Beyond Uber. Business model considerations for alternatives to traditional taxis

Abstract. Dynamic ridesharing is an e-service derived of regular carpooling, which enables the formation of carpools on an as-needed basis, usually on very short notice and whose travel purpose also extends to a broad range of activities, beyond work or school. Services such as Lyft and Uber are considered to be successful examples of business models based on collaborative economy. Nonetheless, recent development in Europe has seen dynamic ridesharing services being outlawed in major cities such as Brussels and Berlin, due to their unclear regulatory status. In this paper we propose an alternative business model for dynamic ridesharing services, which we have developed while working with one provider of dynamic ridesharing services by using action design research methodology. Since the dynamic ridesharing uses the crowd to provide the service, we propose to use the crowd to collect the initial funds to start the service in every city.

Keywords: Dynamic ridesharing, business model, design science, crowdfunding , Uber, Lyft

1 Introduction

This paper presents a research in progress and it is addressed to managers looking for new ways to provide economic support to a dynamic ridesharing service.

Dynamic ridesharing (also known as real-time ridesharing) is a derivative of regular carpooling, which enables the formation of carpools on an as-needed basis, usually on very short notice and whose shared travel purpose also extends to a broad range of activities, beyond work or school (Siddiqi et Buliung 2013). On the one hand, the particular nature of dynamic ride-sharing requires a sophisticated way to manage a large number of drivers available on short notice. Indeed, while classic carpooling allows users to define a meeting point some days in advance, dynamic ridesharing allows only few minutes to perform the matching between an interested rider and a potential driver, before the rider gives up and looks for another transportation option. On the other hand, dynamic ridesharing appears to be suitable for all those activities that do not require or allow planning in advance. Indeed, while classic car pooling is restricted to regular trips, such as home-work, or long-distance trips, such as going to a festival, dynamic ridesharing positions itself closer to taxi services, which are available at any time.

Therefore, we consider dynamic ridesharing as a mobile service, which offers a new mobility solution and which might be cheaper and more ecological than taxi and private cars.

The website dynamicridesharing.org collects a large number of projects done by start-up companies in USA as well as around the world. Most of these projects have failed in the past, even though the recent examples of Lyft and Uber in USA, allows to be optimistic with respect to future development. Indeed, a simple check on the website crunchbase.com shows how Uber has received $1.5 Billion from its investors, one of which is Google Ventures (for comparison, Airbnb.com is currently at $ 780 Million). Nonetheless, dynamic ridesharing services have been outlawed from major capitals in Europe due to regulatory issues with respect to their business model (Fontanella-Khan 2014; Vasagar 2014).

Since these type of mobile services appears to provide value by allowing to a crowd of riders to find a suitable driver among a crowd of drivers available, it would be relevant to investigate which are the crowd-based solutions, in terms of users, executors and funders, for this type of e-service, and to integrate such solution into a business model. Therefore, our research question is: **how can we provide a crowd-based business model for a dynamic ridesharing service?**

The rest of the paper proceeds as it follows. Section 2 briefly illustrates the existing literature, which address our research question. Section 3 illustrates the design science methodology used in this paper. Section 4 illustrates the model obtained. Section 5 summarizes the key elements of the paper and illustrates further directions of investigation.

2 Literature review

In this section we introduce the three key concepts of our analysis: (1) adoption of dynamic ridesharing, (2) design of business model and (3) crowd-based solutions to fund this type of service.

2.1 Dynamic ridesharing adoption

There appears to be a significant amount of research concerning dynamic ridesharing. Unfortunately, most of these papers are not heavily cited; that might be due to the fact that different terms are still used by different communities and firms. For the sake of simplicity, we refer to the work conducted by the website dynamicridesharing.org, which lists a set of dynamic ridesharing projects and a list of non-dynamic ridesharing projects. Accordingly, a dynamic ridesharing system usually (1) collects data from riders and drivers about their expected rides; (2) matches riders and drivers, often by taking into account social features and scores obtained in previous rides; (3) follows the execution of the rides and assures that everything went well; and (4) supports the closure of the ride by allowing for the exchange of scores, and eventually, money, among riders and drivers. For the sake of simplicity, in this paper, we focus on dynamic ridesharing services that use smartphones and that can be considered mobile services.

