**Checkout Flow Optimization Analysis with SQL and Tableau Project**

**Boosting Online Sales: Insights Into Cart Behavior and Checkout Errors**

**Case Description**

**Overview:** In this project, we invite you to embark on a practical, real-world case centered around optimizing an online platform’s checkout flow. The goal of the analysis is to enhance the purchase experience for users on the 365 webpage—a critical aspect of online retail that directly impacts conversion rates and customer satisfaction. You'll delve into an actual database, discover crucial insights, and acquire practical experience enhancing the website's purchase checkout system.

**Objective:** The primary goal is to analyze the 365 platform’s checkout process by devising and building from the ground up a three-page story-based dashboard, displaying key metrics, insights, and visualizationsfor 07-01-2022 to 01-31-2023. Studying the final Tableau story will help you draw conclusions and suggest potential enhancements. Based on your analysis, you must develop a strategy to improve the checkout process and enhance the user payment experience.

Note below how we categorize users based on their interaction with subscriptions and payments.

* **Successful Checkout**: A user completes a payment for a subscription without any issues.
* **Failed Checkout**: A user encounters problems while paying and cannot complete the transaction.
* **Abandoned Cart**: A user adds a subscription to their cart but leaves without finalizing the payment.

Consider the vital metrics our dashboard must address for a comprehensive checkout investigation:

* **Monthly Checkout Success Rate** measures the percentage of successful checkouts compared to monthly attempts. A high rate shows our checkout process is efficient, while a low rate suggests potential areas of improvement.
* **Monthly Cart Abandonment Rate** shows the percentage of users who added items to their cart but didn't buy. If this rate is high, issues like complicated checkout processes or pricing concerns might stop customers from buying.
* **Most Common Checkout Errors and Device Correlations** must be identified during checkout to see if specific devices are more prone to these issues. This helps target tech improvements and suggests ways to boost our checkout success rate.

**Project requirements**

For this Checkout Flow Optimization Analysis with SQL and Tableau project, you’ll work with Tableau Public 2022.1 or newer and optionally MySQL Workbench 8.0.

**Retrieving Checkout Steps Information with SQL**

In this part, your assignment involves sourcing the data files that will later be imported into the Tableau workbook. You'll perform this task using MySQL, where your first step is to import the database from the **365\_checkout\_database.sql** file. Subsequently, you’ll implement the necessary queries and obtain the information for creating the dashboard graphs.

Use the tables checkout\_actionsand checkout\_carts from the **365\_checkout\_database** to retrieve a result set covering the entire period and containing the following fields:

* action\_date: the day on which the checkout activity took place
* count\_total\_carts: the count of shopping carts created each day during the specified timeframe
* count\_total\_checkout\_attempts: the count of purchase attempts each day
* count\_successful\_checkout\_attempts: the count of successful purchases each day

Creating such a result set is crucial because it provides a consolidated view of daily checkout activities over the specified period. By analyzing this data, we can better understand user behavior patterns, identify potential issues in the checkout process, and pinpoint areas for optimization to enhance the overall user experience.

To build the result set, we advise you to utilize common table expressions (CTEs) for capturing the various stages of a subscription attempt. You’ll use the WITH clause to create such common table expressions that can later be easily referenced with the help of a SELECT statement.

Save the result set as a CSV file and call it checkout\_steps.csv.

In the first three steps of the instructions, we’ll create the following CTEs:

* One that keeps all carts created
* One that stores all checkout attempts
* And one that keeps only the successful attempts.

Follow the outlined steps and substitute the question marks with the correct values and expressions when necessary.

       1. Let’s start by building the CTE that keeps all created carts. First, initialize the WITH clause and then, select all fields from the checkout\_carts table.

Note the following skeleton of this query:

???

total\_carts\_created as

(

SELECT

\*

FROM

checkout\_carts

),

        2. Now, using the table you've just set up, pull the data on all users who have created a purchase cart and have also attempted to finalize a purchase. Examine the appropriate action\_name in the relevant table to sift through and collect the required data into a new temporary result.

Note the following skeleton of this query:

total\_checkout\_attempts as

(

SELECT

tc.user\_id,

a.action\_name,

a.action\_date

FROM

??? as tc

LEFT JOIN

??? as a on a.user\_id = tc.user\_id

WHERE

a.action\_name like '%???%'

AND

a.action\_date BETWEEN '2022-07-01' AND '2023-01-31'

),

        3. Next, construct a temporary result set that captures only the successful checkout attempts. Pull the necessary data from the previous CTE, focusing on events that resulted in success.

Note the following skeleton of this query:

total\_successful\_attempts as

(

SELECT

a.user\_id,

a.action\_name,

a.action\_date

FROM

total\_checkout\_attempts as a

WHERE

???

