

Understanding and Visualizing Data

Course Project - e-fulfillment for Correios: Understanding the Market

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Outline

Correios, the Brazilian Postal Service, is the largest logistics operator in Brazil, being responsible for roughly 80% of all parcel services in the country. After an award-winning operation in the summer Olympic and Paralympic Games, the company has to deal with consecutive operational losses from its sheer size and structure.

In order to pick up the pace with its leaner competitors and even with its own clients - which are moving towards integrating supply chain within their own structures - Correios is launching a new logistics solution, e-fulfillment.

E-fulfillment consists in integrating the inventory process, separation and packing of the product. Currently, e-commerce clients receive their orders, separate and pack inside their own structures; Correios then collects and delivers. This service, therefore, aims to reduce clients' inventory processes and speed up the order completion by reducing the steps from order placing to delivery.

In order for the new service to be successful, it has not only to present advantages to potential clients but also be highly profitable. As of November/2016, the service is operational as a pilot version. Still, the market analysis for the potential customers is in a learn-as-we-go basis. This learning curve has been proving rather slow for a such a dynamic market so more accurate and powerful insights are very welcome.

In its initial stages, Correios targets small to medium e-stores and large e-stores that operate as Marketplaces, i.e. sells third-party products in their own websites. In its advanced stages, it plans to offer solutions to larger retailers, all of which are already clients in varied extents.

The objective: provide insights for sales policies on e-fulfillment. Who could be the potential clients and what are the products that would better fit this solution.

Data Collection

Part one: Understanding e-commerce in Brazil.

To understand e-commerce in Brazil it is necessary to comprehend its origins, developments and constraints.

Brazil is the largest country in the southern hemisphere, with dimensions comparable to the contiguous 48 US-States (Brazil is half a million square km larger). Despite its titanic dimensions and the fifth largest population in the planet, 205 million inhabitants, their main concentration lies in the coastal areas. Its southeast region, with dominance of Rio de Janeiro and São Paulo States, represent 54,9% of the country's GDP.

E-commerce in Brazil is no different. Companies headquarters and the bulk of consumers demand are concentrated in this region.

In order to collect data and understand the main competitors and the market demand, the cornerstone for the data collection was to gather external information from reputable media for the segment.

The main data sources are presented below.

Ecommerce Brasil

An association dedicated to e-commerce. It offers training, organizes seminars, forums and networking for the segment.

Objective: find initial information on who the players are and their size.

Public companies' information

Out of the 50-largest e-commerce companies, 11 are public companies, some of them traded in the U.S. with ADRs (American Depositary Receipts) or directly in Nasdaq. In their annual reports, those companies present not only their own financial statements but also market data from paid sources, such as Nielsen and ComScore.

Objective: find investor-level information on the market and relevant players.

Marketplaces

Marketplaces are large and reputable websites where smaller e-retailers offer their products. The large retailer receives a fee for the sale, with the advantage of holding no inventory and little working capital investment.

In Brazil, some large retailers offer this solution. However, the largest marketplace in Brazil is MercadoLivre (NASDAQ: MELI), south american counterpart to Ebay.

MELI is a *sui generis* company in the market. It holds no physical inventory of its own, ranges occasional and professional sellers. Even some of the retail giants have e-stores in MercadoLivre platform. It is currently the largest corporate client of Correios (overall second, Brazilian Government is the first).

Objective: find relevant information on small to medium-sized sellers, their top-selling products and their characteristics (segment, price, size).

Internal Data - Parcel Destination Distribution

Sample data on e-store parcels and their destinations. This data was extracted from sales SQL database and detailed information on parcels omitted, in order to preserve confidentiality.

This database presents the ZIP codes where parcels had been delivered, originated from e-stores.

Objective: Parcel prices depend on: cubic weight (weight and dimensions), origin and destination. Most frequent destinations could enlighten decisions such as where to place cross-docking warehouses, secondary warehouses and, ultimately, expected revenues by using the statistical concept of expectation, $E(x)$.

Part two: Determining the variables.

After the collection of the data, in its “raw” state, it was necessary to analyze it and add qualitative aspects from their analysis.

From the collection, it became immediately clear that the Brazilian e-commerce is highly concentrated. The 50 largest make up for 73% of the market, and those do not take MercadoLivre into account. According to our estimates, MELI universe makes up for another 22%, based on their spending with Correio’s services (since MELI holds no physical inventory, it registers its revenues from fees). The total market, BRL 41.5 BLN is estimated by ComScore.

Therefore, one restriction to this original project is the 5% trailers in the market. For this “grey area”, it will be assumed that they show similar behavior to those inside MELI universe, that from their size it seems reasonable to make limited comparisons.

The data collected is listed below:

50 largest e-commerce companies in Brazil, 2016 (revenue data 2015 FY)

Source: ecommercebrasil.com

Characteristics of the data set: organized from first to last, presents company name (case variable), revenues in fiscal year 2015, percentage of e-commerce to total company sales, growth year-on-year. On the categorical side, if it is a public company or not, if it operates also as a marketplace. From this original source I have added their business segments through research on their activity by their IRS number (CNPJ-CNAE).

MELI Brazil Business Intelligence Data - powered by NubimetricsSource: nubimetrics.com

MercadoLivre endorses developers that offer solutions to its sellers. Nubimetrics is a Business Intelligence Platform that shows valuable data on MELI environment. This is a subscription service with a 15-day free trial.

Data Sets:

- Most successful listings by month (product, seller, total revenues, quantity). I have added the type of product by analysis and also footprint size, n=100 (per month).
- Most successful e-stores (e-store, seller classification). Through research I have added to that set: location, number of SKUs offered and business segment, n=100.
- Most successful sellers: (seller alias, type of seller). Through research I have added their total sales, reputation, feedback - positive, neutral and negative - and years selling through MELI.

SQL Database: e-commerce parcel distribution

Source: Correios (formatted for disclosure)

This source is from a study done in 2016 and shows movements for 2015. It has been sampled to 1000 observations and then narrowed down to 540, to represent a 300 million population, confidence interval of 5.5 and confidence level at 99%. The original database contains data on the seller, weight of the parcel, origin, destination, branch where it was posted and other.