2.2 Business model design

Nowadays, there is large consensus among scholars that a simple way to represent the business model of a company is to use the business model canvas (BMC) described in the book by(Osterwalder et Pigneur 2010). Such model is composed of nine building blocks, which belongs to three main parts: (a) the customer side, (b) the activities side and (c) the revenues side. In our previous work, we have already presented a model to benchmark different providers of dynamic ridesharing services and to represent them on a business model canvas by using freely available data that allows to induce their strategy on the customer and activity sides (Reference removed to assure anonymity). Therefore, in this paper we shall address the revenue side, which was missing in our model.

2.3 Crowd-based funding solutions from the sharing economy

The so-called *sharing economy* (Botsman et Rogers 2010) is a socio-economic system, which is built around the sharing of human and physical assets and that leverages information technology to empower individuals with information that enables distribution, sharing and reuse of excess capacity in goods and services (Sundararajan 2013). Businesses benefit from this tape of system tends to rely on tasks performed by a crowd of users. Such activity is often referred as crowdsourcing, which represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call" (Howe 2006). Wikipedia is the perfect example of a non-commercial crowdsourcing, whereas Threadless or iStockphoto can be considered as commercial crowdsourcing.

Crowdfunding has its origins in the philosophy of crowdsourcing and it is a lever that allows the public to support financially and collectively an idea or project that seduces. Thanks to recent development of the new information technologies, such social networks and the web 2.0, crowdfunding is nowadays seen as a interesting alternative to financial institutions (De Buysere et al. 2012). Today, crowdfunding occurs mainly and massively through online community platforms that serve as intermediaries between the person seeking funding and the bakers. Currently, there are four models of crowdfunding platform: "Donation-based", "Reward-based", "Equity-based and "Lending-based. In return for its funding to a ridesharing service on a crowdfunding platform, we can assume that the contributor could benefit from a transport service. In this case, the model of the platform can be classified as "reward based". Characteristics of crowdfunding to raise money seems particularly suited to the philosophy of dynamic ridesharing, whereas the revenue model most frequently used is "by charging a transaction fee, determined as a percentage commission on funds paid out to fundraisers" (Massolution, 2012).

2.4 Gap analysis

We followed the guidelines of (Okoli et Schabram 2010) to perform a literature review and we defined a protocol to review the existing literature. We used Google

scholar as search engine, we defined three keywords ("Dynamic ridesharing" "Business Model" "funding") and we limited our results to those written after 2010. We obtained 9 results and we used as practical screen the following criteria: (a) it should address funding options for dynamic ridesharing and (b) it should contain empirical results to support its claims.

In the end, no article fulfilled our criteria. Therefore, we present our theoretical model to address the gap in the literature.

3 Methodology

In this section, we describe how we use design science to obtain a theory under the shape of a typology.

3.1 Design science

According to (Hevner et al. 2004), design science addresses wicked problems and seeks out usefulness, rather than truth. Hence, we have chosen this approach to address a practical need that dynamic ridesharing providers currently have, with respect to business models that comply with new European regulations. To create an artifact under the shape of a model, as defined by (March et Smith 1995)we follow the guidelines of (Jones et Gregor 2007) for design theory.

The seven components of design theory, as suggested by (Gregor et Hevner 2013), are described in detail in the following three sections. Section 4 describes our theoretical model, its purpose and scope, its constructs, its functions and its kernel theories. Section 5 describes the principles of implementation and an expository instantiation that is an example for illustration. Section 6 discusses the results obtained and addresses the notion of artifact mutability.

