cart abandonment funnel analysis

February 5, 2025

1 Cart Abandonment Funnel Analysis

This analysis examines the user journey on an e-commerce website, particularly when users add products to their shopping cart but do not complete the purchase.

The goal is to identify at which stage users abandon the checkout process and understand the reasons behind their decision.

1.1 Objectives of Cart Abandonment Funnel Analysis

- 1. **Identify Drop-off Points** Determine at which stage users tend to abandon their cart.
- 2. **Analyze Reasons for Abandonment** Investigate key factors such as high shipping costs, a complicated checkout process, or the need for additional information.
- 3. **Develop Strategies to Reduce Cart Abandonment** Implement solutions like sending reminder emails, offering discounts, or simplifying the checkout process.

1.2 Expected Business Impact

Maximizing Conversions from High-Intent Customers

Users who add products to their cart demonstrate a strong purchase intent compared to casual visitors. By identifying and addressing the barriers preventing them from completing their purchase, businesses can improve conversion rates. This approach is often more cost-effective than acquiring entirely new customers.

2 Case Study: Cart Abandonment Funnel Analysis

2.1 Scenario

A company is experiencing a high cart abandonment rate. Data indicates that most users drop off during the checkout process. The company seeks to understand the reasons behind this behavior and take action to improve conversion rates.

2.2 Business Problem

A high cart abandonment rate leads to low purchase conversion. The company aims to identify the primary causes of abandonment and optimize the funnel to increase sales conversion.

Business Impact:

- 1. Revenue Loss Potential customers who abandon their carts lead to missed sales opportunities.
- 2. **Inefficient Customer Acquisition Costs** Marketing efforts to acquire customers become less effective if many users fail to complete their transactions.

2.3 Analysis Objective

- 1. Analyze user behavior at each stage of the funnel (Add to Cart → Proceed to Checkout → Complete Purchase).
- 2. Identify key reasons for abandonment based on user data.
- 3. Provide actionable recommendations to reduce cart abandonment and improve conversions.

2.4 Key Questions

- 1. What is the distribution of users across each stage of the funnel?
- 2. Which device type has the highest abandonment rate?
- 3. What are the main reasons users abandon the checkout process?
- 4. Are there behavioral differences based on the device used?

2.5 Exploration Data Analysis

```
[1]: import pandas as pd

# Load data csv
df = pd.read_csv('Cart_Abandonment_Funnel_Analysis.csv')

# Display the first 5 rows to understand the structure of the dataset
df.head()
```

```
[1]:
        User_ID Session_Date Device_Type Add_to_Cart Proceed_to_Checkout
     0
               1
                   2024-11-10
                                     Mobile
                                                      No
                                                                            No
     1
                   2024-11-27
                                   Desktop
                                                     Yes
                                                                            No
     2
               3
                   2024-11-08
                                     Tablet
                                                     Yes
                                                                            No
     3
               4
                   2024-11-28
                                    Mobile
                                                      No
                                                                            No
                   2024-11-23
                                   Desktop
                                                     Yes
                                                                            No
```

```
Complete_Purchase Drop_Reason

No No -

No High Shipping Cost
```

No High Shipping Cost

```
Stage User Count

Total Users 10000

Add to Cart 6056

Procedd to Checkout 2997

Complete Purchase 1763
```

display(funnel_distribution_df)

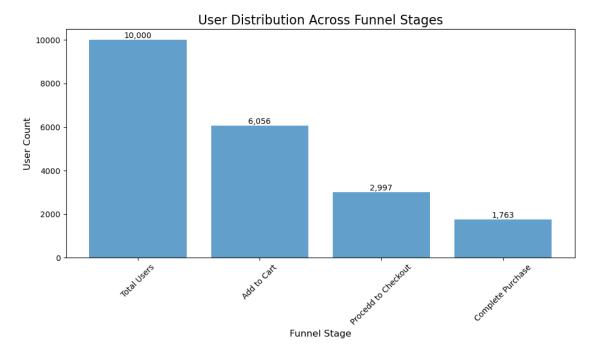
2

2.5.1 Answering the Key Questions

1. What is the distribution of users across each stage of the funnel?

```
plt.ylabel('User Count', fontsize=12)
plt.xticks(rotation=45, fontsize=10)
plt.tight_layout()

# Display the plot with annotated values
plt.show()
```



Conclusion from Funnel Analysis The data shows a significant drop-off at each stage of the purchase funnel:

- 1. Add to Cart (60.56%) Out of 10,000 total users, only 6,056 added items to their cart. This suggests that around 40% of users browse but do not proceed to add products. Possible reasons include lack of interest, unclear product information, or high product prices.
- 2. Proceed to Checkout (49.47% of Add to Cart users) Only 2,997 users moved to the checkout stage, meaning about half of those who added items to their cart abandoned their shopping journey. This could be due to unexpected additional costs (e.g., shipping fees), lack of payment options, or hesitation.
- 3. Complete Purchase (58.83% of Checkout users) Finally, 1,763 users completed their purchases. This indicates that 41.17% of users dropped off at checkout, likely due to a complicated checkout process, payment failures, or second thoughts about the purchase.

Key Insights & Potential Actions

• Reduce Cart Abandonment: Offer incentives like free shipping, discounts, or a seamless checkout experience to encourage users to move from "Add to Cart" to "Proceed to Checkout."

- Optimize Checkout Process: Simplify payment steps, provide multiple payment methods, and reduce unnecessary form fields to minimize friction.
- Retarget Abandoned Users: Implement remarketing strategies such as reminder emails, limited-time offers, or abandoned cart notifications to recover lost sales.

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2. Which device type has the highest abandonment rate?

```
[4]: # Filter data for users who dropped out (did not complete purchase)
dropped_users = df[df['Complete_Purchase'] == 'No']

# Display the filtered data
display(dropped_users)
```

User_ID	${\tt Session_Date}$	Device_Type	${\tt Add_to_Cart}$	Proceed_to_Check	out '
1	2024-11-10	Mobile	No		No
2	2024-11-27	Desktop	Yes		No
3	2024-11-08	Tablet	Yes		No
4	2024-11-28	Mobile	No		No
5	2024-11-23	Desktop	Yes		No
	•••	•••	•••	•••	
9994	2024-11-19	Mobile	No		No
9996	2024-11-20	Tablet	Yes		No
9998	2024-11-07	Desktop	No		No
9999	2024-11-29	Mobile	Yes	,	Yes
10000	2024-11-23	Tablet	No		No
	1 2 3 4 5 9994 9996 9998 9999	1 2024-11-10 2 2024-11-27 3 2024-11-08 4 2024-11-28 5 2024-11-23 9994 2024-11-19 9996 2024-11-20 9998 2024-11-07 9999 2024-11-29	1 2024-11-10 Mobile 2 2024-11-27 Desktop 3 2024-11-08 Tablet 4 2024-11-28 Mobile 5 2024-11-23 Desktop 9994 2024-11-19 Mobile 9996 2024-11-20 Tablet 9998 2024-11-07 Desktop 9999 2024-11-29 Mobile	1 2024-11-10 Mobile No 2 2024-11-27 Desktop Yes 3 2024-11-08 Tablet Yes 4 2024-11-28 Mobile No 5 2024-11-23 Desktop Yes 9994 2024-11-19 Mobile No 9996 2024-11-20 Tablet Yes 9998 2024-11-07 Desktop No 9999 2024-11-29 Mobile Yes	2 2024-11-27 Desktop Yes 3 2024-11-08 Tablet Yes 4 2024-11-28 Mobile No 5 2024-11-23 Desktop Yes 9994 2024-11-19 Mobile No 9996 2024-11-20 Tablet Yes 9998 2024-11-07 Desktop No 9999 2024-11-29 Mobile Yes

Drop_Reason	${\tt Complete_Purchase}$	
-	No	0
High Shipping Cost	No	1
High Shipping Cost	No	2
-	No	3
High Shipping Cost	No	4
	•••	•••
-	No	9993
Forced Account Creation	No	9995
-	No	9997
High Shipping Cost	No	9998
-	No	9999

[8237 rows x 7 columns]

```
[5]: # Count dropouts by device type
device_dropout_count = dropped_users['Device_Type'].value_counts()

# Calculate the dropout rate for each device type
```

