Investigating customer preferences relevant to e-commerce last-mile delivery service design attributes

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E-commerce and omni-channel retailing present challenges from both private and public perspective

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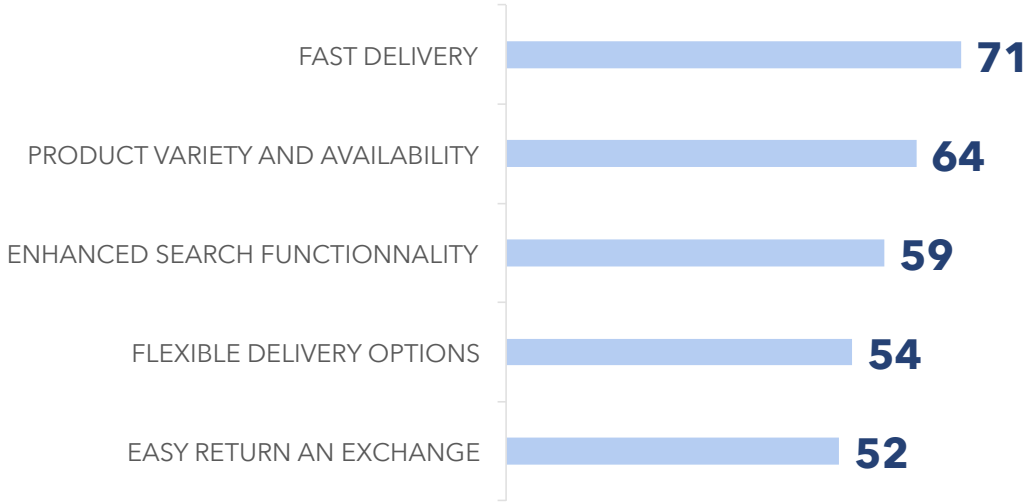
Impacts of e-commerce and omnichannel retail

- Home delivery replacing in-store purchases
- Convenience-driven single-item purchases
- Increasing fragmentation of shipments
- Increased cost per delivery
- Increase vehicular traffic

Customers' expectations with regards to omni-channel experience



Source: DHL 2015

To address increasing customers expectations, retailers are proposing multiple differentiated delivery services

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Multiple-time differentiated delivery services

NEXTDAY DELIVERY

SAMEDAY DELIVERY

prime now

Multiple product exchange options

Customer preferences relevant to delivery services change according to the market in which a company operates

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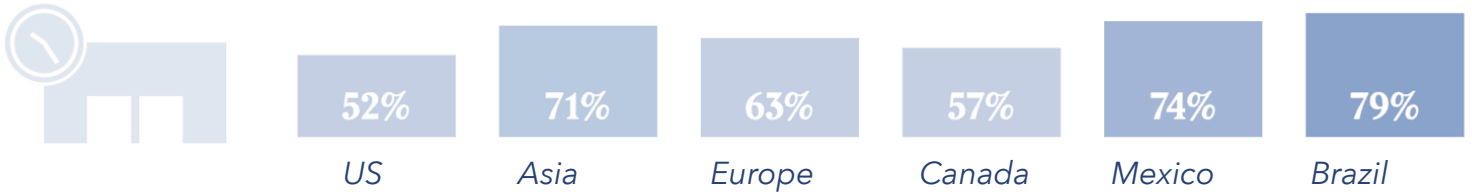
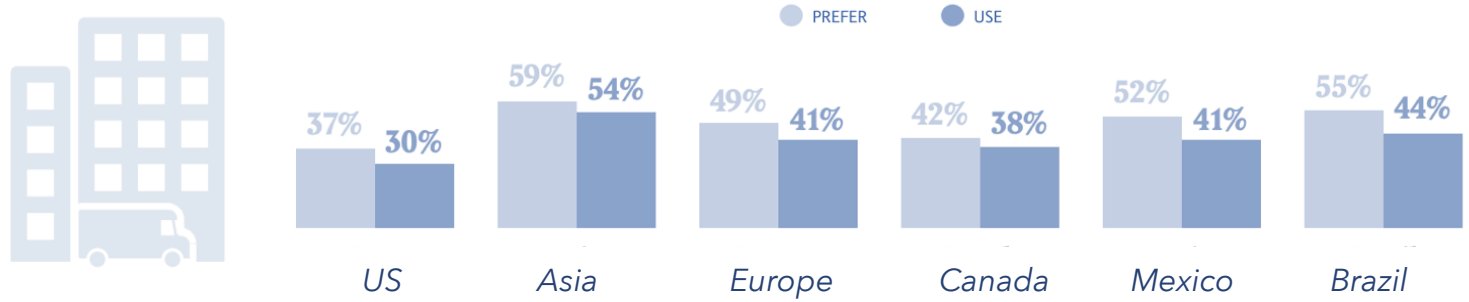
Interest in shipping to alternate location with extended hours for reduced fees