Before moving on to the next section, we acknowledge that we have been working closely with a provider of a dynamic ridesharing service to collect real feedback from the field; and to do so, we have followed the guidelines of (Sein et al. 2011) with respect to so-called action design research (even though we are not allowed to share the data we obtained from within the firm).

3.2 Typology as a form of theory building

Since we are looking for a set of possible business models, we need to develop a typology. According to (Doty et Glick 1994), typologies are conceptually derived, interrelated sets of ideal types that meet three criteria: (1) they contain explicitly defined constructs that can be quantified, (2) relationships among the constructs are articulated, and (3) predictions associated with the typology are testable and subject to disconfirmation. Constructed in this way, a typology can account for multiple causal relationships in a given setting, and it can reduce complexity to manageable levels both conceptually and methodologically.

4 Our artefact

In this section we present (1) the constructs of our typology, (2) the relationships among the constructs, and (3) the predictions associated with the typology.

4.1 Our first order constructs

We identify six constructs in our typology, grouped into two sets: (a) those describing the key features of the business model and (b) those assessing the sustainability of the business model.

On the one hand, we propose to describe the different types of dynamic ridesharing business model by means of three constructs:

1. The *riders* represent the customer side of the business model. For sake of simplicity, we identify only two possible types of customer segments: TRUE (it is a crowd, that is an undefined and generally large network of people) or FALSE (it is not a crowd)
2. The *drivers* represent the customer side of the business model. For sake of simplicity, we identify only two possible types of customer segments: TRUE (it is a crowd) or FALSE (it is not a crowd)
3. The *founders* addresses the need of initial resources to start the business. For sake of simplicity, we identify only two possible types of founders: TRUE (it is a crowd) or FALSE (it is not a crowd)

On the other hand, we propose to assess the sustainability of the different types of dynamic ridesharing business model by means of three constructs:

4. The *regulatory compliance* of the business model, which assumes that in most country, when a driver gains money from sharing a ride, he/she is required to have a license issues by a State entity. For sake of simplicity, we identify only two possible values: TRUE or FALSE.
5. The *revenue flows* of the business model describes the amount of cash money that enters in the firm, which we measure as average yearly revenue per employee. For sake of simplicity, we identify only two possible values: TRUE (> total cost of trip) or FALSE (<total cost of trip).
6. The *cost structure* of the business model describes the amount of cash money that leaves the firm, which we measure as average yearly cost per state license paid by the firm. For sake of simplicity, we identify only two possible values: TRUE (license paid) or FALSE (license not paid).

4.2 Relationships among our first order constructs

In our model, we assume that a crowd of riders lead to high revenue flows. This is supported by notions of economy of scale (a crowd is a large set of people) and economy of scope (a crowd is a set of networked people)

$$\text{High revenue flows} = \text{Crowd of riders} \quad (1)$$

In our model, we assume that a crowd of drivers lead to low license costs. This is due to the fact that a crowd is an undefined set of people, whereas a license is an exchange of property right between the State and an unidentified agent. Therefore, even if some element might have a license, the crowd cannot apply as an overall for a license. Therefore

$$\text{High license cost} = \text{NOT (Crowd of drivers)} \quad (2)$$

In our model, we assume that a license is required if there is profit for the driver. Therefore, lack of compliance occurs only if there are high revenues and low license costs.

$$\text{Regulatory compliance} = \text{High revenues} > \text{High license cost} \quad (3)$$