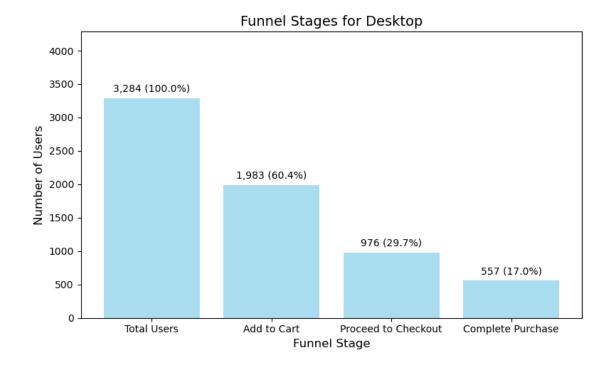
```
total_users_by_device = df['Device_Type'].value_counts()
     dropout_rate_by_device = (device_dropout_count / total_users_by_device) * 100
     # Function to calculate dropout rates at each stage for each device type
     def calculate_stage_dropout_rate(stage_column, total_column, label):
         stage_counts = df[df[stage_column] == 'No']['Device_Type'].value_counts()
         total_counts = df['Device_Type'].value_counts()
         dropout_rate = (stage_counts / total_counts) * 100
         return pd.DataFrame({
             'Device_Type': dropout_rate.index,
             f'{label} Dropout Rate (%)': dropout rate.values
         })
     # Calculate dropout rates for each stage
     add_to_cart_dropout = calculate_stage dropout_rate('Add_to_Cart',__
      ⇔'Device_Type', 'Add to Cart')
     checkout_dropout = calculate_stage_dropout_rate('Proceed_to_Checkout',__

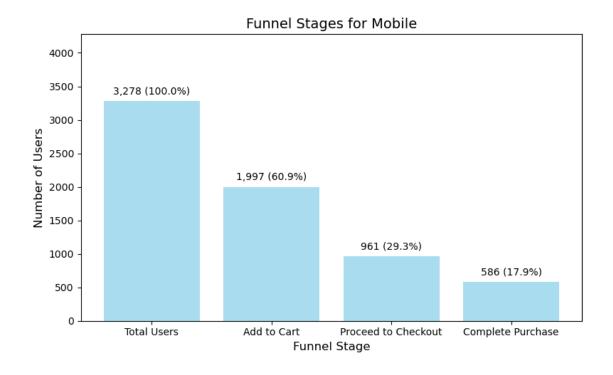
¬'Device_Type', 'Proceed to Checkout')
     purchase_dropout = calculate_stage_dropout_rate('Complete_Purchase',__
      ⇔'Device_Type', 'Complete Purchase')
     # Merge results into a single DataFrame for comparison
     dropout rates = add to cart dropout.merge(checkout dropout, on='Device Type',
                                              how='outer').merge(purchase_dropout,
                                                                on='Device Type',
                                                                how='outer').

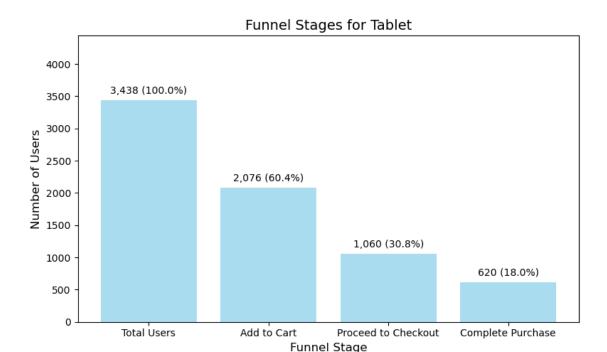
¬fillna(0).sort_values(by='Device_Type')
     display(dropout_rates)
      Device_Type Add to Cart Dropout Rate (%) \
    0
          Desktop
                                      39.616322
           Mobile
                                      39.078707
    1
    2
           Tablet
                                      39.616056
       Proceed to Checkout Dropout Rate (%) Complete Purchase Dropout Rate (%)
    0
                                  70.280146
                                                                       83.038977
                                  70.683344
    1
                                                                       82.123246
                                  69.168121
                                                                       81.966259
[6]: # Prepare data for visualization
     device_types = dropout_rates['Device_Type']
     stages = ['Add to Cart', 'Proceed to Checkout', 'Complete Purchase']
     # Get the total number of users for each device type
     total_users = df['Device_Type'].value_counts()
```

```
# Values for each device
dropout_values = dropout_rates[['Add to Cart Dropout Rate (%)',
                                'Proceed to Checkout Dropout Rate (%)',
                                'Complete Purchase Dropout Rate (%)']].values
# Calculate the total users, Add to Cart, Proceed to Checkout, and Complete L
 →Purchase for each device
funnel_by_device = {
    'Device_Type': device_types,
    'Total Users': [total_users.get(device, 0) for device in device_types],
    'Add to Cart': [df[(df['Device_Type'] == device) & (df['Add_to_Cart'] ==__
 'Proceed to Checkout': [df[(df['Device_Type'] == device) &_
 → (df['Proceed_to_Checkout'] == 'Yes')].shape[0] for device in device_types],
    'Complete Purchase': [df[(df['Device_Type'] == device) &__
 → (df['Complete Purchase'] == 'Yes')].shape[0] for device in device types]
}
# Convert to a DataFrame for visualization
funnel_by_device_df = pd.DataFrame(funnel_by_device)
# Plot bar charts with percentages next to actual values for each device
for i, device in enumerate(funnel_by_device_df['Device_Type']):
   values = funnel_by_device_df.iloc[i, 1:].values
    stages = ['Total Users', 'Add to Cart', 'Proceed to Checkout', 'Complete⊔
 →Purchase'
   total_users = values[0]
    #Calculate percentages relative to total users
   percentages = [(value / total_users) * 100 for value in values]
   plt.figure(figsize=(8, 5))
   plt.bar(stages, values, alpha=0.7, color='skyblue')
   plt.title(f'Funnel Stages for {device}', fontsize=14)
   plt.xlabel('Funnel Stage', fontsize=12)
   plt.ylabel('Number of Users', fontsize=12)
   plt.ylim(0, max(values) + 1000)
   plt.tight_layout()
    # Annotate values on bars woth percentage
   for j, (value, percentage) in enumerate(zip(values, percentages)):
       plt.text(j, value + 100, f'{value:,} ({percentage:.1f}%)', ha='center',__

    fontsize=10)
   plt.show()
```