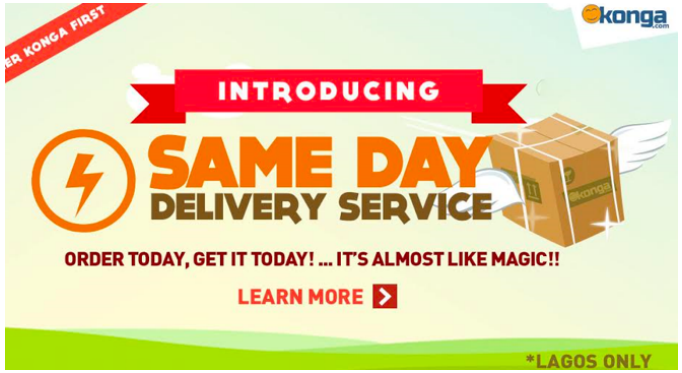


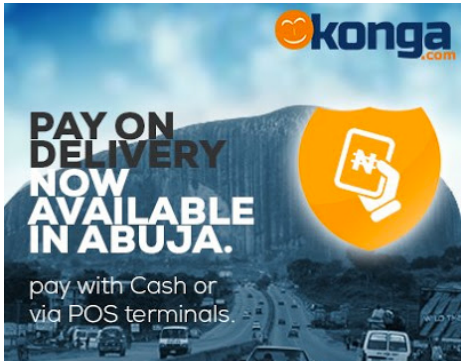
Preference for and usage of alternative delivery locations



Source: UPS, 2018

Furthermore, delivery service design attributes can vary considerably across different markets





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We aim to investigate preferences relative to delivery service design to inform business and policy decisions

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Objectives of the current research:

- Identify relevant attributes characterizing delivery service design
- Investigate customer preferences with regards to those attributes and potential trade-offs
- Identify customer characteristics impacting their preferences with regards to different attributes
- Identify how customers' preferences change according to the type of product considered

Future research directions:

- Establish demand models characterizing consumer preferences for delivery service design
- Integrate demand models in last-mile distribution strategies
- Integrate demand models in city logistics policy design

Example of application: extending traditional last-mile distribution network design

	Traditional distribution network design	*Multi-service distribution network design*	*Supply and distribution network design in omni-channel setting*
Assumptions	• Single delivery service • Single product exchange point • Product range defined • Demand given (observed)	• **Multiple time-differentiated delivery services** • **Multiple product exchange options** • Product range defined • Demand given (observed)	• Multiple time-differentiated delivery services • Multiple product exchange options • **Product range can vary across services** • **Demand is function of products/services offered**
Objective	Design a distribution network that serves customers with a minimal cost for a given demand	Design a distribution network that serves customers with a minimal cost for a given demand **differentiated according to the delivery service type and product exchange options**	Design a product and a service offering and a distribution network design that **maximizes the company profit by balancing between the ability to attract demand, generate revenue and serve customers in a cost efficient way**

Cost minimization → **Profit maximization**

In the current study, we designed and conducted a survey aiming to investigate customer preferences

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Part 1: **Choice tasks**	Part 2: **Respondent characterization**	Part 3: **Ranking of delivery service attributes**
Choice-based conjoint analysis survey with multiple attributes characterizing delivery services and multiple scenarios describing product characteristics	Survey aiming to gather information about the respondents (socio-economic data and information about purchasing habits)	Survey aiming to establish a ranking of most important delivery service attributes for different customers

