

**Request for Research Funding for FY 2019-2020**

<b>Requesting Office</b>	Forecasting and Trends	<b>Priority</b>	5 of 7
<b>Proposed Title</b>	Investigation of E-Commerce Enabled Freight Demand and Activities in Residential Areas		
<b>Justification</b>	<p>The rise of e-commerce and rapid development in user centric on-demand deliveries have changed the way we shop and receive goods. These societal trends and technological advancements are also reshaping the supply-chain and logistics industry. Households, traditionally produce “home-based shopping” trips to retail establishments for goods and services, now are becoming part of the larger production-consumption link. Since much of the last-mile deliveries are directly to the end consumers, these households become the new attraction points at the end of the supply chain. However, existing data, tools and models still follow the traditional paradigm where “freight” activities end at commercial establishments. This leaves an increasing gap in goods movement analysis. This missing component may also have great implications in land use planning and community design to provide proper facilities and capacities to accommodate freight demand.</p> <p>Existing freight demand studies have mostly focused on freight trip generation at commercial establishments, either the production (manufacturer) end or the consumption (retailer) end. Research on household attractions of freight trips has lagged behind. On the other hand, e-commerce has received a fair amount of attention in research, but mainly on the relationships between on-line shopping activities and shopping trips from passenger travel perspective.</p> <p>To fill this knowledge gap, this research aims to advance our understanding in how e-commerce, demographic factors and societal trends drive freight demand, and to provide an approach to addressing the last-mile component in the supply chain. To achieve the above goals, the specific objectives are:</p> <ol style="list-style-type: none"> <li>1. <u>Capture household level consumptions and attractions of goods and services.</u> An on-line household survey would be the best approach to gather information on home deliveries in terms of the frequency and type of goods/services received. Major household characteristics that may affect freight trip attraction will also be collected. The survey design task should also consider a sample plan and implementation strategy to ensure a representative sample for this study.</li> <li>2. <u>Measure the relationships between household and land use attributes and freight trip generation.</u> The hypothesis is that the frequency and amount of freight trips are driven by the needs for services and goods at the household level, which can be explained/predicted by household and personal attributes. Econometric modeling techniques will be explored to identify the most suitable model structure to capture the behavior.</li> <li>3. <u>Recommend approaches to incorporating e-commerce considerations into the FSUTMS and freight demand analysis process.</u> It will examine the impacts of e-commerce on household shopping and related trip generation rates, as well as address the last mile component (households as freight generators) in freight demand analysis.</li> </ol> <p>Through this project, the following research questions will be addressed:</p> <ul style="list-style-type: none"> <li>• Whether there are substitution or supplementary effects between on-line shopping and personal trips, and to what extent?</li> <li>• How do e-commerce activities and the above two effects differ by demographic attributes (e.g. depression babies, baby boomers, generation X, and millennials), household attributes, and land use (e.g. urban vs rural)?</li> <li>• Whether and to what extent these activities may affect transit demand?</li> <li>• Whether and to what extent e-commerce may increase trucking activity, and the implications on rural facilities?</li> </ul> <p>This research helps to address the missing residential delivery component and to better reflect the actual freight demand and truck trips in the planning process. This approach will lead to more effective policies, programs and projects, as well as more context-sensitive land use and community design decisions.</p>		
<b>Impact</b>	Residential deliveries enabled by e-commerce and on-demand delivery services have been increasing rapidly. Statistics shows that there are more delivery trips to residential areas than to commercial establishments. Yet, our existing data and tools are not able to accurately reflect this trend. This research proposes an approach to addressing this missing component in the supply chain by incorporating household generated (attracted) freight trips into the demand analysis framework. This would lead to more accurate demand estimation and		

	effective policies and investments for freight transportation. It also has implications on land use and community design decisions.		
<b>Affected Offices</b>	Freight and Multimodal Operations		
<b>Existing Work</b>	Existing work on freight trip generation mostly focus on commercial establishments. Research on household trip attractions for goods and service delivery trips is lacking. On the other hand, most research on the impacts of e-commerce only focuses on passenger travel perspective, mainly on the relationships between on-line shopping activities and shopping trips.		
<b>Keywords Used In Existing Work Search</b>	e-commerce, home delivery, online-shopping, trip generation, freight demand		
<b>Related Contracts (Give contract numbers)</b>	n/a		
<b>Funding Request</b>	\$250,000	<b>Anticipated Duration</b>	18 months
<b>Project Manager</b>	Frank Collins Forecasting and Trends office Florida Department of Transportation (850) 4145396 <a href="mailto:Frank.Collins@dot.state.fl.us">Frank.Collins@dot.state.fl.us</a>	<b>Contracting Method</b>	direct contract with university
<b>Urgency</b>	1= highest, most immediate need	Home goods delivery is increasing annually and is having direct impacts on how people shop and travel. The rise of e-commerce and user centric on-demand services has dramatically changed the freight industry. However, our data and tools only account for “freight” activities that end at commercial establishments. This leaves an increasing gap in freight demand estimation, which affects our ability to develop and implement effective freight transportation policies, programs and project.	
<b>Implementability</b>	1=greatest likelihood of and proximity to implementing results	This research aims to recommend approaches to incorporating household freight trip attractions into the freight demand analysis framework and addressing the impacts of e-commerce on travel demand and the highway network.	

**Project Benefits (Succinct, complete explanation)**

Residential deliveries enabled by e-commerce and on-demand delivery services have been increasing rapidly. This shift in how consumers receive goods and services have direct impacts on the state and local roadway network. However, our existing data and tools are not able to accurately reflect this trend. This project will provide insights in quantifying the last-mile demand and recommend guidance to incorporate the trends into the demand analysis framework. This would lead to more accurate demand estimation and effective policies and investments for freight transportation. It also has implications on land use and community design decisions.

<b>Project Benefits (Select all that apply and explain)</b>	<b>Quantifiable Benefits (units, dollars, etc...if applicable)</b>	<b>Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits</b>
<input type="checkbox"/> Materials Enhancement	N/A	
<input type="checkbox"/> Materials Savings	N/A	
<input type="checkbox"/> Time Savings	N/A	

○ Lives Saved/Injuries Prevented	N/A	
○ Other (Explain)	Enhanced freight mobility and viable economic growth	The data and methods recommended in this research would lead to better analysis of freight demand, which in turn leads to better investment decisions and enhanced system performance. It also contributes to better land use planning and community design to accommodate freight demand.

\*Comments should explain and support urgency, financial benefit, and implementability scores