4.3 The resulting typology and its associated predictions

1. **Taxi driver**. *Business model*: taxi drivers, intended here as single firm owners, are not belonging to a network and seek clients, who are not belonging to a network either. This type of business is financed by each taxi driver. *Business model sustainability*: taxi drivers pay a license to respect regulations, and they are mostly profitable, even though are not known to be very rich.
2. **Bus service**. *Business model*: a public firm gathering licensed drivers, which seeks clients, who are not belonging to a network. This type of business is financed by a set of funders, since every citizen is as a contributor. *Business model sustainability*: each bus drivers is licensed to respect regulations, and they are mostly profitable, even though are not known to be very rich.
3. **Classic car sharing**. *Business model*: a service gathering cars and allowing every rider subscribed to the service to become a driver. Therefore there is a network of drivers without a license as a taxi. This type of private business is financed by a limited set of funders. *Business model sustainability*: each rider/driver pays a fee to use the car, usually for one hour, and the service is mostly profitable.
4. **Classic ride sharing**. *Business model*: a service connecting a network of subscribed riders with a network of subscribed casual drivers. This service is initially financed by a limited set of funders. *Business model sustainability*: each rider splits the cost of the ride with the driver, who does not pay a license. The service is somehow profitable if a large number of rides is done every hour.
5. **Uber**. *Business model*: a service gathering every rider subscribed to the service to find a professional driver with a license. This type of private business is initially financed by a limited set of funders. *Business model sustainability*: the service is said to deliver high revenues due to the large set of riders, which increase the efficiency of the system, and it complies to regulations in most European States (for the service Uber Pop, see Lyft ideal type).
6. **"Kickstrated taxi"**.*Business model*: this ideal type represent a service that would gather a crowd of subscribed riders to a set of professional drivers with a license. The novelty would be in the funding solution: a community of people would initially finance it (we could imagine citizens in a small city deciding to offer this service in

alternative to its bus system). *Business model sustainability*: the Uber service is said to deliver high revenues due to the large set of riders, which increase the efficiency of the system, and it complies to regulations in most European States. Here, the funders would be a crowd.

7. **Lyft** (and Uber Pop). *Business model*: a service gathering every rider subscribed to the service to find a casual driver with a license. This type of private business is initially financed by a limited set of funders. *Business model sustainability*: the service is said to be efficient but due to the casual nature of the drivers it might be less profitable and it might not comply to some regulations in European States.
8. **"Shared riders"**. *Business model*: a service proposed here (its name is the inversion of "ride sharing") to gather every rider subscribed to the service to a network of casual drivers. This type of business would be initially funded by a crowd, which would be most likely the driver and the riders. *Business model sustainability*: there is reason to believe that service could be fairly efficient without needing a license, since there would be no economic transaction among rider and driver. Indeed, the rider and driver would pay an initial fee to fund the service and then the rider and the driver would share rides and uses the money in the shared fund to cover the cost. A tip can be expected as a form of compensation to exceptional drivers, but that it is not considered an economic transaction.

Table 1. Our typology

	Business model			Business Sustainability		
	Riders crowd	Drivers crowd	Funders crowd	High Revenues	High lic. Cost	Reg. compliant
1	No	No	No	No	Yes	Yes
2	No	No	Yes	No	Yes	Yes
3	No	Yes	No	No	No	Yes
4	No	Yes	Yes	No	No	Yes
5	Yes	No	No	Yes	Yes	Yes
6	Yes	No	Yes	Yes	Yes	Yes
7	Yes	Yes	No	Yes	No	No
8	Yes	Yes	Yes	Yes	No	No(?)

5 Evaluation

According to (Snow et Ketchen 2014) most typologies fail to be assessed by using the five guidelines offered by (Doty et Glick 1994). Therefore, we explain in details how we have addressed each guideline.

5.1 Typological theorists should make explicit their grand theoretical assertion(s).

As previously mentioned, our kernel theories are the diffusion of innovation and the business model canvas, whereas our testable propositions are the following:

P1. A service based on a set of professional drivers, which is addressed to a crowd of riders and that it is founded by means of crowdfunding, is an economically sustainably alternative for taxi drivers.

P2: A service based on a community of casual drivers, which is addressed to a crowd of riders and that it is founded by means of crowdfunding, is an economically sustainably option to private or public entities requiring a cheap mean of transportation.

5.2 Typologies must define completely the set of ideal types.

We have defined the full set of ideal types, and we have discussed the soundness of each result obtained. For two ideal types we did not find a correspondence in the existing literature. Hence, we propose a two new business cases.