Conclusion from Device-Type Dropout Analysis The dropout rates at each stage of the funnel are quite similar across Desktop, Mobile, and Tablet, but some key insights emerge:

1. Add to Cart Dropout (~39%)

- The percentage of users who do not proceed to checkout after adding items to the cart is nearly the same across all devices.
- This suggests that device type is **not a major factor** in influencing whether users add products but abandon them before checking out.

2. Proceed to Checkout Dropout (~69-71%)

- The highest dropout rate at this stage is on Mobile (70.68%), followed by Desktop (70.28%), and the lowest on Tablet (69.17%).
- This might indicate that mobile users face more friction during the checkout process, possibly due to small screens, slow page loads, or complex forms.

3. Complete Purchase Dropout (~81-83%)

- The highest final checkout abandonment occurs on **Desktop** (83.04%), while **Mobile** (82.12%) and **Tablet** (81.97%) perform slightly better.
- Desktop users may be more likely to compare prices across different websites or hesitate before completing the purchase.

Key Insights & Recommendations Improve the Mobile Checkout Experience – Since Mobile has the highest drop-off rate at checkout, optimizing mobile usability (faster loading, autofill forms, simplified payment options) can improve conversions.

Reduce Friction for Desktop Users – Given the highest final dropout rate on Desktop, businesses should ensure that payment options are seamless and consider offering incentives (discounts,

free shipping, urgency messages) to encourage completion.

A/B Test for Tablet Optimization – With slightly lower dropout rates, Tablet users may benefit from further UX improvements to enhance their experience.

3. What are the main reasons users abandon the checkout process?

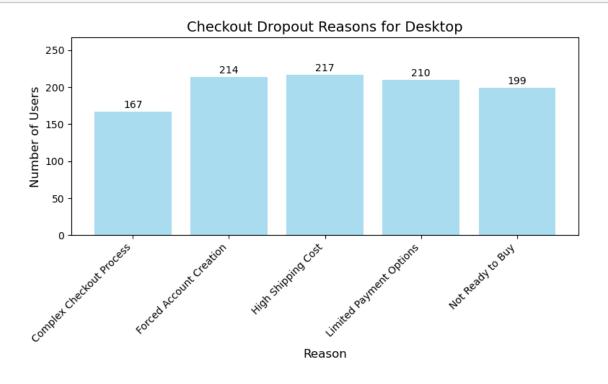
Desktop	Mobile	Tablet
167	216	208
214	195	184
217	230	201
210	215	221
199	180	202
	167 214 217 210	167 216 214 195 217 230 210 215

