

Case Study

SHOPPING CART ABANDONMENT

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1 Introduction

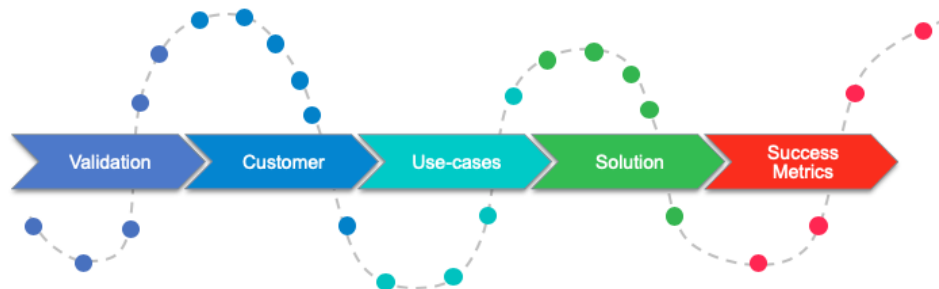
During my preparation for the interview, I was looking through Shopify's website, trying to find customer challenges to solve or ideas to help deliver more value to Shopify e-commerce merchants.

Shopify already provides a wide variety of products and services for merchants over the different phases of the e-commerce journey including starting the business, selling, marketing and managing the business.

I decided to look for a statistic in e-commerce that shows a challenge that many merchants are facing in their operations and try to tackle it.

The challenge I decided to proceed with is cart abandonment. According to cumulative data gathered by independent research firm Statista, as of the second quarter of 2018, it was found that the total online shopping cart abandonment rate worldwide was 75 percent [\[1\]](#).

This mini case study tackles the challenge of cart abandonment by validating the problem, identifying targeted customers, prioritizing the different use-cases, proposing solutions and discussing success metrics and concerns.



2 Problem Validation

In order to avoid wasting company resources and focus on solving customer pain points, we need to prove that shopping cart abandonment is real a problem among Shopify merchants.

To ensure and validate that the reported metric is truly correct and is a representative of our Shopify merchants, Shopify data warehouse can be queried to calculate the average shopping cart abandonment rate across all merchants.

In the scope of this case study, the shopping cart abandonment metric accounts only for online store visitors, who actually reach the checkout page but then abandon the checkout process without completing the purchase, resulting in a lost customer conversion. The metric does not

take into account visitors who add items to their shopping carts but never reach the checkout page.

Cart abandonment rate can be measured by utilizing the different session metrics to calculate the drop rate between the number of sessions to reach checkout and the number of converted sessions that result in purchases.

Reached checkout sessions: The total number of sessions where a customer reached the checkout page with a product in their cart.

Sessions converted: The total number of sessions where a customer purchased a product.

****Assumption:** The number of sessions that reached checkout does not account only for sessions that only reached checkout and did not convert into purchases but also the converted sessions that resulted in purchases. Reached checkout is a super set that includes the converted sessions.

$$\text{Cart abandonment rate} = \frac{\text{Reached checkout sessions} - \text{Converted sessions}}{\text{Reached checkout sessions}}$$

Assumptions:

- The data warehouse has a dimension table (sessions_raw) that keeps track of all sessions across all stores. The dimension table is partitioned by store_id and created_time.
- Aggregation ETL jobs run on a monthly basis to roll up session metrics into a sessions_monthly table

Table: sessions_raw

+-----+-----+-----+-----+-----+-----+
session_id store_id created_time expires_time reach_chkout_bit converted_bit
+-----+-----+-----+-----+-----+-----+

Table: sessions_monthly

+-----+-----+-----+-----+
store_id created_month total_reached_checkout total_converted
+-----+-----+-----+-----+

We can then run the following SQL command to get the average cart abandonment rate:

```
SELECT
    AVG(a.abadon_rate') AS 'TOTAL_ABADON_RATE'
FROM (
    SELECT
        ( SUM(total_reached_checkout) - SUM(total_converted) ) /
        SUM(total_reached_checkout) AS 'abadon_rate'
        , store_id
    FROM
        sessions_monthly
    WHERE
        created_month BETWEEN '2018-01-01' AND '2018-12-31'
) a
;
```

Fictitious returned result:

```
+-----+
| TOTAL_ABADON_RATE |
+-----+
| 0.73               |
+-----+
```

Based on the returned result, we can verify that in 2018, Shopify merchants experienced, on average, a 73% cart abandonment rate. We can conclude that the cart abandonment is a true problem among our merchants, a problem that we should try to solve.