5.3 Typologies must provide complete descriptions of each ideal type using the same set of dimensions.

We have presented our ideal types and we have done two actions: (a) we gave an example for those that are currently implemented and (b) we suggested a business case for those that are theoretically sound.

5.4 Typological theories should explicitly state the assumptions about the theoretical importance of each construct used to describe the ideal types.

We have derived our constructs from the nine blocks of the business model canvas and from the components of diffusion of innovation. For sake of simplicity we have simplified our set of first order constructs in order to obtain the lowest set of ideal types that answers our research question. Indeed, the number of ideal types is (number of possible values per ideal type)^(number of first order consturcts), which in our case were 2 values (true/false) and 3 independent first-order constructs, which led to 2^3=8 ideal types.

5.5 Typological theories must be tested with conceptual and analytical models that are consistent with the theory.

Most of the ideal types refer to business models that are fairly known. Therefore, we are going to present an analytical model that illustrates our ideal types. To do so, we make a set of quantitative assumptions, which have been simplified with the only purpose to illustrate a business case in which would is consistent with our theory and that would validate our propositions. An empirical validation of such business case is beyond the scope of this article, and it is meant to be part of future work.

Let us assume to have a small city and that (a) the cost of a ride is $0.75/km and that applies to any driver, whereas the cost of a taxi licence is $1/km and it does not apply to the crowd of drivers, (b) a rider requests on average a 5km ride and the price of a ride is usually set at 2 times the cost of the ride, but if there is there is a crowd of riders, the price is set at 1.75 times the cost, (c) the time needed for a driver to do a ride and to come back to the starting place is 10 minutes, which leads to a maximum of 6 rides/hour.

As shown in the third column of the table, in our example we have supposed that a taxi driver does three rides per hour in average, and that a bus does only two. Average number of users of car sharing and ride sharing is set at 1 to represent the complexity of achieving critical mass in the classical systems. Uber and Lyft models are assumed in this example to achieve maximum efficiency, as speculated nowadays by most media. Our two proposed models are set at 3 rides per hour, since they profit from a crowd of riders but we do not assume them to be more performant than a taxi firm.

Table 2. An example associated to our typology

	Cost/km	Price/km	# rides/hr	Profit/hr	Rank
1) Taxi driver	$1.75	$3.50	3.00	$26.2	*2*
2) Bus service	$1.75	$3.50	2.00	$17.5	*4*
3) Car sharing	$0.75	$1.50	1.00	$3.7	*7*
4) Ride sharing	$0.75	$1.50	1.00	$3.7	*7*
5) Uber	$1.75	$3.06	6.00	$39.4	*1*
6) Kickstart taxi	$1.75	$3.06	3.00	$19.7	*3*
7) Lyft	$0.75	$1.31	6.00	$16.9	*5*
8) Shared riders	$0.75	$1.31	3.00	$8.4	*6*

The fourth column is obtained by multiplying the profit per ride (profit per km * 5km/ride) and the average number of rides per hour. The fifth column of the table shows the ranking of profitability of the different types, which are meant to represent how nowadays the taxi firm appears to be a profitable option, even though Uber is believed to be even more profitable. Lyft is represented as less profitable than a single taxi driver, since it is not aimed at professionals and it is not based only on extrinsic motivation (that is drivers are doing it for something beyond money). Classic ride sharing and car sharing are represented as the least profitable options, as suggested by previous literature. Finally, we speculate that our "Kikstart taxi" solutions could be fairly profitable for a community of taxi drivers, whereas our "Shared rides" solution could be performing better than classic ride sharing and car sharing solutions.

6 Conclusions

In this paper we propose a set of possible business models to managers looking for new ways to provide economic support to a dynamic ridesharing service.

Recent development in Europe regarding firms such as Uber led us wondering how we could provide a crowd-based business model for a dynamic ridesharing service. Accordingly we identified 8 different patterns, which we described by using the three main elements of a business model (customer side, activity side and finance side) and that we assessed by using three dimensions of sustainability (legal compliance, revenue flows and cost structure).

