

Take-home Assignment

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Section 1

Question 1

Quantify how the 2018 HDB Resale Portal launch impacted property agents' business using transaction data

Question 2

Develop a predictive model for COE prices across all vehicle categories and recommend optimal quota adjustment strategies to help stabilize COE prices in Singapore.



Question 1

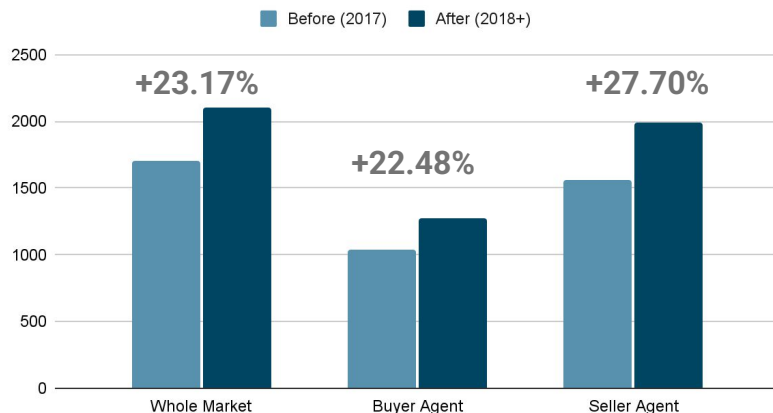
Singapore's Digital HDB Portal Unexpectedly Boosted Property Agents

- The launch of the portal particularly promoted agent transactions, especially for seller agents.
- The portal's market share impact has not been uniform—some areas showed positive outcomes, while others experienced negative effects.
- There was no significant impact observed on flat types transactions or on price changes.

The HDB Portal created a win-win outcome: higher transaction volumes and increased agent market share, with seller agents seeing the strongest gains.

Complex estates like Marine Parade (+17.2%) and emerging areas like Punggol (+11%) increased agent usage, while **premium Central Area (-7.4%)** decreased. The portal **redistributed rather than eliminated** agents, creating specialized markets based on property complexity and buyer sophistication.

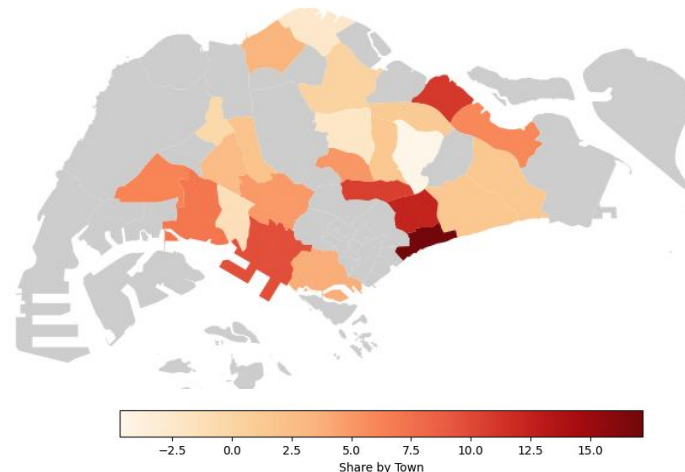
Average Monthly Transactions Before vs After



Seller Agent Market Share Change: +6.6%

Buyer Agent Market Share Change: +2.7%

Town-level Data Share in Singapore



Data Source:

- CEA Sales persons Property Transaction Records
- Resale flat prices based on registration date from Jan-2017 onwards

Further Investigation

Include more data evidence

Deeper Analysis

- **Causation vs correlation:** Is the portal directly responsible, or are there other factors?
- **Market dynamics:** What drove the geographic variations?
- **Business implications:** What does this mean for agents' revenue/strategy?

Why the HDB Portal Boosted Agent Usage?