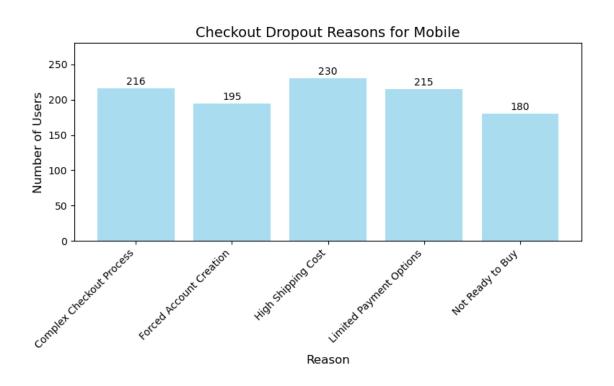
```
[8]: # Create bar charts for dropout reasons for each device
for device in checkout_reasons_by_device.columns:
    reasons = checkout_reasons_by_device.index
    values = checkout_reasons_by_device[device]

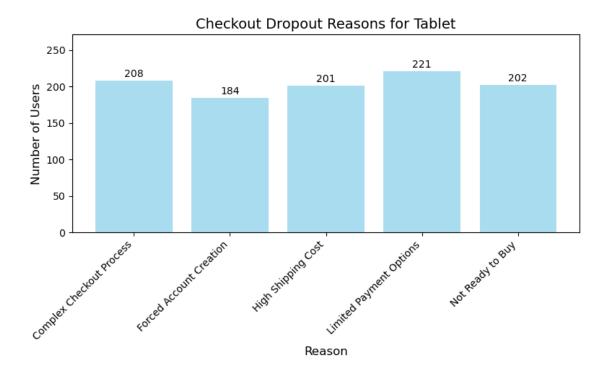
    plt.figure(figsize=(8,5))
    plt.bar(reasons, values, alpha=0.7, color='skyblue')
    plt.title(f'Checkout Dropout Reasons for {device}', fontsize=14)
    plt.xlabel('Reason', fontsize=12)
    plt.ylabel('Number of Users', fontsize=12)
    plt.ylabel('Number of Users', fontsize=12)
    plt.ticks(rotation=45, ha='right', fontsize=10)
    plt.ylim(0, max(values) + 50)
    plt.tight_layout()

# Annotate values on bars
for i, value in enumerate(values):
    plt.text(i, value + 5, f'{value:,}', ha='center', fontsize=10)
```

plt.show()







Conclusion from Dropout Reasons by Device Type The data highlights the key reasons why users abandon their purchases across different devices. Here are the main takeaways:

1. Common Dropout Reasons Across All Devices

• **High Shipping Costs** is the most common reason for abandonment across **all devices** (217 on Desktop, 230 on Mobile, 201 on Tablet).

Actionable Insight: Consider offering free shipping, reducing costs, or providing upfront shipping estimates before checkout.

• Limited Payment Options is also a significant barrier, especially for Tablet users (221 reports).

Actionable Insight: Adding more payment methods (e.g., e-wallets, BNPL, local banking options) could reduce this issue.

2. Device-Specific Insights

• Desktop Users (Highest Drop: Forced Account Creation - 214 reports)

Desktop users are more likely to abandon their purchase if they are required to create an account.

Actionable Insight: Offer guest checkout or social login options to reduce friction.

• Mobile Users (Highest Drop: High Shipping Cost - 230 reports)

Mobile users are particularly sensitive to shipping costs.

Actionable Insight: Display shipping costs earlier in the shopping journey and highlight free shipping thresholds.

• Tablet Users (Highest Drop: Limited Payment Options - 221 reports)
Tablet users abandon purchases due to fewer available payment methods.

Actionable Insight: Ensure that tablet users have access to a seamless and flexible payment experience.

Key Recommendations Offer Transparent and Competitive Shipping Rates – Reduce unexpected shipping costs to prevent dropouts.

Provide a Guest Checkout Option – Especially for Desktop users, to avoid forcing account creation.

Expand Payment Methods – Cater to Tablet and Mobile users by adding local and digital payment solutions.

- 4. Are there behavioral differences based on the device used? Yes, there are notable behavioral differences among **Desktop**, **Mobile**, and **Tablet users** in terms of cart abandonment. The data highlights key trends:
 - 1. Checkout Dropout Rates Vary by Device
 - Mobile has the highest drop-off rate at the "Proceed to Checkout" stage (70.68%), suggesting that mobile users face more challenges during checkout.
 - Desktop has the highest final abandonment rate (83.04%), meaning many desktop users hesitate at the last step before completing the purchase.
 - Tablet users abandon slightly less in both stages, indicating a more stable conversion rate.

