**City of Toronto Operating Budget: Category and Sub-Category Date Analysis:**

\*Variable Nomenclature

\_exp: stands for all values related to expense.

\_rev: stands for all values related to revenue.

\*Analysing data for 5 years (2014-2023)

\*All the values here in analysis codes are in Millions (10^6) CAD

\*Some special functions used:

* lambda: Used lambda in function, to take a value and if numeric, then return the value divided by 1 million rounded to two decimal places, else return original value as string.
* globals() :multiple time usage, here in code because we are dealing with variables with similar structures but for different time periods.
* corr() : used in seaborn heatmap to draw a co-relation matrix between different categories

**Expense Analysis:**

1. Expenses are majorly divided into eight main categories:

Category with highest budget in last 5 year: “Salaries and Benefits”

(with contribution % share each year: 2019: 44%, 2020: 45%, 2021: 44%, 2022: 46%, 2023: 45%)

Category with lowest budget in last 5 year: “Equipment”

(with contribution % share each year: 2019: 0.46%, 2020: 0.46%, 2021: 0.44%, 2022: 0.49%, 2023: 0.49%)

1. Total budget year wise: there is an increase in trend with two bumps: in year 2021 and 2023.

Following is the total expense in millions along with % change each year.

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1. Analysis of Time series data of expense amount over the years for different categories

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Major Interpretation:

* Salary and benefits: Increasing over the years.
* Service And Rent: Increasing over the years.
* Contribution To Reserves/Reserve Funds: Significantly decreasing after 2021.

The sharp decline after 2021 may reflect a strategic financial decision in response to the uncertainties brought about by the pandemic. Organizations might have redirected funds or altered financial plans to address immediate challenges or to adapt to the changing economic landscape during the pandemic.

1. Seaborn Heatmaps:

* Relation of Expense Amount Across Years with Different Categories
  + Positive relation over the years: Salary and Benefits, Equipment, Services and Rent. As the years progress, there is a positive correlation, indicating an increase in expense amounts for these categories. The heatmap visually demonstrates that the values tend to rise over time.
  + Contribution To Reserves/Reserve Funds: A noticeable drop is observed in the Contribution to Reserves/Reserve Funds category, especially highlighted by the shades becoming darker in the heatmap for the year 2021. This suggests a significant decrease in the allocated funds for reserves during that specific year, possibly reflecting adjustments made in response to specific financial considerations or external factors.

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* Co-relation Analysis of Budget Categories

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* As very clearly presented Contribution to Reserve/Reserve Funds, has a negative co-relation with almost all other categories, when the expense amounts in the Contribution to Reserve/Reserve Funds category increase, the expenses in all, other categories tend to decrease, and vice versa.

1. Salary Trend and regression for a decade (a glimpse of one most important contributor in operating expense)

Round R-squared value is 0.97: suggest a very strong model fit with

Linear Regression: 189.24x + -376107.61, suggesting a very strong explanation power.

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1. Analysing Subcategories:

* Salaries and Benefits emerge as the foremost contributor to expenses. Notably, within Salaries and Benefits, the Permanent Salary subcategory stands out as the highest expense.
* A subcategory labeled "Gapping" exhibits a negative value in the summary. The negative value signals the presence of unaccounted expenses. These unidentified costs are likely incorporated as an adjustment to rectify the total operating budget. This underscores the necessity for a more in-depth study to categorize and understand these expenses, as they do not align with any specific category.

**Revenue Analysis:**

1. Revenue is majorly divided into nine main categories:

Category with highest budget in last 5 year: “Sundry and Other Revenues”

(with contribution % share each year: 2019: 54%, 2020: 56%, 2021: 54%, 2022: 53%, 2023: 51%)

Category with lowest budget in last 5 year: “Licences & Permits Revenue” and “Transfers from Capital.”

(With contribution % share each year:

Licences & Permits Revenue: 2019: 1%, 2020: 1%,

Transfers From Capital :2021: 1.3%, 2022: 1.3%, 2023: 1.4%)

\*\*Since year 2021,2022,2023 has Lic and Permit value: not present

1. Total revenue year wise: there is a continuous increase in trend.

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1. Analysis of Time series data of revenue amount over the years for different categories

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* Sundry and Other Revenues: there is an increase in trend over years.
* Provincial Subsidies: there are two significant fluctuations in year 2021 and 2022.
* User Fees and Donation: there is a drop in 2020.
* Federal Subsidies: there is significant increase in year 2023.

1. Seaborn Heatmaps:

* Relation of Revenue Amount Across Years with Different Categories
  + Positive relation over the years: Sundry and Other Revenues, Federal Subsidies. As the years progress, there is a positive correlation, indicating an increase in revenue amounts for these categories. The heatmap visually demonstrates that the values tend to rise over time.
  + Provincial Subsidies: it is one of the major contributors of revenue in year 2021 and 2022.
* A chart with numbers and text

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* Co-relation Analysis of Budget Categories
* A screen shot of a graph

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* As very clearly represented in heatmap- darker the blue shade, more is negative co-relation with the budget categories. More the red shades, higher is positive co-relation.
* Example- Provincial subsidies has negative co-relation with Transfer from Capital meaning if one increase and other will decrease.

1. Analysing Subcategories:

* Maximum Revenue generating subcategory: “Donations” (from Category User Fees and Donations.
* Minimum Revenue generating subcategory: “Taxation” (from Category Other Revenues)

1. Gapping: Unaccountable budget, this can be counted as data limitation as there is one sub-category:” Gapping” which looks like the unaccountable budget here compensated here, with no future details: below is final breakdown for gapping budget.

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**Total Gain or Loss for Five year**:

Year 2022 and 2023 is profitable comparison to previous below data.

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