

A BoE Business Plan for Ridesharing

Market Size and Revenue.

There is a general consensus that it is best to sell ridesharing support on an organization-by-organization basis since co-workers are more likely to share rides and have common destinations. Before looking at the total market, let's look at the characteristics of a company needed to make it a candidate.

Silicon Valley company I'm familiar with has the following characteristics:

- 6,000 employees at one location
- The median employ lives within a mile of about 50 other co-workers (surprisingly high).
- A company car-pooling service had about 10% of the employees sign up (surprisingly high).

This car-pooling service has failed to work so far, even though the numbers look promising to the theory below. Being engineers they failed to market the service effectively.

A Theory

[Warning: I've thought way too much about this, so don't try to go so deep for your project.]

Ridesharing can succeed only if there are enough riders and drivers. The density of users traveling similar routes must be high for matching to occur. If there is no tipping point at which a service attracts a self-sustaining critical mass, it is not going to succeed.

How big does a group of willing ridesharers, or any other market, need to be in order to self-sustain?

A very useful paper by Hall and Quershe¹ proposed a model for the effect of mutual compatibility. Suppose the number of feasible drivers for a given rider is Poisson distributed with mean N . Let P be the probability that one of those drivers is compatible with the rider. Then the probability that the rider actually gets a ride is $1 - e^{-PN}$. Figure 1 shows how the probability of success depends upon P and N ; e.g., if there are 20 drivers each with 0.20 probability of saying "yes", the rider has a better than 80% chance of getting a ride. Increasing either N to 50 or P to 0.35 makes the other parameter irrelevant.

The authors went on to measure P for subscribers to a real system, Los Angeles Smart Traveler.² The responses of drivers called with a rider's request was

Yes	9%
Maybe	11%
Not Today	28%
No	16%
No Answer	36%.

Sadly, the Smart Traveler system arbitrarily limited the number of drivers approached to 10 while Figure 1 suggests that calling 20 or more would have significantly improved performance. Also, this study was published in 1997, before widespread cell phone use, so the “No Answer” category might be smaller now.

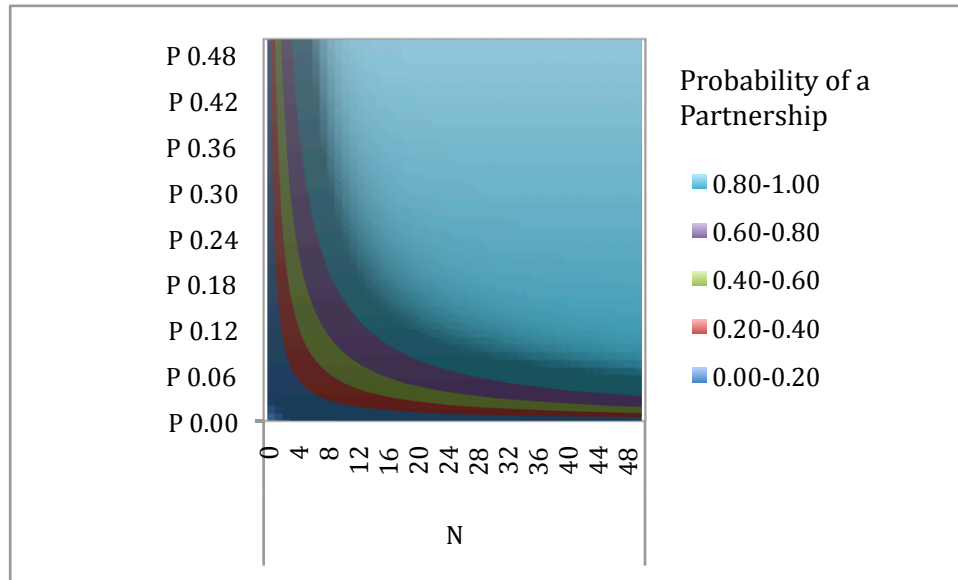


Figure 1. Effect of P and N on Successful Partnering

Now let’s look at the probability that someone will even propose a match. Like any dating situation, it depends upon past success. Suppose each person’s enthusiasm starts at 20%, the probability of making a proposal each day. If a proposal succeeds, she increases her enthusiasm by moving the probability half the distance to 1.0. If the proposal fails, she halves the probability. As enthusiasm increases, the number of proposers increases, the number of feasible partners increases, and the probability of a proposal succeeding increases, according to the exponential formula above. This causes enthusiasm to increase further—a positive feedback loop.