Since this is internal data and subject to compliance restrictions, treatment was done in order to:

- Suppress all identifying information, except destination of the parcel.
- Aggregate destination ZIP codes. Brazilian ZIP codes follow an 8-digit pattern. The 1st digit indicates region; the 2nd, sub-region; the 3rd, sector. This aggregation was also necessary in order to identify patterns and classify distributions.

This information will be used to confirm that delivery demand is a proxy to economic activity and population density geography.

Google Trends

Source: Google

Google Trends is a tool from the famous company that shows popularity and interest over time for a given search term. It plots time series graphs showing that interest. It is also possible to compare various search terms plotted in the same graph.

E-fulfillment: product information

Source: Correios (formatted for disclosure)

The product has 3 separate fees: storage, separation and packing and return processing. After that, posting with Correios is optional, Priority (PAC) or Priority Express (SEDEX), following a price chart.

This information, combined with market data, will determine:

- Target products for storage, separation and packing. What are the best product characteristics for Correios to offer this service?
- Break-even points for each pallet position. How many products have to be stored per month in a pallet position in order to surpass the opportunity cost of that position?

Thus, this is the “Rosetta Stone” of the project objective: to provide insights on sales, directing sales teams on where to target their efforts and what could be good and bad deals.

Data Visualization and Analysis

Revenues per Company (R\$ thousands)



Revenues e-commerce 2015



Revenues by Business Segment



Visualization 1: The e-commerce market in Brazil, data set ECBRASIL_50_RANK+MELI, graphs made with Tableau.
Source: e-commerce Brasil, Correios estimates for MELI.

The Market and its Players

From the data collected in the 50 largest e-commerce companies in Brazil, 2016 and added MercadoLivre's Share of the Market, it was possible to create the first set of visualizations of the e-commerce in Brazil.

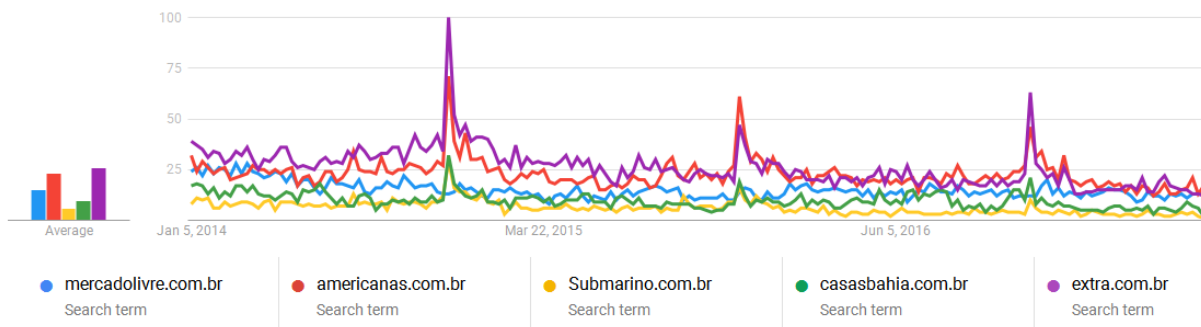
The data collected with e-commerce Brasil, combined with the estimated MercadoLivre's universal revenues, made possible to calculate the estimated "free-float": BRL 1.95 Billion, or 4,69% of the total market revenue.

From this data it is possible to determine that the market is highly concentrated and directed towards department stores and marketplaces.

Since MercadoLivre was added to the original data set, possibly being classified by e-commerce Brasil as individual small players, it is necessary to verify its relevance as a market player.

Proving MercadoLivre's relevance

MELI was included in the data set due to its relevance. In order to ascertain its relevance, which is known due to postal movement, a research on Google Trends was performed and compared to the two largest retailers most popular websites. The websites americanas.com and submarino.com belong to B2W. The websites casasbahia.com.br and extra.com.br belong to CNOVA, now called ViaVarejo.