Insight: Mobile checkout needs better optimization, while Desktop users may require more purchase incentives.

2. Key Dropout Reasons Differ by Device

High Shipping Costs Are the #1 Dropout Reason Across All Devices

- Mobile users are most affected (230 reports), followed by Desktop (217) and Tablet (201).
- This suggests that **unexpected shipping fees** cause hesitation across all platforms.

Fix: Show shipping costs earlier, offer free shipping thresholds, or provide discount incentives to reduce abandonment. Desktop Users Are Also Affected by Forced Account Creation (214 reports)

- While high shipping costs remain the top issue, many desktop users abandon due to forced account creation (214 reports).
- Desktop users likely expect a **quick and convenient** checkout and are less patient with mandatory sign-ups.

Fix: Offer guest checkout or social login options. Tablet Users Face Issues with Limited Payment Options (221 reports)

Tablet users are more likely to abandon their purchase because fewer payment methods are available.

Fix: Introduce more digital wallets, BNPL (Buy Now, Pay Later), and local banking options to accommodate different user preferences.

3. Mobile Users Need a More Streamlined Experience

- Mobile users have **higher abandonment rates across all stages**, suggesting friction in navigation, form filling, or payment options.
- Possible reasons: Slow page loads, small screen constraints, or inconvenient checkout flows.

Insight: Improve **mobile UX** by simplifying the checkout process, enabling autofill, and ensuring mobile-friendly payment gateways.

Final Takeaway: Tailored Strategies for Each Device Desktop – Reduce forced account creation & provide clear purchase incentives.

Mobile – Optimize checkout flow, reduce friction, and improve mobile payment integration.

Tablet – Expand payment methods to improve completion rates.

2.5.2 Business Implications of Cart Abandonment Funnel Analysis

Understanding behavioral differences across **Desktop**, **Mobile**, **and Tablet users** has **direct business implications**, particularly in **revenue loss**, **customer experience**, **and marketing strategy**. Here's how:

1. Revenue Loss Due to High Cart Abandonment

- High shipping costs (top dropout reason across all devices) mean potential customers leave before completing their purchase, leading to lost revenue.
- Desktop users abandoning due to forced account creation suggests that many ready-to-buy customers are deterred by unnecessary steps.
- Limited payment options for Tablet users indicates missed opportunities to convert these customers.

Business Action:

Offer free shipping thresholds or upfront shipping cost transparency.

Implement guest checkout to capture hesitant desktop users.

Expand payment methods to improve conversion rates for Tablet users.

2. Customer Experience & Retention

- Mobile users abandon at higher rates during checkout (70.68%), meaning the process may be inconvenient or frustrating.
- If checkout friction isn't addressed, users may switch to competitors with a smoother experience.
- Poor user experience leads to negative word-of-mouth and lower repeat purchases.

Business Action:

Optimize **mobile checkout UX** (autofill, fast-loading pages, simple payment options).

Reduce unnecessary steps and remove friction in form-filling.

Send cart abandonment reminders via email or push notifications to bring back users.

3. Marketing & Targeted Campaigns

- Desktop users abandoning at the final stage (83.04%) means **remarketing efforts** could nudge them toward completing their purchase.
- Since Mobile users are most affected by high shipping costs, discount or free shipping promotions should target mobile shoppers more aggressively.
- Tablet users dropping off due to **payment issues** indicates an opportunity to **personalize** ads with flexible payment options.

Business Action:

Use retargeting ads & abandoned cart emails for desktop users.

Offer mobile-exclusive promotions like free shipping.

Highlight "Buy Now, Pay Later" (BNPL) options in tablet-friendly ads.

4. Competitive Advantage

- Businesses that solve these issues faster than competitors can boost conversions without increasing customer acquisition costs.
- If competitors have an easier checkout process, potential buyers will shift to them instead.

Business Action:

Conduct A/B testing to refine checkout flows.

Benchmark against competitors' UX & payment options.

Implement exit-intent surveys to understand real-time reasons for dropouts.

Final Business Takeaway: Prioritize Fixes Based on Impact Biggest Priority: Reduce high shipping costs (biggest reason for cart abandonment).

Next Steps: Optimize mobile checkout and expand payment methods to remove friction.

Long-Term Strategy: Use retargeting, promotions, and improved UX to recapture lost conversions.