Survey design: choice tasks
Description of attributes and levels

Attributes	Levels
Delivery Method	• Store • Automatic Lockers • Home/Office Delivery
Distance	• 5 Km • 2.5 – 5 Km • 1 - 2.5 Km • <1 Km
Delivery Lead Time	• Same Day • Next Day • Two Days • > Two Days

Attributes	Levels
Delivery Time Window	• Early Mornings • Working Hours • Late Evening • Scheduled Hours
Delivery Cost	• USD 5 • USD 3 • USD 1 • USD 0.5 • USD 0.25 • Free

Survey design: choice tasks
Description of scenarios

Scenario short name	Product value	Urgency	Example of a product
LNU	Low	Non-urgent	Book, non urgent
LU	Medium	Non-urgent	Piece of clothing, non urgent
MNU	High	Non-urgent	Electronic device, non urgent
MU	Low	Urgent	Book, urgently required for work
HNU	Medium	Urgent	Piece of clothing for an event this week
HU	High	Urgent	Electronic device urgently needed

Survey design: respondent characterization
Description of attributes and levels

Attributes	• Levels
Gender	• Male • Female • Other
Average household income	• Less than $ 250 • Between $ 251 and $ 500 • Between $ 501 and $1500 • Between $ 1501 and $ 3000 • More than $ 3000
Number of persons in a household	• 1-2 • 3-4 • More than 4
Marital status	• Single • Married • Separated • Widowed
Type of residence	• Single-Family Home • Apartment • Condominium

Attributes	Levels
Perceived safety of the neighborhood of residence	• Safe • Rather safe • Rather Unsafe • Unsafe
Working situation	• Work at home • Work outside of home • Not currently working
Perceived safety of the neighborhood of work	• Safe • Rather safe • Rather Unsafe • Unsafe
Person present at home to receive deliveries during the work hours?	• Yes • No
Frequency of purchases	• From 0 to 1 purchase per month • From 2 to 3 purchases per month • From 4 to 5 purchases per month • More than 5 purchases per month

Survey design: respondent characterization
Ranking the importance of different attributes

Time windows	an arranged time period that customer can to choose to receive the product
Delivery Cost	price that the consumer has to pay to receive the product in accordance with his preference
Information availability	the availability of information about the delivery since the moment of the purchasing until the receipt of the package
Safety	the guarantee that the package will be received by the customer and it will be intact
Multiple product exchange options	options available to the customer where he can pick up the package (e.g. shopping mall, supermarket, stores, lockers, metro stations,...)
Payment methods	possibility of the customer paying the merchandise in installments and/or through different options such as credit card, mobile apps (e.g. samsung pay, apple, wechat,...)
Delivery lead time	time required to deliver a package from the company to the consumer
Packaging	external protection applied on the product in order to be transported
Easiness of returns	easiness of returning products to the retailer

The survey was conducted in three countries…

Brazil	Bolivia	China
964 respondents	106 respondents	122 respondents

Preliminary results…
Elements positively correlated with the purchasing frequency

Brazil	Bolivia	China
• Higher family income • Lower age • Safe work environment	• Working from home • Safe home environment • Safe work environment	• Gender (female) • Type of residence (apartments) • Working from home • Age

Preliminary results…
Ranking of delivery service attributes

Brazil	Bolivia	China
Cost of delivery	Time windows	Cost of delivery
Time windows	Safety	Safety
Safety	Cost of delivery	Delivery lead time
Information availability	Information availability	Time windows
Delivery lead time	Delivery lead time	Information availability
Payment methods	Multiple product exchange options	Payment methods
Multiple product exchange options	Contact information	Easiness of returns
Contact information	Easiness of returns	Information availability
Packaging	Payment methods	Multiple product exchange options
Easiness of returns	Packaging	Packaging

Conclusions and future work

- E-commerce and omnichannel retailing introduces a large number of delivery options differentiated according to a number of attributes
- We investigate customer preferences relevant to delivery service attributes
- Preliminary results show groups of attributes that are more important across different investigated markets but also some differences between these markets
- Future research should establish demand models based on the survey results and integrate them in quantitative models for last-mile distribution strategies and inform policy decisions

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Thank you.

Questions?

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