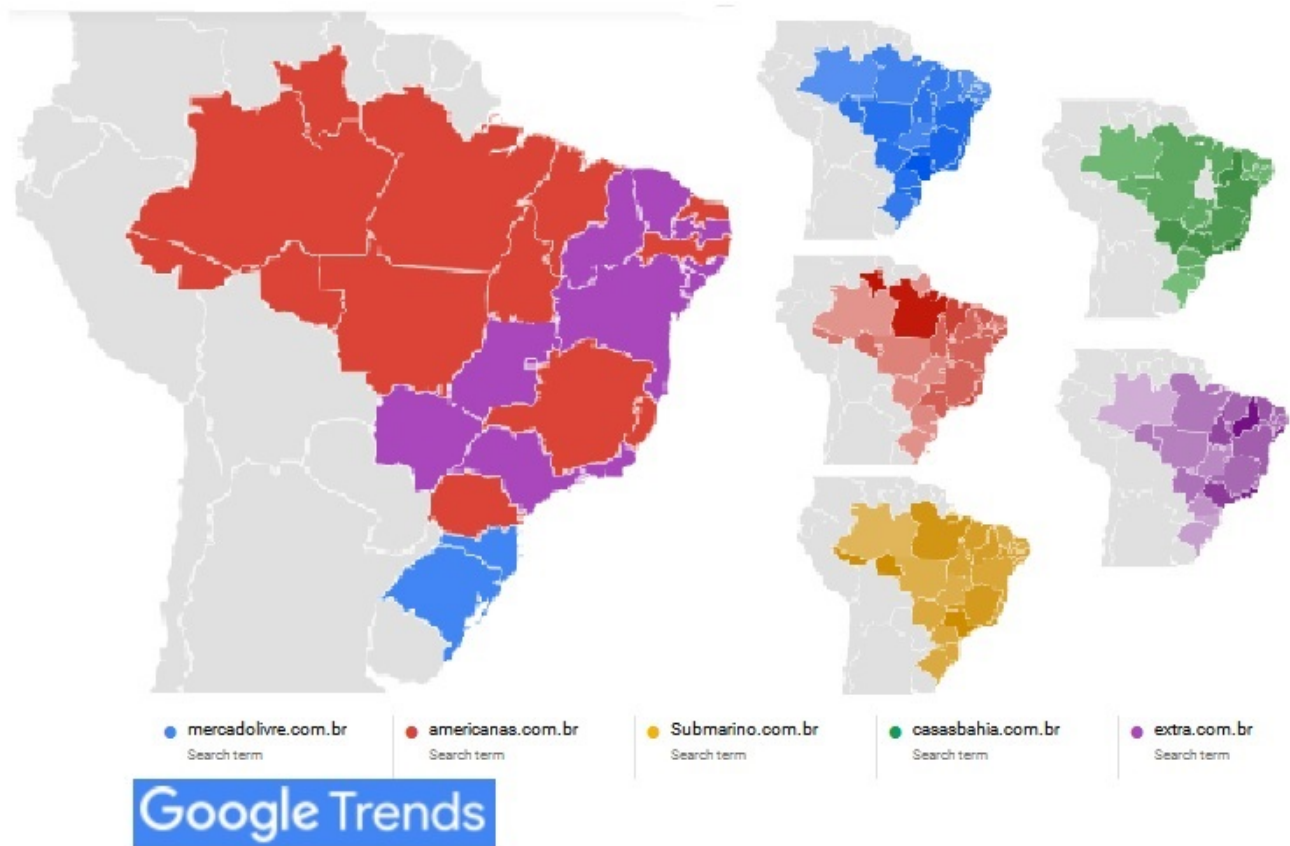


Visualization 2: Interest over time, B2W vs ViaVarejo (CNOVA) and MELI.
Source: Google Trends

From the visualization above and its histogram, it is possible to verify that MercadoLivre follows the competitors with the exception of "spike" periods in late November. This happens due to the "Black Friday effect". Black Friday Sales, which is a tradition for American retailers, came to Brazil in 2010. Its first years were mostly marketing without

real rebates, becoming known as “Black Fraud”, everything for half of the double. After some years and bad reputation acquired from that period, Black Friday sales became increasingly significant, specially among the largest retailers, and prices became truly competitive. Since MercadoLivre is a Leviathan (Hobbesian, body of bodies), i.e. its size comes from multiple smaller sellers, it is comprehensible that Black Friday trends do not extend to the company in the same manner.

Interest by subregion



Visualization 3: Maps of Brazil, combined interest by subregion and individual interest.
Source: Google Trends

The second analysis, also done with Google Trends, was made to determine regional behavior for each website, and what are the preferences of each of the states of Brazil for those websites.

This analysis, however, shows only the “winners” in each state. In the smaller maps, it is possible to verify each one of the websites’ performance individually.



Visualization 4: Histogram, Interest over time, originally shown in Visualization 2, zoomed.
Source: Google Trends

The maps of interest by subregion unfold that MELI is not the “winner” website in most regions. Still, the histogram shows that it is consistently the third choice on average.

Since this overview did not disqualify the inclusion of MercadoLivre, the hypothesis of maintaining its position in the data set will be kept.

The Market in Numbers

The company list not only confirms once again the market’s concentration, but also provides hints to product segments that should be interesting to analyze for the e-fulfillment sales strategy.

Department Stores are the biggest and sell a wide range of products, from electronics to clothing. In spite of being the biggest, those observations do not produce much insight on what products should Correios focus to store, pack and deliver under this service.

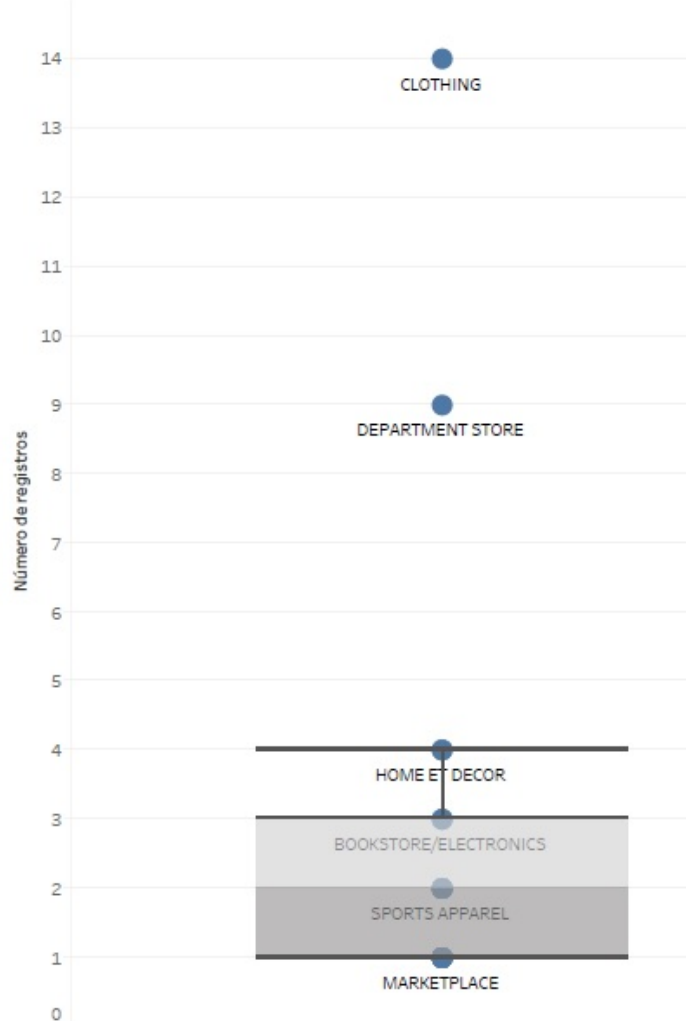
Specialized stores also offer a wide range of products, however of a more limited scope. Assuming specialized stores of such items are on the top due to high demand, Correios is able to profit from that information in order to establish a sales policy that is more assertive and precise.

Visualization 5: List of revenues (top 22), Largest by Segment (number of occurrences), Revenue of Public vs Closed Capital Companies. Visualizations made in Tableau.