2.6 Cart Abandonment Funnel Analysis: Data-Driven Action Plan

2.6.1 1. Summary of Key Insights

Cart Abandonment Rates by Stage

Stage	User Count	Dropout Rate (%)
Total Users	10,000	-
Add to Cart	6,056	39.44%
Proceed to Checkout	2,997	50.52%
Complete Purchase	1,763	41.18%

Device-Based Dropout Rates

Device	Add to Cart	Proceed to Checkout	Complete Purchase
Type	Dropout (%)	Dropout (%)	Dropout (%)
Desktop	39.62%	70.28%	83.04%

Device	Add to Cart	Proceed to Checkout	Complete Purchase
Type	Dropout (%)	Dropout (%)	Dropout (%)
Mobile	39.08%	70.68% $69.17%$	82.12%
Tablet	39.62%		81.97%

Top Reasons for Cart Abandonment

Drop Reason	Desktop	Mobile	Tablet
High Shipping Cost	217	230	201
Forced Account Creation	214	195	184
Limited Payment Options	210	215	221
Complex Checkout Process	167	216	208
Not Ready to Buy	199	180	202

2.6.2 2. Business Implications & Revenue Impact

Revenue Loss Due to Abandonment

- The highest dropout occurs during checkout (50.52%), leading to significant revenue loss.
- Mobile users have the **highest abandonment at the checkout stage** (70.68%), indicating poor mobile experience or payment friction.
- Desktop users have the **highest final abandonment rate** (83.04%), suggesting they hesitate before completing purchases.

Customer Experience & Retention

- Shipping costs are the #1 reason for abandonment across all devices, meaning unexpected fees reduce conversion rates.
- Mobile users struggle with checkout complexity, leading to higher abandonment at payment stages.
- Forced account creation is a **big issue for desktop users**, indicating frustration with additional steps.

Marketing & Competitive Impact

- High dropout rates reduce ROI on customer acquisition costs since many users exit before completing transactions.
- Poor checkout UX can lead to negative reviews & lower repeat purchases.
- Competitors with smoother checkout experiences can attract these abandoned customers.

2.6.3 3. Data-Driven Action Plan

High Priority Fixes (Immediate Impact)

1. Reduce High Shipping Costs (Main Dropout Reason) Display shipping costs upfront to prevent last-minute surprises.

Offer free shipping for orders above a certain value.

Provide shipping discounts for returning customers.

2. Optimize Mobile Checkout UX (High Dropout at Checkout Stage) Enable autofill for shipping and payment details.

Simplify checkout flow with fewer steps.

Ensure fast-loading pages and seamless mobile navigation.

3. Expand Payment Options (Tablet Users Struggle with Limited Choices) Add more digital wallets (Apple Pay, Google Pay, PayPal, etc.).

Introduce Buy Now, Pay Later (BNPL) options.

Allow localized payment methods to cater to different markets.

Medium Priority Fixes (Strategic Improvements)

4. Remove Forced Account Creation (Desktop Users Hesitate to Sign Up) Enable guest checkout to reduce friction.

Offer social login options (Google, Facebook, Apple ID).

Clearly communicate benefits of account creation (loyalty rewards, faster checkout next time).

5. Implement Retargeting & Remarketing Strategies Send abandoned cart emails with discounts or limited-time offers.

Use retargeting ads to remind users about their abandoned carts.

Implement push notifications to re-engage users.

6. Personalize Offers Based on Device Behavior Mobile: Offer free shipping incentives.

Desktop: Highlight guest checkout & security features.

Tablet: Promote flexible payment options.

Long-Term Strategy & Continuous Optimization

7. A/B Testing & Checkout Optimization Test different checkout flows to see what reduces friction.

Experiment with various shipping discount thresholds.

Optimize payment methods based on user preferences.

8. Competitor Benchmarking & Customer Feedback Analyze competitors' checkou processes to identify best practices.
Collect user feedback via exit surveys to understand real-time issues.
Monitor analytics to track the effectiveness of changes.
2.6.4 4. Expected Business Outcomes
Increase conversion rates by reducing friction in the checkout process.
Lower cart abandonment rates, leading to higher revenue.
Enhance customer experience, leading to more repeat purchases.
Improve marketing efficiency by focusing on high-intent buyers.
Gain a competitive advantage by optimizing the purchase journey.
2.6.5 Next Steps: Implementation & Monitoring
Prioritize high-impact fixes and track changes using A/B testing.
Monitor conversion rate improvements post-implementation.
Continuously refine strategies based on data insights.

[]:[