

New platform flips traditional on-demand supply chain approach on its head

June 19 2019

Imagine you are heading to the grocery store and receive a phone alert asking if you'd also be willing to bring your neighbor's groceries home. Or you are on your way to a concert and see you could fill the seats of your car—and your wallet—if you picked up a few other music fans along the way. As the supplier in these scenarios, you have the choice of which services you provide and when. This may very well be the way commerce is headed.

Research recently published in *Transportation Research Part B: Methodological*, by systems engineers at Rensselaer, demonstrated how a hierarchical model that provides suppliers with a certain amount of choice could improve supply and demand matching for underutilized resources—and may even transform what's become known as the sharing economy.

In this research Jennifer Pazour, associate professor of industrial and systems engineering at Rensselaer Polytechnic Institute, and Seyed Shahab Mofidi, who recently received his Ph.D. from Rensselaer, built a ride-sharing environment simulation and plugged simulated data into the algorithms they created. However, the same approach could be applied to other scenarios, such as businesses that wish to share warehouse space or nonprofits looking to fill volunteer hours with the use of an ondemand application.

"What is exciting to me is that this proof of concept shows the model works," Pazour said. "This laid the foundation that this way of giving



people recommendations and choices can actually help all entities in the system."

Approaches currently being used, Pazour said, may match a supplier with a demand request based on what's best for the client without much choice from the supplier. This may result in a fast response but, she points out, it prevents some suppliers from participating.

Inversely, other existing platforms may show all available demand requests to a supplier, allowing them to sift through the options and choose what works for them. It's an approach that has supplier in mind, but results in a much slower response for the client.

The team's <u>platform</u> tries to strike a balance between supply and demand by giving the supplier some—but not all—choices based on previous supplier behavior. Pazour compares this approach to how other platforms may suggest a set of movies you may like to watch, or products you may like to buy based on your previous decisions.

For example, a driver—or supplier—with a car will be given some choices of potential riders they could pick up. They can then make a decision based on their plans for the day and the route they are already about to take. These decisions will inform which potential riders they are offered in the future.

"Our approach is more proactive," Pazour said. "We're not going to ask you anything initially. We're going to push you notifications, options, and let you choose and then the model will deal with the consequences."

What the researchers found is that this approach performed better, compared to other approaches, when the platform doesn't have much information about the supplier and their preferences.



"This methodology is most useful when the platform isn't able to perfectly predict people's actions," Pazour said. "That is reality, but I think that's one thing that's missing in a lot of the other apps."

Pazour also hopes more people will be inclined to opt in to a platform that provides more choice, which in turn could lead to an increase in the use of underutilized resources like empty seats in a car.

"If we give more choice, maybe we will get more people who are willing to do this," Pazour said.

In addition to looking at this challenge in terms of efficiency, Pazour also has equity in mind.

For example, an on-demand grocery delivery service could help those who don't have a <u>grocery store</u> nearby. In that case, simply matching a <u>supplier</u> with their closest neighbor may exclude some clients from being served.

"If it's designed for efficiency of resources, that's potentially a different algorithm than if it's designed for equity. So we're thinking about how we can make sure everyone gets this service at some equitable level," Pazour said.

Now that they know their methodology works, Pazour and her team are able to expand their research. They plan to improve the platform models and algorithms and apply them to other areas of supply and demand, including volunteerism. Pazour said her team is also exploring opportunities to work with companies to analyze actual data and evaluate if this unique approach could benefit them.

More information: Seyed Shahab Mofidi et al, When is it beneficial to provide freelance suppliers with choice? A hierarchical approach for



peer-to-peer logistics platforms, *Transportation Research Part B: Methodological* (2019). DOI: 10.1016/j.trb.2019.05.008

Provided by Rensselaer Polytechnic Institute

Citation: New platform flips traditional on-demand supply chain approach on its head (2019, June 19) retrieved 26 April 2024 from <u>https://phys.org/news/2019-06-platform-flips-traditional-on-demand-chain.html</u>

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