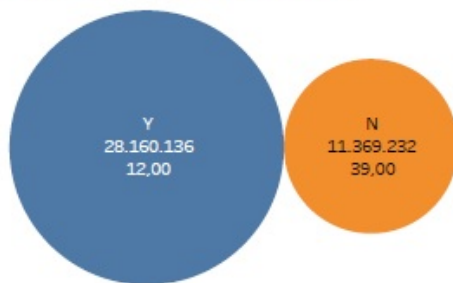
Company List

Company1	Business Segment1	
B2W DIGITAL	DEPARTMENT STORE	10.509.600
MERCADOLIVRE	MARKETPLACE	9.000.000
CNOVA.COM	DEPARTMENT STORE	3.472.000
MAGAZINE LUIZA	DEPARTMENT STORE	2.059.000
PRIVALIA	CLOTHING	2.019.660
GRUPO NETSHOES	SPORTS APPAREL	2.000.000
OTHER	VARIED	1.970.632
MAQUINA DE VENDAS	DEPARTMENT STORE	1.580.253
GRUPO HERVAL	DEPARTMENT STORE	1.090.381
DELL COMPUTADORES	ELECTRONICS	1.001.021
FAST SHOP	ELECTRONICS	902.978
GFG LATAM - DAFITI	CLOTHING	769.000
POLISHOP	DEPARTMENT STORE	670.795
SARAIVA	BOOKSTORE/ELECTRONICS	569.479
WALMART BRASIL	DEPARTMENT STORE	516.656
ULTRAFARMA	PHARMACY	356.933
LOJAS COLOMBO	DEPARTMENT STORE	344.171
MOBLY	HOME ET DECOR	306.000
WINE.COM	SPIRITS	300.000
PANVEL FARMACIAS	PHARMACY	179.782
LOJAS RENNER	CLOTHING	168.918
GRUPO SOMA DE MOD..	CLOTHING	132.309

51 Largest by Segment



Revenue of Public Companies



Source: e-commerce Brasil, Correios Estimates for MELI.

Public companies represent a large portion of the big e-retailers in terms of revenue. There are 12 of them in the list, representing almost 68% of all revenues. Companies that trade stocks have more information available and are subject to SEC when listed in the U.S. or CVM, SEC equivalent in Brazil. This means that Correios can easily gather external information from those companies, be that from the original source or from Equity Research specialists. Data such as these are highly valuable, preparing sales officers to offer tailored solutions to big sellers as variants of the original e-fulfillment service.

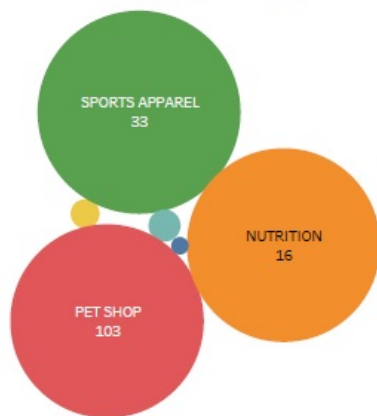
At this point, it is important to mention that e-fulfillment does not target the large retailers as of yet. From the list, however, there is an increasing number of those retailers that are integrating marketplace solutions within their websites.

- B2W (1st)
- CNOVA (2nd)
- Magazine Luiza (3rd)
- Privalia (4th)
- Grupo Netshoes (5th)
- Saraiva (12th)
- Cia Hering (43rd)
- Sunglass Hut (47th)

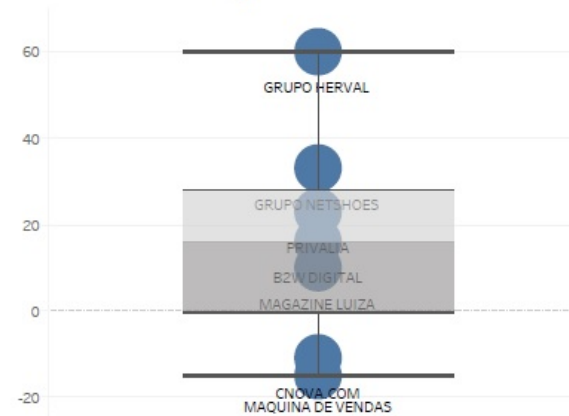
In this case, it seems a very reasonable assumption to predict that marketplaces will, in fact, aggregate the offerings to a few domains in a foreseeable future. This means that the smaller and medium retailers' survival will probably depend on offering their products through a more known platform.

The final analysis for the general market study is growth. What are the companies and segments that are growing faster?

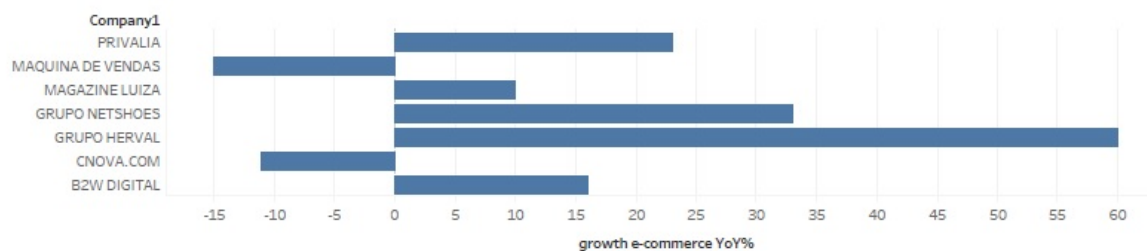
Growth YoY by segment (%)



Growth YoY - 10 Largest



Growth YoY by Company (%)



Visualization 6: Growth Year-on-year by segment, growth year-on-year (10 largest). Visualizations made in Tableau.
Source: e-commerce Brasil, Correios Estimates for MELI.

Considering only segments, Sports Apparel, Nutrition and Pet Shops are growing rapidly, the latter at the fastest pace.

In this visualization set it is interesting to verify that it seems the “game is changing”, with the leader B2W further consolidating its dominance, while comparable companies such as CNOVA and Maquina de Vendas are losing ground. Correios could either focus on ailing companies offering logistics improvements or tracking the high growth segments and players for business opportunities.

Unfortunately, this analysis is not able to affirm precisely what business segments might be the best, due to the erratic behavior of comparable players. This is the case for the Department Stores. Clothing and Sports Apparel have many similarities and could even, for some analyses, be considered the same segment. In this case, it is recommended to deepen the analyses for this segment in a future project.

E-fulfillment analysis

Concept Analysis

The service, as it was conceived, was to offer logistics solutions to smaller retailers that have little or no access to other forms of integrated logistics. For example, sellers who keep inventory at their homes, improvised or outdated warehouses would have access to full integrated logistics. They would now worry only about their sales instead of packing and shipping.

