dynamic, it does not function independently, and is not limited to specific tasks. It is a viable alternative solution for the Mobility Web. It is flexible and agile. Interconnected crowdsourced delivery may have a competitive edge against other solutions (logistics service providers, taxis, public transportation system, etc.) for key segments in the following situations. This includes, intra-urban delivery when population is dense and delay is short, taking charge of the last segment from last deposit point to final destination, the delivery of very fragile objects or living animals, and generically as a smart complement to other means on all inter-hub routes by taking advantage of the huge flow of commuters and travellers.

8 Conclusion

This study is amongst the first to examine in depth crowdsourced delivery business models. After a critical analysis of 18 startups in the crowdsourced delivery industry, we propose a typology of five archetypal business models. We can observe that B2C intra-urban models are currently dominant. With no surprise, they concentrate the bulk of investments. In an industry where critical mass is a key success factor, the B2C intra-urban business model has two advantages: they partner with retailers, and they operate in highly dense population cities. But a doubt remains about their capacity to grow and to develop in smaller towns and in interurban delivery.

We propose a paradigm change toward interconnected crowdsourced delivery. Based on the Physical Internet concept, (1) we suggest to stop considering each crowdsourced route to be dedicated to a single parcel from its source to its destination, but rather an openly consolidated segment for sets of parcels heading to the same next hub in their relayed way to their final destination; and (2) we also suggest to stop considering the crowdsourced delivery as an isolated industry that answer to specific needs, but rather as one alternative solution to build the Mobility Web.

The capacity to interconnect the players within the industry and to interface with actors of the Mobility Web (traditional logistics and transportation companies, public transportation systems, auto-sharing companies, etc.) may be one key success factor for the future of the industry.

The main limitation of the study is its data collection method. We used public documentation, with no access to first-hand information. The crowdsourced delivery industry is very young and far from maturity. Things change very fast. Journalists are typically one step behind the industry. They are still fascinated by the concept. Information about business models, strategies and vision of the industry future is rare.

We propose four avenues for future research. First, further qualitative and quantitative studies are required to better understand the business models, challenges and success factors of the new born actors in the industry. Second, simulation experimentation is needed to better assess the potential of interconnected crowdsourced delivery and to find ways to optimize the whole ecosystem. Third, instrumental research is needed to create a new generation of algorithms, protocols, vehicles, containers and platforms enabling interconnected crowdsourced delivery. Fourth, there should be field based pilot studies validating the feasibility, efficiency and sustainability of the proposed interconnected crowdsourced delivery innovations.

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