3 Goal

Our goal is to design a product that results in cart conversion lifts, reducing the average cart abandonment rate among Shopify merchants and increasing the average revenue per user for our Shopify merchants.

4 Customer Identification

We need to understand our targeted customer segment in order to build a solution that is tailored to our targeted merchants.

There are several ways to segment our market. I've decided to use the annual merchandise volume to split our target market into 3 segments:

Entrepreneurs	Merchandise volume: Small volume typically up to \$50K
SMB's	Merchandise volume: between \$50K to \$500K
Larger brands	Merchandise volume: above \$500K

** Shopify data warehouse can be queried to identify which segment has the highest abandonment ratio. For simplicity, we will skip this step.

My initial gut feeling was to exclude the larger brands segment from our targeted market because the larger brands can attack the problem by offering solutions such as free shipping. Larger brands have large volumes and can utilize the economies of scale and the bargaining power of buyers with shipping companies to negotiate better discounts. By absorbing the discounted shipping costs, large retailers can afford to offer free shipping to get better conversion rate.

However, I've decided that we need to include all segments in our market because shopping cart abandonment affects both small and large business alike. Especially at the scale of the larger brands, the problem truly intensifies.

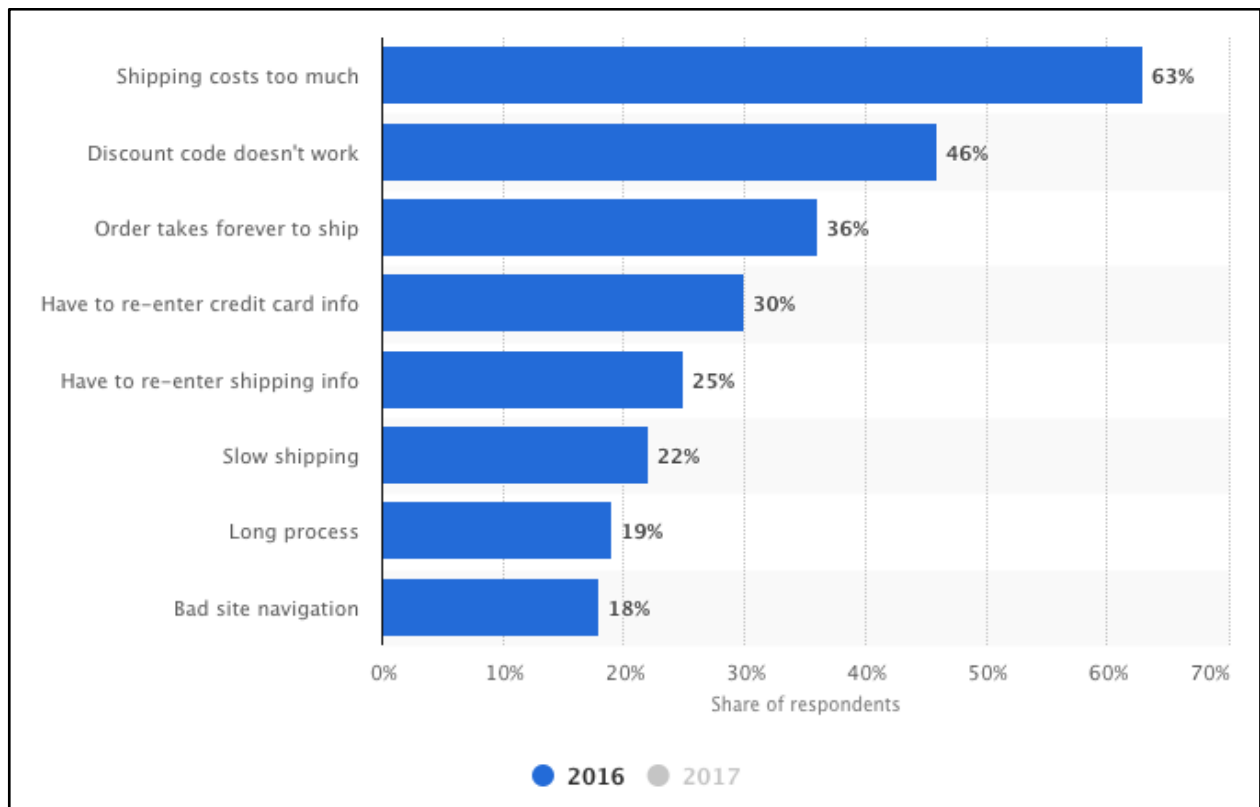
To demonstrate, for a large brand that has an average of 150,000 online visitors per month and an average order value of \$50, a small 0.4% increase in the conversion rate results in an extra 1\$30,000 per month, which adds up to \$360K per year.