It consists in the following stages:

- Storage (W): at Correios’ warehouse, the client has a pallet position or set of drawers, to which “rent” is paid by unit. This is charged when the merchandise enters the warehouse, and the rate is flat for month or fraction of month. It enters, it pays.
- Pick & Pack (P): once the customer order is received by the seller, the warehouse receives the service order to separate the items of the order, pack and label accordingly. Fees apply per order.
- Return Processing(R): if the final customer decides to return the product, reverse logistics is done in order to re-store or quarantine the product. Fees apply per order.
- Shipping (S): it is done in Correios’ parcel delivery structure, and fees apply according to origin/destination, cubic weight, type of parcel (priority or express). Fees also vary from client segmentation: larger volumes pay less.

So, the revenues per unit would be the following:

$$R_u = P_w + P_P \cdot O \cdot U_p^{-1} + P_S \cdot O_S \cdot U_p^{-1} + P_R \cdot O \cdot E(U_R)$$

W
Price

P Price x
Order/Unit

S Price x
Order/Unit

R Price x Order x
Expectation of
Units Returned

Equation 1: Equation for e-fulfillment revenues per unit, created by the author based on product guidelines.

From the equation, the following questions arise for the product:

- Warehouse storage is flat for any product footprint that can be carried within the parcel network. How many products per pallet position would break-even?
- Pick & Pack prices are flat per order. How many units in an order would be accepted? If the order has more units than the threshold, would it be broken into multiple orders?
- Return Prices are flat per order. How to determine what return orders to a given unit number and diversification are lucrative and which are not?

For warehouse storage, it is possible to come to a number. The opportunity cost of a pallet position is around 70 times the price of the storage of a single unit per month. Therefore, 70 is a magical number for finding the right product to store. If a position is not occupied by at least 70 products in a given month, there is loss. Clients were recently contacted to store items such as chairs, fitting at the most four of them in a pallet position. They were obviously interested.

Pick & Pack prices, for orders with large quantities, would be restricted to the maximum weight and size that is shipped through Correios. The sum of height, length and depth cannot go over 200cm. Weight cannot exceed 30kg or 50kg to selected locations. To quantify unit break-even points per order, it is necessary to create either Monte Carlo Simulations of linear algorithms. More data, however, is necessary to ascertain values and methodology.

To determine return prices, data regarding stores returns is necessary, and it is not available at this time. This statistics should be treated as an iterative process and collected at the warehouse when fully operational.

Targeted Clients Analysis

E-fulfillment, at this time, is being offered to Correios e-stores clients, regardless of business segment. Restrictions are to companies' sizes. At this stage, it is restricted to smaller companies.

In this case, it would only reach from BRL 1.95 to BRL 10.95 Billion market, or 26% of the industry. These numbers mean the market outside the scope of the 51 largest (qualified as OTHER in the visualizations) for the lower range and including the full extent of MercadoLivre at the upper range.

It is also important to note that the "lower" range of the 51 largest has its lower revenue set in BRL 9.3 Million, roughly USD 3 Million. It is not reasonable to suggest that a three million-dollar business has a home storage, or half a million.

For comparison, the business case of e-fulfillment targets annual revenues up to BRL 675,000. These are not only much harder to find, but are also facing a fair number of Goliaths.

MercadoLivre currently offers MercadoEnvios. This service is basically a set of contracts made with Correios and other courier services offered to sellers for regular parcel (no warehousing or packing). Basically, MercadoLivre negotiates better shipping prices due to its size, offering lower prices than the individual seller would otherwise have available. And then, MELI collects profits on that as well. This means that including MercadoLivre's sellers in the potential market numbers might not be viable without a partnership between Correios and MELI. Correios' solution, if bypassed MercadoLivre, would not only compromise relations with its largest corporate client, but also increase its SG&A for the very same deliveries it already makes.

Availability Analysis

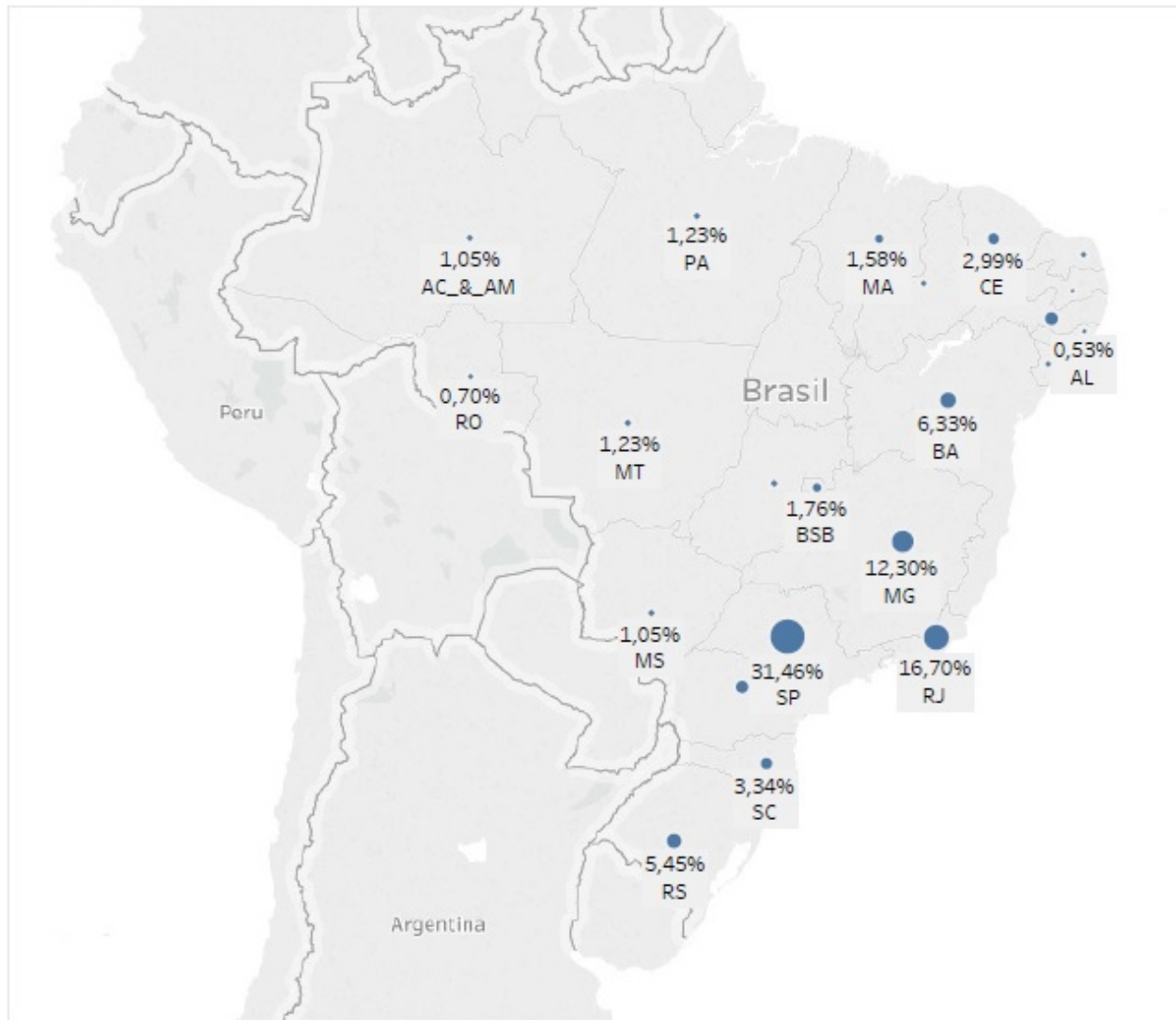
In this analysis, the idea is to determine whether there is proximity with the client, demanding and receiving.