GROUP BY a.user\_id

),

       4. With the relevant CTEs in place, it's time to implement a method to count the specific records we're targeting. We'll use additional CTEs to capture the necessary count. Begin by counting the total number of carts from the CTE containing all purchased carts daily.

Note the following skeleton of this query:

count\_total\_carts as

(

SELECT

action\_date,

???(\*) as count\_total\_carts

FROM

???

GROUP BY action\_date

),

       5. Construct a query that counts the total daily checkout attempts following the same approach.

Note the following skeleton of this query:

count\_total\_checkout\_attempts as

(

SELECT

action\_date,

???(\*) as count\_total\_checkout\_attempts

FROM

???

GROUP BY action\_date

),

       6. Now, construct a query to count only the successful daily attempts.

Note the following skeleton of this query:

count\_successful\_checkout\_attempts as

(

SELECT

action\_date,

???(\*) as count\_successful\_checkout\_attempts

FROM

???

GROUP BY action\_date

)

       7. Finally, select the pertinent data from the last three CTEs and pull out the desired columns for your checkout\_steps result set. Use the IFNULL function to substitute the null values with a value. Order the record by action\_date to obtain the information chronologically.

Note the following skeleton of this query:

SELECT

c.action\_date,

???,

IFNULL(???, 0) as count\_total\_checkout\_attempts,

IFNULL(???, 0) as count\_successful\_checkout\_attempts

FROM

count\_total\_carts c

LEFT JOIN

count\_total\_checkout\_attempts a on a.action\_date = c.action\_date

LEFT JOIN

count\_successful\_checkout\_attempts s on s.action\_date = a.action\_date

WHERE

c.action\_date BETWEEN '2022-07-01' AND '2023-01-31'

ORDER BY c.action\_date

       8. After executing the final query, save the result set as a CSV file called checkout\_steps.csv.

**Interpreting the Results**

Now that you’ve successfully created your Tableau dashboard, you’re ready to gain valuable insights from it and propose areas of improvement. Based on the findings gathered from the Tableau dashboard, provide a comprehensive **analysis report** including the **current state of affairs**, **business objective**, your chosen **hypothesis**, and suggested **actionable insights**. Justify your selections based on data interpretations and potential impacts on the overall user experience.

Begin by examining the story pages and identifying trends.

* Are there months that underperform or outperform others significantly?
* Can you discern a correlation between the error messages received and the devices on which they occurred?
* What suggestions can you make to enhance the overall checkout process?

**Current State of Affairs**

Examine each story page sequentially to outline the checkout flow’s current state. Identify the months with the highest checkout success rates, those with the highest cart abandonment rates, the predominant error message, and noticeable patterns related to device usage.

**Business Objective**

The business goal concerning the checkout flow centers on refining and optimizing the process for a better user experience. From a business standpoint, this increases sales, boosting profits.

**Hypothesis**

The findings gathered from the dashboard allow for multiple hypotheses addressing the visible challenges in the platform's checkout flow. Our focus should be on identifying the most prominent issue tied to the checkout errors and seeking a straightforward remedy. Consider a simple solution, especially given the prevalence of the most common error message on mobile devices compared to desktops.

**Actionable Insights**

Given the findings we've gathered, we can now propose various actionable strategies to address users’ challenges with their debit and credit card issues. These may differ based on the specific improvement areas we focus on. Consider suggestions grounded in your formulated hypothesis, but also delve into alternative solutions that address payment challenges identified from your observations.

When seeking actionable solutions to improve the checkout process, consider the following guiding insights and pose pertinent questions in four specific domains:

1. **Webpage Interface Enhancements**

* How easy is it for users to navigate the checkout page?
* Is the process intuitive and straightforward, or does it require unnecessary steps?
* Are the payment information input fields large enough?
* How does the checkout interface adapt to different device sizes and screen orientations?

1. **Demographics**

* Are there elements of the checkout process that might not be as effective for specific demographic groups?
* Are all parts of the checkout process translated appropriately for users from different regions?

1. **Payment Alternatives**

* Does the checkout process offer multiple payment methods to cater to a broader range of users?
* Are there emerging payment methods in certain parts of the world that still need to be integrated?

1. **Real-time card validation**

* Which error types occur most frequently?
* Would the process improve if users were alerted to issues with their bank cards while entering the necessary details?

**Part 9:** Interpreting the Results

**Current State of Affairs**

The Tableau dashboard reveals critical findings related to the checkout flow of the platform:

* September 2022 witnessed the lowest checkout success rate.
* October 2022 had the highest cart abandonment rate.
* The most frequent error encountered during checkout was the "number field is required."
* While 68% of users attempted to checkout via desktop and 32% via mobile, the most common error message was displayed 502 times for desktop users and escalated to 718 times for mobile users.

Analyzing recent metrics from our checkout process has surfaced vital areas of concern that require immediate attention to optimize sales and improve user experience.

