

Project brief

To develop a tool that allows continuous monitoring and flagging out of non-compliances to the SGX Procurement Policy, specifically:

1. PO raised after service commencement date
2. Invoice payment in excess of approved PO amount
3. Contracts which are more than \$5k but broken into smaller value contracts

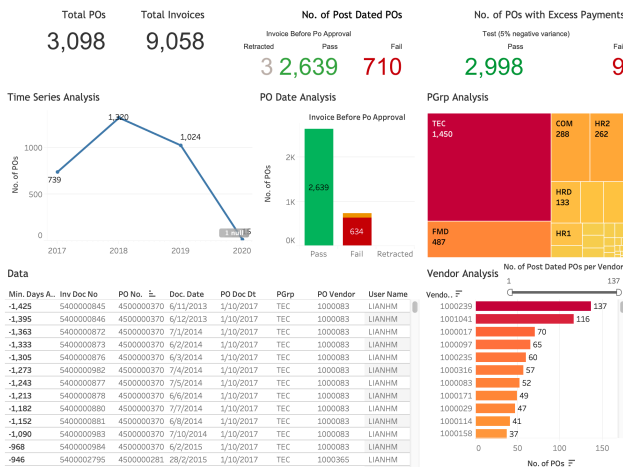
Data Cleaning & Manipulation

A python script would be created to automate the entire compliance monitoring process for SGX. The objective was to allow SGX to simply open the python code and run it without any other action needed. This will eliminate the need for majority of the manual work currently done by SGX and make the entire process more efficient and effective. The python script would automatically generate the output in the form of excel spreadsheets, listing flagged out POs or EPVs that have broken any of the rules set in place within the code itself. From the output, SGX would be able to conduct further investigation for confirmation of non-compliance. Additionally, it was also decided that the output from python would also be visualised using Tableau. This would make presentation of the output much easier to understand while also enabling the discovery of additional insights.

Dashboard 1

PO Raised or Approved After Service Commencement

Date as of: 25/3/2020 10:17:29 PM
Review from 30/9/2017 to 20/1/2020

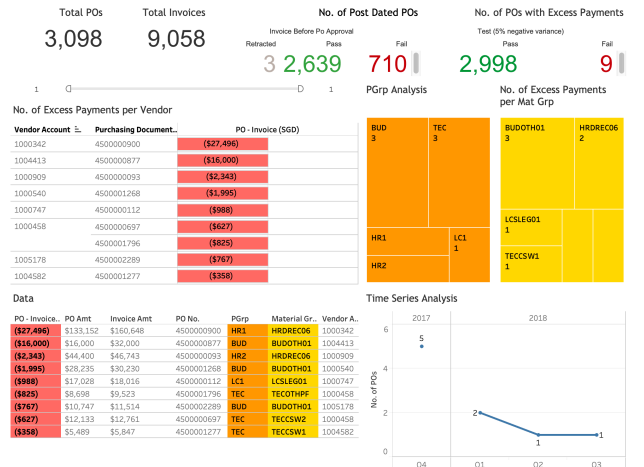


710 out of the total 3098 POs consisted of POs which were invoiced before PO approval and raising, whereas 9 had payment amounts in excess of the approved amount. This can be drilled down by clicking on the number 710 or 9. The treemap of PGrp Analysis displays the different purchasing group that these non-compliant POs were from, where the size and the colour corresponds to the count of POs. The vendor analysis helps SGX to identify potential red flags when there are vendors with at an unexpected high number of post-dated POs

Dashboard 2

Invoice In Excess of PO

Date as of: 25/3/2020 10:17:29 PM
Review from 30/9/2017 to 20/1/2020



The largest discrepancy in amount is highlighted in red and sorted to alert the reviewer if the amount of excess payment is exceptionally huge. The yellow and orange tree maps sorts the top purchasing groups and material groups that were invoiced above the 5% limit from the PO. This allows SGX to narrow down specific purchasing or material group procurements that are consistently making excess payment instead of complying to the policy, and to take more precaution when these groups are making future purchases.

Dashboard 3

Overall Analysis of EPVs Scoped in For Compliance Review

Date as of: 27/3/2020 9:45:48 PM
Review from 20/4/2017 to 26/3/2019



The Time Series Analysis shows the number of EPVs (blue bar graph) against the total EPV amount (orange line graph) as they should be positively correlated. Next, the allowable range of deviation from the Benford's Law was set at +/- 20%. If the blue bar graph lies outside of the green distribution band, the EPVs' first digit defies the Benford's Law. Both visualizations act as a filter for each other and for the Data table, to provide a complete breakdown of the EPV.

Dashboard 4

Sequential & Date check

Total EPVs 5,655

Date as of: 26/3/2020 3:13:42 PM
Review from 20/4/2017 to 26/3/2019



This dashboard could potentially catch contracts more than \$5,000 but broken into smaller value to bypass the PO controls. Rule 2 identifies high sequential counts of EPVs made in proportion to the total sequential EPVs per Vendor, which would appear on the top right corner of the scatter plot. Rule 3 and 3B identifies the total count of EPVs per vendor on a day or within 30 consecutive days respectively, detecting any patterns in repeated purchases to the same vendor.