Improving Education in Punjab

The report analyzes school data from various locations across Punjab, Pakistan, with a focus on improving the education landscape. The primary goal is to determine how a 3 billion USD fund can be optimally allocated to address key constraints in education.

Data Analysis and Recommendations

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# Introduction:

The dataset provided offers a comprehensive overview of school data from various locations across Punjab, Pakistan. This dataset is a valuable resource that provides insights into the performance and characteristics of schools in the region. By analyzing this dataset, we can gain a better understanding of the educational landscape in Punjab and identify areas that require improvement.

This analysis is conducted on behalf of an international ed-tech company that is committed to investing 3 billion dollars in Punjab, Pakistan. The company's vision is to leverage technology to bridge educational gaps, ensure equal opportunities for all students, and enhance the infrastructure and facilities in schools. This report serves as a roadmap for achieving these objectives effectively.

A fund of 3 million US dollars has been allocated to support educational initiatives that will significantly contribute to improving the educational system in Punjab. The company expects that the funds will be allocated judiciously, ensuring that every dollar is utilized optimally to make a meaningful impact.

The primary focus of this report is to analyze the dataset on schools in Punjab, conduct a marketing feasibility analysis, and provide data-driven recommendations on how the allocated funds can best be utilized to enhance the quality of education in the region. The proposed initiatives aim to address key constraints and challenges faced by schools, teachers, and students in Punjab.

The analysis will explore various aspects of the education system, including enrollment, teacher distribution, school infrastructure, gender demographics, and more. The insights gained from this analysis will guide the allocation of funds to specific initiatives and provide a foundation for data-driven marketing strategies.

# Literature Review:

Below figure shows the map of Punjab along with the districts:



* Understanding of educational landscape
* Problems in education
* Needs of improvement

# Data Description:

The dataset used for this analysis contains comprehensive information on schools in Punjab, including School ID, School Name, Location, Enrollment, Teachers, School Up gradation Years, School Gender, Gender Studying, School Level, School Head Information, School status, School medium, Year of establishment, Infrastructure and more.

# Data Cleaning and Manipulation:

Prior to analysis, the dataset underwent cleaning and manipulation processes. This included addressing missing values (null values are replaced by blanks) and standardizing data formats to ensure data accuracy. There are no duplicate values available in the dataset. Few of the columns are made hidden for the visual readability purpose. The clean dataset serves as the foundation for analysis.

# Dataset Analysis:

The analysis covers various aspects of Punjab's education landscape, including enrollment, teacher distribution, school infrastructure, gender demographics, and more. These analyses uncover key trends and insights that inform the subsequent recommendations. Few of the analysis are mentioned below. However, a dynamic dashboard has been made along with the report to have detailed insights in visualization format.

**Geographic & Demographics:**

* The data includes information of 418,191 schools from 36 districts of Punjab. Total 11,961,473 students are enrolled in these schools. The distribution has been shown in the below table.

|  |  |  |  |
| --- | --- | --- | --- |
| S. No. | Districts | Total Students Enrolled | No. of Schools |
| 1 | FAISALABAD | 885829 | 2208 |
| 2 | LAHORE | 647421 | 1138 |
| 3 | RAHIMYAR KHAN | 566920 | 2774 |
| 4 | SARGODHA | 478529 | 1925 |
| 5 | GUJRANWALA | 436511 | 1554 |
| 6 | KHANEWAL | 431175 | 1242 |
| 7 | SIALKOT | 417285 | 1797 |
| 8 | BAHAWALNAGAR | 415787 | 2142 |
| 9 | KASUR | 410437 | 1358 |
| 10 | OKARA | 388308 | 1404 |
| 11 | RAWALPINDI | 381495 | 1806 |
| 12 | MULTAN | 376324 | 1313 |
| 13 | T.T.SINGH | 351500 | 1181 |
| 14 | MUZAFFARGARH | 350780 | 1756 |
| 15 | JHANG | 350610 | 1479 |
| 16 | VEHARI | 350384 | 1424 |
| 17 | GUJRAT | 344067 | 1398 |
| 18 | SAHIWAL | 338271 | 1158 |
| 19 | D.G. KHAN | 327994 | 1602 |
| 20 | SHEIKHUPURA | 322152 | 1160 |
| 21 | BAHAWALPUR | 320431 | 1659 |
| 22 | LAYYAH | 278910 | 1515 |
| 23 | NAROWAL | 251481 | 1096 |
| 24 | PAKPATTAN | 247671 | 858 |
| 25 | ATTOCK | 237180 | 1204 |
| 26 | BHAKKAR | 231570 | 1262 |
| 27 | MANDI BAHA UD DIN | 219397 | 778 |
| 28 | MIANWALI | 216307 | 1232 |
| 29 | CHINIOT | 187969 | 697 |
| 30 | NANKANA SAHIB | 187068 | 748 |
| 31 | CHAKWAL | 186378 | 1139 |
| 32 | RAJANPUR | 180317 | 951 |
| 33 | JHELUM | 165545 | 791 |
| 34 | LODHRAN | 165530 | 755 |
| 35 | KHUSHAB | 160306 | 953 |
| 36 | HAFIZABAD | 153634 | 734 |
|  | **Grand Total** | **11961473** | **48191** |