In the end we obtained a typology, which we assessed by following a set of recognized guidelines. Our model offers two major contributions: (1) it allows to benchmark existing business models in a coherent way and (2) it offers two new business models, which deserved to be explored by practitioners and scholars in the field.

With respect to current limitations, we intend to address two main shortcomings of our model, with respect to its link to the real world: (a) each business case should be associated to a real firm, whereas (b) the quantitative validation should be done empirically by using the data from the real firms.

7 References

Botsman, Rachel, et Roo Rogers. 2010. « What's mine is yours ». *New York: Harper-Business*. https://www.tantor.com/SellSheets/1920_MineIsYours.pdf.

De Buysere, Kristof, Oliver Gajda, Ronald Kleverlaan, Dan Marom, et Matthias Klaes. 2012. « A framework for european crowdfunding ». *European Crowdfunding Network (ECN), available at www. europecrowdfunding. org/european_ crowdfunding_framework*. https://d21buns5ku92am.cloudfront.net/26522/documents/17930-1351284179-FRAMEWORK_EU_CROWDFUNDING.pdf.

Doty, D. Harold, et William H. Glick. 1994. « Typologies as a unique form of theory building: Toward improved understanding and modeling ». *Academy of Management Review* 19 (2): 230‑51.

Fontanella-Khan, James. 2014. « €10,000 fines threat for Uber taxis in Brussels ». *Financial Times*, avril 15. http://www.ft.com/cms/s/0/b23e9ee4-c4b9-11e3-9aeb-00144feabdc0.html#axzz371FSR6V5.

Gregor, Shirley, et Alan R. Hevner. 2013. « Positioning and presenting design science research for maximum impact ». *MIS Quarterly* 37 (2): 337‑56.

Hevner, Alan R., Salvatore T. March, Jinsoo Park, et Sudha Ram. 2004. « Design science in information systems research ». *MIS Quarterly* 28 (1): 75‑105.

Howe, Jeff. 2006. « The rise of crowdsourcing ». *Wired magazine* 14 (6): 1‑4.

Jones, David, et Shirley Gregor. 2007. « The anatomy of a design theory ». *Journal of the Association for Information Systems* 8 (5): 1.

March, Salvatore T., et Gerald F. Smith. 1995. « Design and natural science research on information technology ». *Decision support systems* 15 (4): 251‑66.

Okoli, Chitu, et Kira Schabram. 2010. « A guide to conducting a systematic literature review of information systems research ». http://aisel.aisnet.org/sprouts_all/348/.

Osterwalder, Alexander, et Yves Pigneur. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*. Wiley. com. http://books.google.com/books?hl=en&lr=&id=fklTInjiPQAC&oi=fnd&pg=PT14&dq=business+model+generation&ots=95Qmk5YDNM&sig=pGtYbamYixt3OUpDWeKGMZsEyww.

Sein, Maung, Ola Henfridsson, Sandeep Purao, Matti Rossi, et Rikard Lindgren. 2011. « Action design research ». http://bada.hb.se/handle/2320/9888.

Siddiqi, Zarar, et Ron Buliung. 2013. « Dynamic ridesharing and information and communications technology: past, present and future prospects ». *Transportation Planning and Technology* 36 (6): 479‑98.

Snow, Charles C., et David J. Ketchen. 2014. « Typology-driven theorizing: A response to Delbridge and Fiss ». *Academy of Management Review* 39 (2): 231‑33.

Sundararajan, Arun. 2013. « From Zipcar to the Sharing Economy ». *Harvard Business Review*.

Vasagar, Jeevan. 2014. « Uber taxi service suffers setback in Berlin ». *Financial Times*, avril 17. http://www.ft.com/cms/s/0/1591faf2-c638-11e3-ba0e-00144feabdc0.html#axzz371FSR6V5.