Consider a range of subscriber populations from 200 to 600. For this example, a subscriber population of 400 is sufficient for a sustained growth rate of proposers even if P is just 0.01. On the first day 80 of the 400 propose, then $80 \cdot (1 - e^{-0.8}) = 44$ find partners. The 44 increase their enthusiasm from 20% to 60%; the disappointed 36 decrease their enthusiasm to 10%, and the 320 who didn’t propose remain at 20%. On the next day $44 \cdot 0.6 + 320 \cdot 0.2 + 36 \cdot 0.1 = 94$ propose, and the number of proposers continue to increase each day.

This is a straw man theory. Measurement of real market systems is needed to find a dependable theory. The system needn’t be a ridesharing service; we can use any nascent service in which there are “buyers” and “sellers” who make more deals as the size of the market increases. If there is a powerful positive feedback effect, then

a service that achieves critical mass also has the chance of monopolizing a regional market.

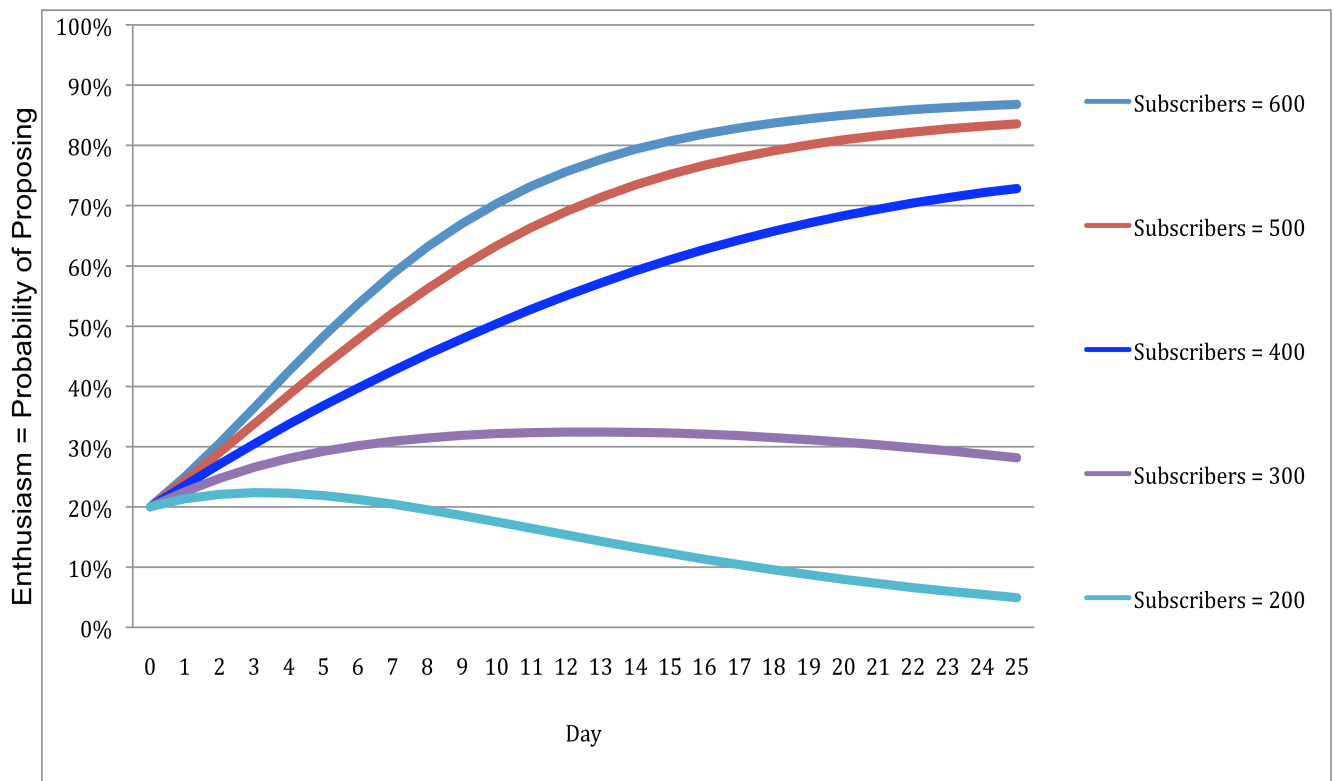


Figure 2 Effect of Success on Subscribers' Enthusiasm over 25 Days

This theory suggests that we should look at companies with 5,000 or more co-located employees, each of which would generate 500 subscribers, 375 (or 75%) of which tried the service each day, generating about 150 pairings per day. Assuming we somehow collect \$.50 for each ride, we'd gross \$75/day from each company, or about \$20,000 per location per year, ignoring possible ad revenue. There are

There are nearly 2,000 companies with over 5,000 employees in the US. Using the conservative 3% rule, we might sign up 60, so the whole business generates \$1.2M per year. This is not promising, but might be a good hobby. Of course, if the system goes viral and begins to cross company boundaries or attract walk-ons, it might generate much more.

Operating Costs and Profit

Each user requires a negligible amount of data, easily held on a smart phone: contact information, current co-ordinates, social network, preferences, current plans, and past trips

The routing database might be big. Consider a region like Manhattan.

- It is a graph with edges. For every edge (existing street segment or planned traverse of a street segment), assume 10^3 bytes.
- Manhattan has over 125 cross streets and 12 avenues, so it has over $2 \cdot 125 \cdot 12 = 3,000$ street segments.
- Suppose we sign up three companies there, creating 2,000 subscribers, 40% of whom offer rides each day, leading to 800 planned trips.