* 88% schools are located in rural areas whereas 12% are from urban areas
* Below chart shows distribution of schools according to the medium.
* Below chart shows distribution of schools according to the school levels and school gender. It can be seen that availability of higher level schools are quite low.
* The enrollment of male and female students is almost equal at different level of schools. However, less number of students at higher level of schools is because of unavailability of those school levels.
* RahimYarKhan has highest number of enrollments in primary schools whereas Faisalabad has highest number of enrollments in both secondary and higher secondary schools.
* In total there are 52% female schools and 48% male schools.
* The distribution of teachers positions is shown in the below charts
* Below pie chart show the percentage of vacant and filled teaching and non-teaching posts. There are 0.33% vacant positions for teachers and 51% for non-teaching staff.

|  |  |
| --- | --- |
|  |  |

* These are the top 5 districts:
  + With the highest number of teachers – Faisalabad, RahimYarKhan, Rawalpindi, Lahore and Sargodha
  + With the highest number of teachers - Faisalabad, Rawalpindi, Sargodha, Lahore and Bhawalnagar
* This bar chart shows distribution of teachers across different schools.
* Below table shows school ownership across different schools. It can be seen that most of the schools are owned by Education Department. However, there are many schools which are located in buildings provided by local residents especially in rural areas. While most of the schools in urban areas are located in Municipal Buildings.

|  |  |  |
| --- | --- | --- |
| School\_ownership | Rural | Urban |
| Building Provided By Local Residents | 900 | 129 |
| Education Department | 40846 | 4825 |
| Municipal Building | 45 | 492 |
| On Rent | 44 | 140 |
| Property Of Any Other Institution Besides The Municipal Institution | 65 | 67 |
| Running In The Mosque | 79 | 49 |
| School Council provided building | 79 | 5 |
| Some Other Govt. School | 114 | 35 |

**Infrastructure:**

* 99.68% schools has the facility of toilets, 99.52% has facility of drinking water, 98.44% has facility of electricity and 97.32% schools has boundary walls.
* Below chart shows the distribution of schools based on the building condition.
* Below chart shows the distribution of schools based on the security condition.
* Below are the names of the 5 districts with the lowest availability of drinking water facilities in schools.

|  |  |
| --- | --- |
| District | Count of Schools with Unavailability of Drinking Water |
| D.G. KHAN | 70 |
| RAWALPINDI | 28 |
| RAJANPUR | 22 |
| BAHAWALNAGAR | 20 |
| MIANWALI | 16 |

* Below are the names of the 5 districts with the lowest availability of toilets in schools.

|  |  |
| --- | --- |
| District | Count of Schools with Unavailability of toilets |
| BAHAWALNAGAR | 44 |
| RAHIMYAR KHAN | 17 |
| D.G. KHAN | 17 |
| RAJANPUR | 16 |
| MUZAFFARGARH | 8 |

* Below are the names of the 5 districts with the lowest availability of electricity in schools.

|  |  |
| --- | --- |
| District | Count of Schools with Unavailability of Electricity |
| RAHIMYAR KHAN | 115 |
| BAHAWALPUR | 85 |
| BAHAWALNAGAR | 80 |
| MUZAFFARGARH | 63 |
| D.G. KHAN | 48 |

* Below are names of the 5 districts with the lowest presence of boundary walls in schools.

|  |  |
| --- | --- |
| District | Count of Schools with Unavailability of boundary walls |
| BAHAWALNAGAR | 184 |
| RAWALPINDI | 176 |
| JHANG | 123 |
| T.T.SINGH | 99 |
| SAHIWAL | 97 |

# Justification for Fund Allocation:

Each proposed objective for fund allocation is justified based on the data analysis. These objectives aim to address critical constraints within Punjab's education system, ensuring that the allocated funds are utilized effectively.

# Data-Driven Marketing Strategies:

To promote the proposed initiatives effectively, data-driven marketing strategies are recommended. These strategies are tailored to reach key stakeholders and raise awareness about the educational programs and projects.

# Budget Plan:

A detailed budget plan is provided, illustrating how the 3 billion USD fund is optimally allocated across the five key objectives. This allocation ensures that resources are utilized efficiently and transparently.

# Recommendations:

Based on the analysis, the following recommendations are proposed:

* Allocate 10 Million Rs for school-level upgradation, with a focus on modernizing infrastructure and facilities.
* Invest 5 Million Rs in infrastructure improvements, prioritizing the construction of toilets, boundary walls, classrooms, and building maintenance.
* Allocate 2 Million Rs to enhance facilities, including the provision of clean drinking water, the development of playgrounds, and well-equipped labs.
* Invest 20 Million Rs in establishing new middle and high schools in rural areas, ensuring separate facilities for both genders.
* Allocate 10 Million Rs to establish new primary-level schools to accommodate growing student populations.

# Conclusion:

This report serves as a comprehensive guide to improve education in Punjab, Pakistan. By implementing the recommendations, the ed-tech company can make a substantial and positive impact on educational outcomes in the region. Leveraging data-driven insights and effective marketing strategies is crucial for the success of these initiatives.

# References:

<https://schoolportal.punjab.gov.pk/sed_census/>