September 2022's dip in the checkout success rate is a clear red flag, hinting at potential underlying issues during that month. The spike in cart abandonment in October 2022 further supports this—suggesting that customers might encounter hurdles in the checkout process that dissuade them from finalizing their purchase.

Of particular concern is the recurring Number Field is Required error. Not only is it the most frequently reported issue, but its higher occurrence on mobile devices—despite a smaller percentage of mobile users compared to desktop—indicates a significant discrepancy in the user experience across platforms. Mobile users seem to face a disproportionately high rate of challenges, which might discourage them from continuing their purchases.

Considering these findings, addressing the Number Field is Required error—with an intensified focus on the mobile user experience—is imperative. Equally important is a thorough review of the checkout process, especially for September and October 2022, to identify and rectify the root causes of these spikes in cart abandonment and low success rates.

**Business Objective**

After analyzing our platform's metrics and user feedback, we identified that the checkout process had potential pain points. We noticed users abandoning their shopping carts or needing help completing their purchases. Such patterns suggest lost immediate sales and the risk of diminishing customer loyalty in the long run.

Focusing on the checkout flow would be strategic and impactful. A smooth and intuitive checkout process is often the final nudge a potential customer needs to convert their interest into a purchase. By refining this process, we aim to address any friction points that might be causing users to abandon their carts or hesitate in finalizing their purchases.

Our primary business objective is to refine and streamline the checkout flow, aiming for a substantial increase in the success rate and a marked reduction in cart abandonment. Achieving this will signify a more efficient and user-friendly checkout process, enhancing user experience and profitability.

This objective is about more than just increasing sales in the short term. It's also building a foundation for long-term customer trust and satisfaction. By enhancing the checkout process, we're investing in the overall user experience, ensuring that customers find our platform reliable, easy to use, and customer-centric. This, in turn, will not only drive immediate profitability but also foster longer-term customer loyalty.

**Hypothesis**

While analyzing our checkout flow data, we recognized a glaring discrepancy. Mobile users reported the Number Field is Required error more frequently than desktop users—even though the number of mobile users attempting to checkout was significantly less.

This raises a crucial question about the user-friendliness of our mobile interface, especially concerning the card number input. Therefore, we can suspect that the layout or design of the card number input field might not be as intuitive or visible on smaller mobile screens as it is on desktops. Mobile users—especially those new to our platform or in environments with glare or interruptions—might inadvertently miss or misunderstand this input field. Based on this, we can formulate the following hypothesis:

The card number input might be challenging to spot on mobile displays, leading users to overlook it. By enhancing the visibility of this field—such as increasing its size or changing its design—we anticipate a boost in checkout success rates, which could result in a significant rise in completed transactions and, consequently, an increase in the company's revenue.

**Actionable Insights**

Several critical aspects of improvement are possible concerning these specified areas.

1. **Webpage Interface Enhancements**

A webpage interface is pivotal in guiding user interaction—influencing their decisions, and ensuring a smooth, frictionless experience. When users encounter obstacles or confusion during their interaction—especially during critical processes like checkout—the likelihood of abandoning the task rises significantly.

The design intricacies of the checkout screen can be a decisive factor in the user's journey, determining whether they complete the purchase or leave midway. Certain critical elements, like input fields for card details, can appear constrained or be overshadowed by other components on smaller devices or screens. This can lead to users needing to enter the necessary information, leading to errors or transaction failures.

Enhancing the size and overall design of the checkout screen might assist users in entering their card details more efficiently, thereby simplifying and improving the checkout process.

1. **Demographics**

The error message, Your Card was Declined, is roughly three times more prevalent on desktops than mobile devices. Most desktop users might belong to a demographic that has a higher likelihood of using cards that get declined, such as corporate cards or cards from specific banks or regions. Analyzing the user demographics or card types most used on desktops vs. mobiles will provide more precise guidance or support for these particular user segments. For example, users from certain areas might have restrictions on the number of transfers they’re allowed to issue in a single transaction. If so, we could devise a solution to offer users a payment plan in several installments to stay within the transaction limits in these countries.

1. **Payment Alternatives**

Offering alternative payment methods could reduce the abandonment rate due to card issues.  
Some customers might face card declines or prefer a different payment method for security or convenience. Introduce options like digital wallets, bank transfers, or buy-now-pay-later services.

Imagine a situation where users are about to purchase your online product, but their preferred credit card gets declined because of a temporary bank error. By introducing alternative payment methods—such as digital wallets or buy-now-pay-later options—you allow these users to spread out their payments or utilize a different payment avenue. This mitigates the risk of transaction decline due to credit card limits and caters to the user's convenience and financial comfort—potentially increasing successful checkouts.

1. **Real-Time Card Validation**

Real-time validation of card details can catch errors before the checkout process advances to the decline stage.