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Correios is operational on an e-fulfillment warehouse in SP, and in its final stages for opening other five warehouses, one in each state: PR, PE, RJ, MG and BSB.

By visualizing the map and the demands by jurisdictions, there is high demand for RJ and SP states; medium demand for MG, BA and RS states; small demand for BSB/DF, SC, CE, PE and PR. As a side note, Correios has two separate Regional Headquarters in SP State, due to its high demand both in São Paulo City as in other key cities.

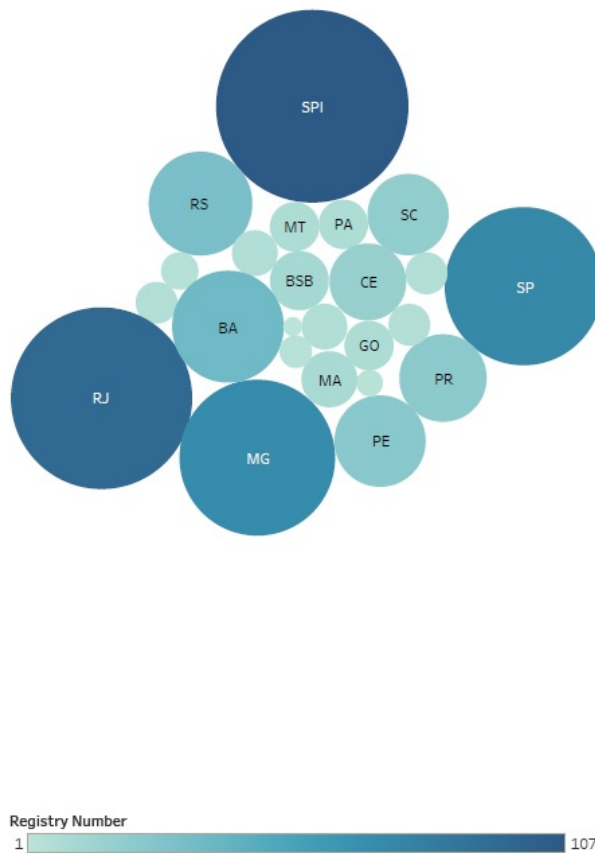
Parcel Destination



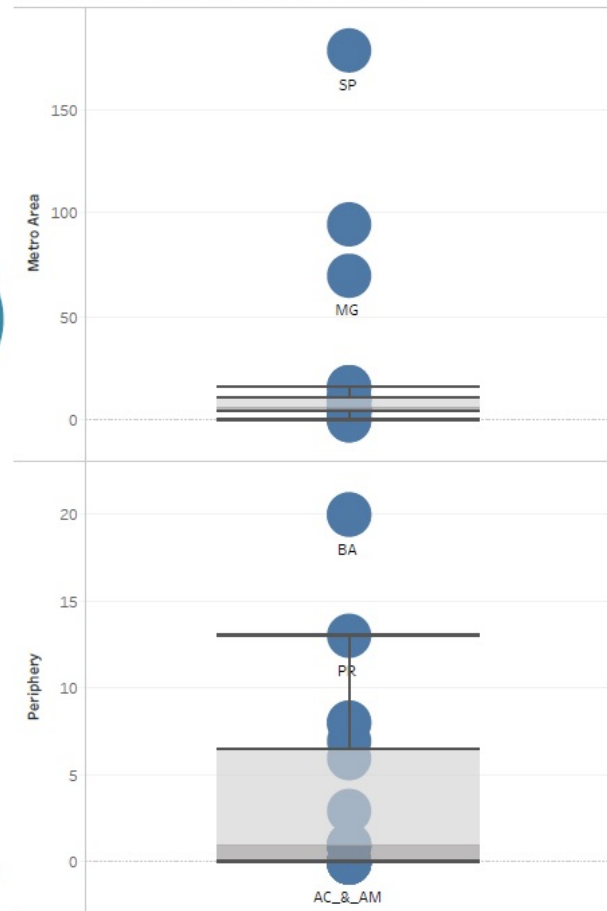
Visualization 7: Map of e-commerce Parcels Destination. $n=570$, confidence interval 99%, error margin 5%.
Source: Correios Internal Data, sensitive information suppressed from data set.

This information can provide insights to size and position of the warehouses, by presenting the average distances, to be developed in further detail in the future. There are also states that have low demand and a lot of dispersion. For example, BA or Bahia, that due to its demand and dispersion shows evidence to be more attractive than PE (state contiguous to the north of AL) in order to establish a warehouse, even due to geographical size.