5 Customer use-cases

Because the problem of cart abandonment has already been identified, there is no need to explore a wide variety of merchant use-cases such as starting a store, marketing, selling and store management. The problem statement of cart abandonment limits the scope of the use-cases we need to explore to:

- Merchants need to convert more visitors into customers by eliminating the primary reasons why online store visitors abandon their shopping carts without completing the purchase.

A wide variety of methods can be used to identify the primary reasons for cart abandonment such as conducting customer interviews, surveys and quantitative analysis based on collected data. For the purpose of this study, I've decided to refer to a 2016 survey carried out by the independent research firm Statista.



Primary reason for digital shoppers in the United States to abandon their carts in 2016 [\[2\]](#)

According to the 2016 survey carried out by Statista, 63 percent of respondents stated they had abandoned shopping carts due to the cost of shipping and 22 percent of respondents stated they had abandoned shopping carts due to slow shipping.

For the purpose of this case study, I've decided to focus on shipping challenges. A/B testing can be used to measure customer satisfaction and conversion rates for free shipping vs

expedited shipping. The other option is to use existing statistics reported by independent research firms.

Based on the data provided by the Statista survey above, free shipping option on checkout is more important to customers than having the option for expedited shipping. Therefore, we will focus primarily and prioritize the ability to offer free shipping over the ability to offer expedited shipping.

6 Current solutions & weaknesses

6.1 Shopify checkout recovery emails

Shopify offers merchants some options to help reduce the rate of cart abandonment such as:

- Automatic abandoned checkout recovery emails after X number of days.
- Applying automatic discount codes to abandoned checkout recovery emails.

The 2 options mentioned above can help increase the conversion ratio. However, the 2 options will only work to convert those visitors who abandoned their carts for reasons such as:

- They decided to buy later
- They were browsing on their phone and abandoned the checkout to finish the process on a laptop later on.

However, the checkout recovery emails will not prove to be effective on visitors who abandon their carts for other reasons such as:

- No free
- No expedited shipping options
- Security concerns
- Limited payment methods

** A query to Shopify data warehouse can be used to prove that for those merchants who are using the checkout recovery emails, the cart abandonment ratio is still high and could be improved.

6.2 Shopify shipping with discounted prices

Shopify offers its merchants discounted shipping rates by establishing partnerships with several shipping companies such as USPS, DHL, UPS and Canada Post.

Even with the discounted shipping rates, shipping products, especially international shipping, is still considered expensive preventing merchants from being able to offer free shipping.

Using Shopify's shipping calculator [\[3\]](#), a 1.3 Kg shoe box delivery from Washington to Canada would cost on average \$40. A 125 g shirt delivery from US to Europe would cost on average \$30.

With the current prices, offering free shipping to end customers will eat into profits, resulting in lower margins which is not favorable for merchants.

In addition, Shopify shipping, which helps merchants speed up packaging, fulfillment and delivery, is limited only to orders shipped from fulfillment locations based in the United States (USPS, DHL Express, and UPS) and Canada (Canada Post). With the current vision of Shopify and its investments towards international markets such as Shopify's initiative to translate the platform into languages other than English, Shopify must be able to offer other shipping options to address the needs of international merchants and cross border shipping.

7 Suggested solution

Over the past decade, technology advances at the presence of the internet have been disrupting many businesses by democratizing the user experience and utilizing the powers of the sharing economy and crowdsourcing. Many new companies, such as Uber and Airbnb, are now disrupting markets that were dominated for years by other big players.

The existing shipping solutions mentioned in the past section are considered partial fixes that try to mitigate the issue. However, if we are willing to take bigger gamble, some additional options are open to us.

