

Integration and Testing

1. Integration: Importing Data into Excel and Ensuring Consistency

Step 1: Export Data from Database

- **Run SQL Queries:** Use the SQL queries from Part 3 to extract the relevant data (e.g., land ownership, economic data, resource access, and survey data).
- **Export Data:** After running each query, export the result as a `.csv` or `.xlsx` file. This can typically be done via database tools like MySQL Workbench, phpMyAdmin, or SQL Server Management Studio by selecting the query results and choosing the export option.

Step 2: Import Data into Excel

- Open Excel
- Go to Data > Get Data > From Text/CSV or From Workbook (depending on the file format you exported).
- Import each file into separate sheets within a new Excel workbook.
- For direct database connection, use Data > Get Data > From Database > From SQL Server Database or From MySQL Database if you prefer a live connection to your database.

Step 3: Clean and Prepare Data

- **Consistency Check:** Ensure that each sheet contains well-structured, consistent data:
- **Column Names:** Verify that column names are descriptive and consistent across datasets.
- **Data Types:** Ensure that data types match (e.g., dates are formatted as date fields, numerical values like land size and income are formatted correctly).
- **Remove Duplicates:** Use Excel's Data > Remove Duplicates feature to clean up any redundant data entries.
- **Handling Missing Data:** Identify and handle any missing or null values. You can either remove them or replace them with appropriate defaults (e.g., `0` for numerical fields).

Step 4: Merge Data (If Required)

- **VLOOKUP/INDEXMATCH:** If needed, merge datasets using VLOOKUP or INDEXMATCH functions based on common fields like `Community_ID`. For instance, you may want to join land ownership and economic data for easier analysis.

Step 5: Refresh Data

- **Refresh Mechanism:** If you've connected Excel directly to the database, set up a refresh schedule under Data > Refresh All to pull in updated data periodically.
- **Manual Updates:** If working with static `.csv` files, be prepared to reimport data whenever updates are made.

Step 6: Validate Data Consistency

- **Ensure that totals in Excel match the totals in your SQL query results:**
- **Summarize Key Fields:** Compare total land ownership, total population size, and other aggregated figures between Excel and the database.
- **Cross-Check by Community:** Ensure that community-specific data in Excel is consistent with the original database queries.

2. Testing the Excel Dashboard

Once your data is integrated and consistent, perform testing to ensure that the dashboard functions as expected.

Step 1: Test Pivot Tables

- **Verify Pivot Table Accuracy:**
- **Ensure that pivot tables display the correct values based on your imported data.** Check calculations like sum of land owned, average income, and employment rates for accuracy.
- **Test filtering and grouping functionality within pivot tables** to ensure they dynamically update when filters are applied (e.g., filtering by community, race, or year).

Step 2: Test Chart Functionality

- Test Interactivity:
- Check that charts update correctly based on slicers or filters. For example, when filtering by Year, verify that line charts for economic data adjust accordingly.
- Test different chart types to confirm that they reflect the data accurately (e.g., bar charts, pie charts, and line charts).

Step 3: Validate Slicer Functionality

- Slicer Testing:
- Ensure that all slicers (e.g., for Year, Community, Race) correctly filter the dashboard. Test multiple slicer combinations to confirm that pivot tables and charts update dynamically.
- Test slicers across multiple sheets to verify global slicer functionality.

Step 4: Perform KPI Validation

- If you have added KPI indicators for total land owned, average income, poverty rates, etc., ensure that they correctly summarize data:
- Use manual calculations to check KPI values against raw data.
- Verify that KPIs update dynamically when slicers are applied.

Step 5: Handle Edge Cases

- Test with Missing Data:
- Check how the dashboard responds to missing or incomplete data. Ensure that charts and tables handle null values gracefully (e.g., showing "N/A" instead of errors).