Jurisdictions



Metro Area x Periphery Distribution



Visualization 8: Demand Visualizations by Jurisdictions. SPI and SP represent SP state. Visuals made in Tableau.
Source: Correios Internal Data, sensitive information suppressed from data set.

MELI Analysis

The last analysis of this project is MercadoLivre.

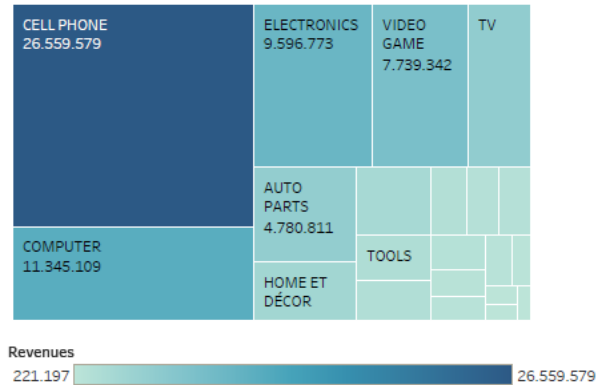
For this analysis, all data was collected from Nubimetrics, a business-intelligence tool developed by the homonymous company, validated by MercadoLivre. This solution was found in MercadoLivre University website, that contains a series of instructions for the seller to be successful with sales in their platform. As a side note, the platform uses visualizations made in Tableau software, which is the same used to create the visualizations presented in this document.

Verifying the first visualization from MercadoLivre, it is possible to infer a tendency towards products most sold in the platform: cell phones, electronics and accessories, home et décor and auto parts. On the curiosity side, there is hair (yes, human hair).

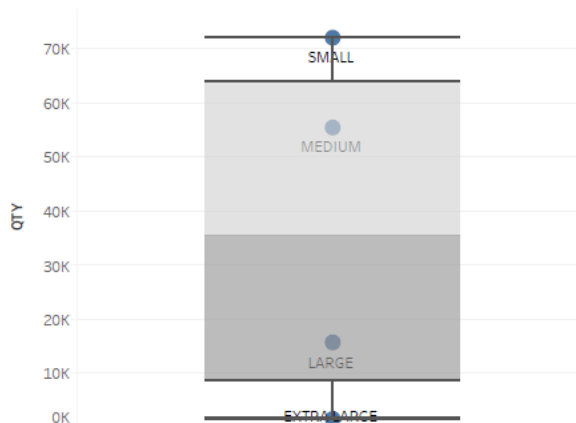
Products Sold by Type

Type Of Product	
ACCESSORIES	3.679
AUTO PARTS	7.990
BEAUTY	7.531
CELL PHONE	34.946
CLOTHING	11.797
COMPUTER	9.735
DOMESTIC APPLIANCES	1.556
ELECTRONICS	36.361
HAIR	1.004
HOME APPLIANCE	503
HOME ET DÉCOR	12.247
PRINTER	1.393
SOFTWARE	291
TOOLS	5.126
TV	4.026
VIDEO GAME	4.942

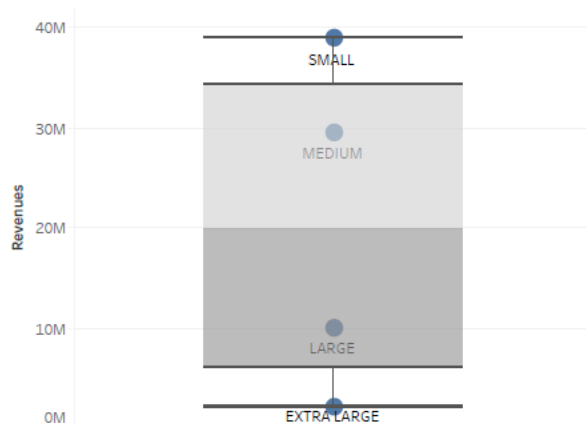
Revenues by Product - may 2017



Quantities by Product Size



Revenues by Product Size



Visualization 9: MercadoLivre, Products Most Sold by type and size.
Source: Nubimetrics, MercadoLivre website, data treatment by the author.

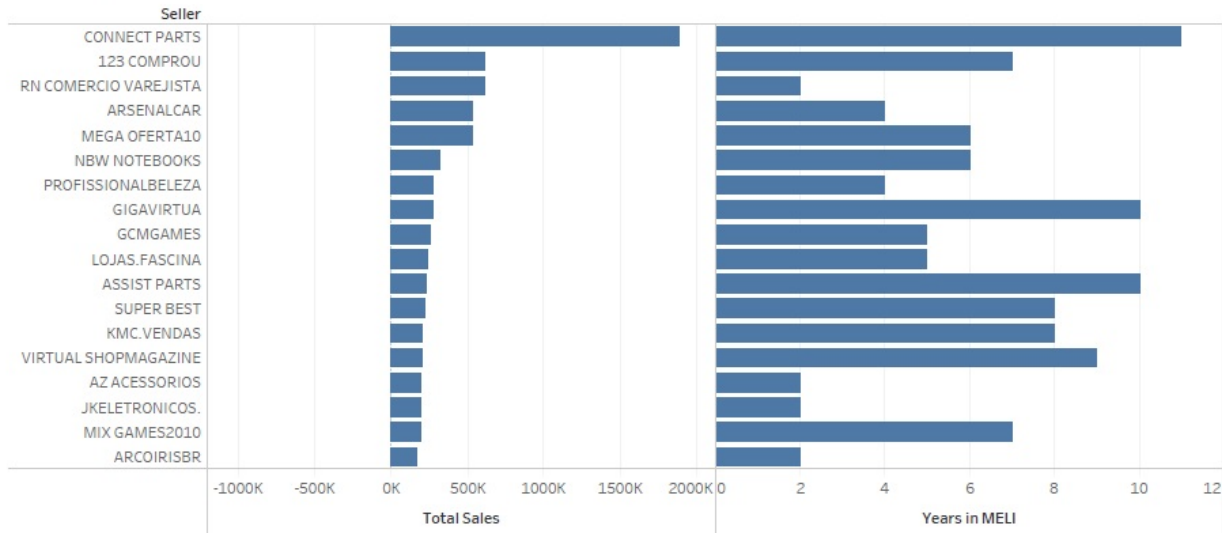
In terms of revenues, cell phones are leaders, second to computers. This inference is quite reasonable, considering Brazil has a growing number of connected people and smartphones are becoming the most relevant device to internet connection.