Implement real-time validation on desktop platforms to give immediate feedback if a card number, expiry date, or CVV is incorrectly entered.

For example, imagine a user trying to purchase a product late at night—possibly in a hurry or while being distracted. They might inadvertently mistype the card number or expiry date. Without real-time validation, they would proceed through the checkout process to face a declined transaction. This could lead to frustration, and in some cases, the user might abandon the purchase altogether. By implementing real-time validation, the system can immediately alert the user about the mistake, allowing them to correct it on the spot and continue their purchase smoothly. This enhances user experience and reduces the chances of cart abandonment due to such trivial errors.

**Quiz**

**Question 1:**

In the context of our project on checkout flow optimization, understanding monthly performance is crucial to pinpointing areas of improvement and potential anomalies. Leveraging the story you've constructed, which month—over the entire analysis period—stands out as the most successful in terms of checkout attempts?

July 2022August 2022November 2022January 2022

**Question 2:**

Working on such an analysis, it’s essential to identify the peaks and trenches in our monthly performance. By delving into the story you've assembled, can you determine which month—throughout the entire analysis duration—witnessed the lowest number of checkout attempts, and what was that exact figure?

August 2022, 128 attemptsSeptember 2022, 112 attemptsOctober 2022, 98 attemptsJanuary 2023, 96 attempts

**Question 3:**

As we aim to refine the checkout flow and understand user behavior, pinpointing our peak moments can provide significant insights. From your constructed story, can you discern which of the listed months registered the highest count of purchase carts?

August 2022October 2022December 2022January 2023

**Question 4:**

Identifying cart abandonment patterns is crucial to effectively strategizing improvements in our checkout flow. Based on the narrative presented in your story, can you identify the two months that witnessed the most significant cart abandonment rates?

August 2022 and October 2022August 2022 and November 2023July 2022 and December 2022October 2022 and January 2023

**Question 5:**

Understanding device-related error trends is crucial to finding and rectifying user issues during checkout. Can you determine the error message that most frequently appeared on desktop devices during September 2022?

The number field is requiredYear field is requiredYour card was declinedYour card has insufficient funds

**Question 6:**

To ensure the accuracy of our actions moving forward, we must verify our insights against the data presented in the story. Referring to the narrative in your story, can you identify which of the following findings aligns with the information from the analysis?

The checkout success rate in September 2022 is approximately 40%.The cart abandonment rate in September 2022 is lower than in December 2022.The error message, Your Card Has Insufficient Funds, is the third most common overall.Your Card was Declined is the third most common error received on the desktop.

**Question 7:**

Opportunity sizing refers to estimating the potential value or impact of a particular opportunity or solution. In the context of business strategy and decision-making, it helps quantify the potential benefit of an initiative, giving a clearer picture of the stakes at hand.

For our Checkout Flow Optimization project, let's delve into opportunity sizing:

* In January, the checkout success rate was 34% out of 360 attempts.
* Each successful purchase generates approximately $30 in revenue.
* We aim to improve the checkout success rate to 40% in February.

For this exercise, assume that the number of checkout attempts in February will remain consistent with January (360 attempts). Given this assumption, calculate the opportunity size. Compared to January's earnings, how much additional revenue could the company earn in February if we achieve the targeted 40% checkout success rate?

$547$760$567$648

**Retrieving Checkout Errors Information with SQL**

Use the tables checkout\_actionsand checkout\_carts from the **365\_checkout\_database** to retrieve a new result set called checkout\_errors containing the following fields:

* user\_id – the identification number of the student attempting to checkout
* action\_date – the date of the checkout attempt
* action\_name – the text detailing the specific action performed by the user
* error\_message – the text with the received error (if any)
* device – the type of the used device (desktop or mobile)

Generating this result set is essential because it offers a comprehensive overview of checkout errors encountered by users during the defined time frame. Through its analysis, we can identify common issues students face during checkout—enabling us to make informed decisions on potential enhancements or changes to the platform.

This insight is valuable in optimizing the checkout experience and minimizing obstacles, which can directly contribute to increased user satisfaction and revenue.

Follow the steps outlined below.

Ensure to substitute the question marks with the correct values and expressions.

1. Select the pertinent columns from the checkout\_actions table that offer details about the error received post-action and the device utilized during the process. You can filter exclusively for events that resulted in errors or retrieve all actions and remove the irrelevant ones later in Tableau. Our primary interest lies in the error messages and the devices used.

Note the following skeleton of this query:

SELECT

user\_id, action\_date, action\_name, ???, ???

FROM

???

WHERE action\_date BETWEEN '2022-07-01' and '2023-01-31' and action\_name like '%checkout%'

GROUP BY user\_id

ORDER BY action\_date

1. After executing the query, save the result set as a CSV file called checkout\_errors.csv.