7.1 Crowdsourced E-commerce Delivery

Crowdsourced delivery is gaining popularity as a new delivery model. it leverages local, non-professional couriers to get packages to customers' doors. This model allows companies to satisfy consumers' growing demand for cheaper but also faster online delivery services.

The way how crowdsourced delivery works is that a customer makes a purchase on an online store. The merchant packages the order and places the order on a crowdsourced delivery app. The delivery is assigned to one of the part-time couriers using the app. Couriers can either bid to accept a local delivery or may be automatically assigned one based on their flight routes or proximity to the pickup location or other metrics. The order gets picked up and delivered by the courier, either to a hub for distribution or directly to the end customer's door.

There are 2 options for Shopify to offer crowdsourced delivery options for merchants:

1. Partnering with existing companies that offer crowdsourced delivery
2. Build an in-house crowdsourced delivery platform

7.1.1 Option 1: Establishing partnerships with existing companies in this field

Multiple startups like Postmates, Instacart, and others are looking to disrupt the last-mile delivery space by leveraging the "Uber model," and connecting businesses to non-professional couriers who can deliver goods instantly.

One option for Shopify is to establish partnerships with some of these startups to offer crowdsourced delivery options to its merchants.

A great example of this option is Shopify's partnership with Deliv in 2018 [\[4\]](#). Deliv provides a new last mile delivery solution to power same day delivery for retailers and businesses.

Unfortunately, most companies in this field are still in the early stages and can't yet scale with Shopify merchants. In addition, this option can't be used for international shipping. Most of the existing crowdsourced delivery services are limited to last mile delivery within the same city or the same country.

7.1.2 Option 2: Shopify's in-house crowdsourced shipping platform

In this option, Shopify would establish its own crowdsourcing shipping platform that allows merchants to fulfill and send packages using the power of the crowd. Once the crowdsourced delivery network gets established with high enough supply and demand, delivery prices will be significantly reduced which will allow merchants to absorb the delivery cost without sacrificing a big portion of their margins. In addition, it will enable a new cheaper option for cross border delivery to international markets.

7.1.3 Analysis and recommendation

The following table shows a quick analysis that can be used to prioritize and select one of the options mentioned above

	Risk	International offering	Scale	Ease of implementation	Investment
Option 1	Low	No	Not yet	Low effort	Low
Option 2	High	Yes	Yes	High effort	High

Based on the analysis above, although option 2 has a higher risk and requires a larger investment, I suggest we go with option 2 for the following reasons:

1. It fits Shopify's strategic internationalization efforts. It satisfies the major requirement of having the ability to offer international delivery.
2. It satisfies our scale requirements to be able to scale with many merchants across different countries.
3. Although, investing in a new shipping platform might seem outside the scope of Shopify's core competencies, becoming a leader in international e-commerce shipping would help Shopify increase its merchant market share on the long run and win new businesses.
4. The new shipping platform could start as a loss leader to help merchants succeed in increasing their conversion ratios which is in full alignment with Shopify's mission to make commerce better for everyone. However, once the platform becomes established with a wide enough user base, the platform itself could become an additional source of revenue for Shopify.

8 Initial plan

In order to avoid wasting company's resources by going directly into building a full-blown crowdsourced shipping platform, a carefully studied initial plan must be put in place to allow the evaluation of the new platform by establishing success metrics before taking further steps

8.1 First phase

First will start with phase 1, which will run for 6 months. We will limit the operations of the new platform to 2 cities, one in Canada and one in the US. The following criteria must be considered in the selection process of the 2 cities:

- 1- We must select 2 cities with large numbers of Shopify merchants who are running strictly non-seasonal stores. We want to avoid any seasonal merchandise because seasonality affects demands, which in turn would affect our shipping metrics and make it much harder to compare and measure the success of the initial phase.
- 2- There must be a relatively large number of weekly flights between the 2 cities to facilitate cross border delivery. Aviation databases such as aviation edge [\[5\]](#), can be used to run queries for this criterion.
- 3- We must select 2 cities with a large number of orders that get delivered across the 2 cities. Shopify data warehouse can be used for this query.
- 4- Preferably, we shall pick 2 cities with large numbers of loyal repeating customers. The repeating pattern for those customers will help in measuring the success of the initial phase.

8.2 Cold start

Crowdsourcing for businesses with two-sided network has one fundamental challenge at early stages, which is the chicken and egg problem. We want to get both the consumers (in this case the customers buying merchandise) and the producers (delivery carriers) onto the network and the producers won't come there until the consumers do and vice versa.