Verifying the dimension size of the product, smaller footprint products are the most relevant ones, both in quantities and in revenues. This visualization was made to be compared with e-fulfillment break-even storage number of products for each pallet position: 70 units.

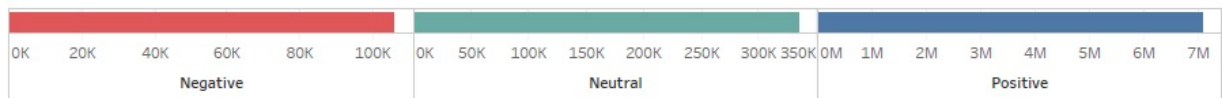
Products considered small are the ones that more than fit 70 units in a pallet position; medium products do not fit 70 units at the same time in a pallet position, but may reach that number on average from inventory turnover. Large products would require more than 4x inventory turnover to reach 70 units per pallet position. Extra large products are

the ones that exceed the maximum weight and/or dimension requirements to be carried through Correios' parcel network.

MELI Top Sellers



User Experience - Top Sellers



Visualization 10: MercadoLivre, Top Sellers List, Total Sales and Relationship with Meli; User experience with top sellers.

Source: Nubimetrics, MercadoLivre website, data treatment by the author.

In visualization 10, the top MELI sellers list is shown by user name. Thus, should Correios decide to approach MELI sellers individually, these are their names. There is high variance in terms of years of relationship with MELI. From this we can infer that the top list changes from time to time. In this case, following up this list and updating it regularly can produce more powerful insights on sellers that are consistently medium, erratically large, growing or diminishing its share over time.

Insights and Final Considerations

Recommendations

From the data analysis, the market observations to product configuration, there are important topics that come to light. Here are the key considerations:

- Go big or go home: market is very consolidated by a few huge players. At this level, consolidation tends to go further, and thriving small retailers could survive being leaner and growing. If Correios Logistics department wants to be a part of the “big boys table”, it needs to offer solutions for those behemoths as well.
- Kid Gloves: MercadoLivre is the largest marketplace and profits from the *status quo* on parcels. Offering a service while leaving them out of the profits is a red flag for possible competition. It is also the largest commercial client of Correios. Caution is required with the big seller’s list.
- Small Products: in order to maintain all the stages of the fulfillment profitable, choosing products wisely is key. Either medium-sized products with high turnover or small-sized ones are acceptable. The current configuration cannot accept large sized products without loss.
- Locations: careful thought must be given to where the warehouses are positioned and their sizes. A bad move may corrode profits by exceeding capacity in SP and plenty idle space in PE.

Controlling Bias

Market data

The Market Analysis section shows some insights on the data. However, some views give us only hints how what might be happening across the variables.

One example of that is Google Trends. People might be looking for prices online as reference, however still preferring physical stores to make a purchase, specially referring to products that cost more overall. In this case, an assumption was made: the searches for merely finding the “fair price” is evenly distributed within the largest e-stores. That might be not true if this analysis extended to all 51 largest stores in the list.

Internal data

Internal data access was limited due to access and compliance restrictions, and there are much better sources of data to verify parcel movement that can be extracted from Correios’ enterprise systems, for example, financial data from accounts receivable and

billing areas. However, results on geographical distribution reflect Brazilian economy and geography very closely. Thus, the sample shows reasonable results for a data-driven decision.

MELI Data

MELI data deliver a very interesting insight: cell phones look like the best alternative as product and could determine Correios' course of action. There must be considerations regarding being the only alternative or best product overall by merely being phones or by carrying their main characteristics that make them the best: small footprint size and high turnover. In this case, any other product with these characteristics should be taken into consideration.

Follow-up KPIs

As a market and product study, there is need for constant improvement and update of the scenario. For that, follows the selected KPIs.

That are many more than could be incorporated, such as operational quality, delivery times and warehouse usage. Those might come with a deeper understanding and awareness of the product situation. All in all, to introduce each new KPI it is necessary to implement and access data more and more accurately.

Growth:

- Market Growth Rate (CAGR): Measure market growth realized at the period. This can be divided by sectors for a thorough analysis.
- Service Growth Rate (CAGR): Measure the service year-on-year and check if it follows the market. At earlier stages, this KPI should grow significantly more than the market, assuming it will receive demand unmet. For the following terms as the service reaches maturity, it is important to check if it follows the market properly.

The formula for CAGR is:

CAGR
(Compound Annual Growth Rate)

$$\text{CAGR} = \left(\frac{\text{End Value}}{\text{Begin Value}} \right)^{\left(\frac{1}{\text{Number of Years}} \right)} - 1$$

Equation 2: Equation for CAGR.

Service

- Revenues per Unit: Determine what are the revenues per unit served in the e-fulfillment service system, shown in equation 1.

$$R_u = P_w + P_P \cdot O \cdot U_p^{-1} + P_S \cdot O_S \cdot U_p^{-1} + P_R \cdot O \cdot E(U_R)$$

W
Price

P Price x
Order/Unit

S Price x
Order/Unit

R Price x Order x
Expectation of
Units Returned

This KPI gives an overview of how well the service is performing to add value to the company.

Conclusion

This project has been taken as both part of the learning process in the SHA571: Understanding and Visualizing Data as well as a tool to help Correios with important decisions regarding its launch service. Its main idea is to raise awareness to the elements in a series of decisions on how to implement and offer a competitive service for the right customers.

It is important to note that Data Analytics is an iterative process, with a learning curve each time statistics is used to understand a situation. This leads to insights and actions towards producing better data and by then making better and better decisions.

More importantly, the data has shown that it is not possible to serve every client under the service design, and some of them, with low turnover or large footprint sizes might incur in operational loss. Hence, focusing is important, as well as offering similar tailor-made services to Correios' large and midsize corporate clients.

Since market tends to consolidate even further, it is also important to partner with larger players even for their marketplace offerings. These companies, if left out of the profits in shipping might select different courses of action in order to establish competition.