- Suppose the average trip is 20-blocks. This generates 1,600 planned segment traverses.
- $10^3 \cdot (3,000 + 1,600) = 4.6 \cdot 10^6 = 4.6$ Mbytes, We could put the whole database on a smart phone!

Ignore storage costs.

Assume we can get by with one computer per region. In 2010, \$1,000 bought a single computer for a year, running in a high-quality data center 24x7, according to Tim Chou, *Introduction to Cloud Computing (in about 1,000 Words)*. It looks like Amazon's EC2 might cost \$250 per year for a dedicated computer in 2011. Heroku would be more, but it includes complete development support and is free until you have any volume.

Ignore processing costs. (If it ever becomes an issue we'll be millionaires!)

Each region will need human operators to handle difficulties, 24/7. Assume there are 10 regions, so we need 30 operators. We can have them work from home, so they should be cheap, \$40K/year. Total \$1.2M/year.

Oops, there goes the business!

Plan B: Have six operators to handle the whole country. Maybe outsource to Asia, at least for 8PM to 4AM. Maybe it will cost \$200K/year.

Most important, we need a sales person to call on the 2,000 large companies to sign up 60. We should pay her \$100K plus incentives and give her a \$300K marketing budget. There goes \$500K/year.

So the operating profit might be \$500K/year.

Start-up costs

Our use case to hours exercise suggests we need three programmers for a year. At \$150K per programmer, that's \$450K. We won't have any revenue for the first year, but will have to have the sales person on board for at least half a year: \$250K.

Good Investment?

The five-year cash flow might be -\$700K, +\$200K, +\$500K, +\$500K, +\$500K. The present value at a 3% discount rate is about \$850K.

There are certainly many better business opportunities, so this has to be a labor of love.

[This whole exercise does not really produce convincing numbers one way or another, but it will help us to understand our situation going forward and provides a guide for what numbers to look for.]

¹ R. W. Hall & A. Quershe (1997, July/August). Dynamic Ride Sharing: Theory and Practice. *Journal of Transportation Engineering*.

² G. Giuliano, R. Hall, and J. Golob, "Los Angeles Smart Traveler Field Operational Test Evaluation" (January 1, 1995). California Partners for Advanced Transit and Highways (PATH). Research Reports: Paper UCB-ITS-PRR-95-41. Retrieved from <http://repositories.cdlib.org/its/path/reports/UCB-ITS-PRR-95-41>