The solution to this challenge lies in subsidizing one side of the market to build demand in the network. In this case, Shopify will invest in its own carriers and absorb the cost for the first 6 month of operations to build customer demand and to test the crowdsourced delivery concept.

The crowdsourced delivery option will then be rolled out to merchants in the two selected cities to offer free shipping to customers. Shopify delivery carriers will be responsible for collecting the merchandise and travelling across the 2 cities to fulfill the delivery orders in the first 6 months of operation.

8.3 How to measure success

The following metrics can be used to measure the success of the initial 6-month phase:

1. Acquisition and activation of service:
 - a. A month over month view of the number of merchants who activated the crowdsourced delivery option on their checkout pages.
 - b. Percentage of merchants over time who activated the new delivery service.
2. Engagement behavior:
 - a. Percentage over time of gross merchandise volume (GMV) delivered via the new delivery option vs other classical delivery options
 - b. Percentage over time of customers who uses the crowdsourced delivery option vs other delivery options.
 - c. Cart abandonment rate over time per store for the past 12 months.
 - d. Total average cart abandonment rate over time for all stores across the 2 cities over the past 12 months.
 - e. Month over month view that compares the total average cart abandonment rate for all stores for the first 6 months of new delivery operation vs the exact same 6 months from last year.
 - f. Month over month view of total number of loyal repeating customers to see if the new free delivery service allows merchants to convert more customer into loyal repeating customers.
3. Retention
 - a. Month over month view of number of repeating customers, across all stores, who used the new delivery option repeatedly more than once.
 - b. Month over month view of number of drop customers or the single use customers, across all stores, who used the new delivery option once and then reverted back to other delivery options.
4. Financial
 - a. For the top 20 stores by GMV, a 12 months view that shows a month over month percentage growth in net sales minus delivery charges.
 - b. For the top 20 stores by GMV, a month over month view of the average revenue per user (ARPU).

9 Concerns

9.1 Tariffs

A tariff is a form of tax on imports or exports of items across the border of a certain country. It is a policy that taxes foreign products to encourage or protect domestic industry. Tariff charges must be accounted for in the calculations of shipping prices.

Most countries publish a list of the tariff charges that apply to different product categories.

Those lists can be parsed and used in the delivery platform to estimate and add corresponding custom charges. For example, Canada Boarder Services agency has an online version of 2019 custom tariffs [\[6\]](#)

9.2 Country rules and security regulations

Carriers must be allowed to check the merchandise that get shipped across the border. In future phases, investment in x-ray security scanners and other forms of detection and security equipment in delivery hubs will make the process much more efficient.

9.3 Strategic fit

Although investing in a new shipping platform might seem from the outside that it doesn't fit the core business of Shopify, investments towards a new seamless delivery platform that reduces delivery costs and allows for higher conversion rate aligns perfectly with Shopify's overall strategy to make e-commerce better for everyone and empowers merchants to get more sales and higher margins. Another example of how a secondary product can help the overall business strategy is Shopify's POS hardware systems. Although building hardware might not seem as one of Shopify's core competency, hardware POS system helps Shopify merchants tremendously by bridge the gap between physical and digital retail.

The new shipping platform will also help solidify Shopify's strategic position in the international market by enabling easier and cheaper cross border deliveries.

10 Summary

Cart abandonment is a real problem that faces our Shopify merchants. Although, online shopping is growing, the rate of abandonment of online shopping carts is much higher than the rate at which customers walk away from purchases in physical stores.

Two options have been proposed to enable Shopify to help its merchants reduce the rate of cart abandonment. The first option is to partner with one of the crowdsourced delivery startups. Partnering with existing startups would limit our ability to scale the platform and provide cross border delivery services. The recommended solution for Shopify is to start investing in its own crowdsourced delivery platform. The new platform should run through a 6-month experimentation phase before taking the decision make larger investments towards the new crowdsourced delivery system.

11 References

- [1] <https://www.statista.com/statistics/457078/category-cart-abandonment-rate-worldwide/>
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- [3] <https://www.shopify.com/toolbox/shipping/calculator>
- [4] <https://techcrunch.com/2018/04/23/deliv-now-offers-same-day-delivery-for-shopify-retailers/>
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