- **Complexity revealed:** Portal transparency showed buyers/sellers how complex HDB transactions really are, driving demand for professional help
- **Market expansion:** 23-27% more total transactions created significantly more opportunities for agents to capture
- **Digital-human partnership:** Consumers used portal for research, then hired agents for expert verification, negotiation, and sophisticated pricing strategies



Question 2 Conclusion

- Strategy
 - Categories B and E are the most sensitive to market changes.
 - Category C is the most stable, followed by Category A.
- Takeaways
 - Demand-supply ratio is a strong signal for price trends
 - Historical premiums and quotas are top influencing factors.
- Implementation Suggestion
 - Ensure regular model updates with up-to-date market data to anticipate price changes and respond proactively.

Data Source

- COE Bidding Result (2020-2025)
- Motor Vehicle Quota (skip)
- Births and Fertility Rates (2010-2024)

Methodology

- Use XGBoost to build a regression model that predicts COE prices across different categories.
- 38 Features including:
 - Lagging features
 - Relative features
 - Birth Rate
 - Premium Volatility

Model Performance

	MAE	MAPE
Category A	\$5,304	6%
Category B	\$18,004	16%
Category C	\$5,106	7%
Category D	\$1,112	11%
Category E	\$18,187	15%

Top Identified features across categories:

- a. Quota
- b. Percentage Change of Premium
- c. Last Month Premium
- d. Bids Received

Key Notes:

- Quota is the most influential feature across all categories, followed by the premium.
- The demand-to-supply ratio is another key factor driving price changes.
- Although the categories share strong similarities, each still has distinct driving factors.

Quota Adjustment Recommendations

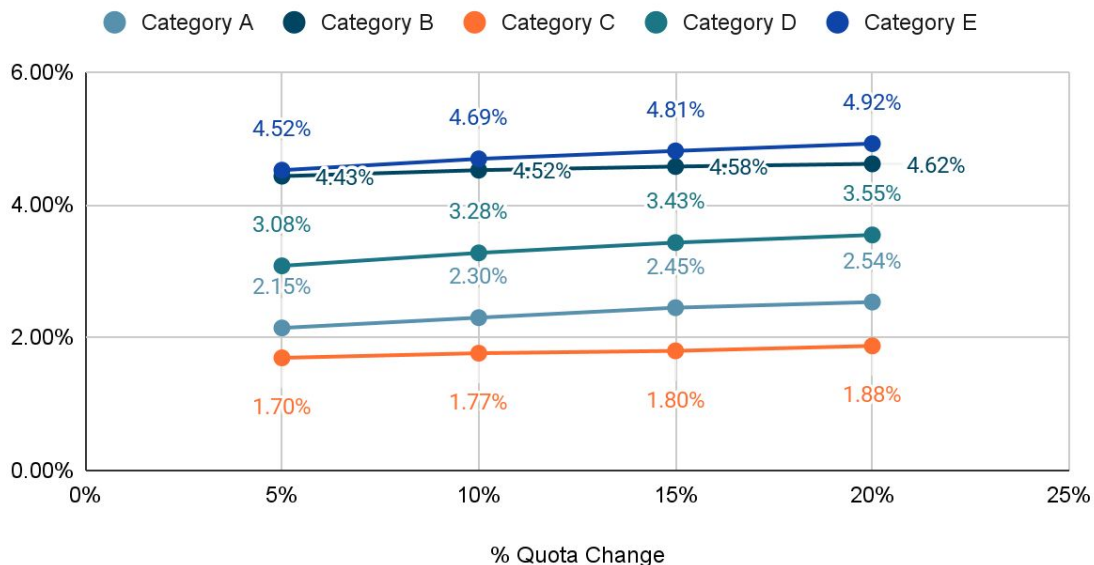
Optimal Strategy: 10% quota adjustments emerge as the sweet spot, delivering meaningful impact across all categories without excessive market disruption.

Strategic Recommendations:

- **Category C:** Larger adjustments ($\pm 15\text{-}20\%$) due to inherent stability
- **Categories B & E:** Smaller changes ($\pm 5\text{-}10\%$) to prevent price shocks
- **Categories A & D:** Moderate adjustments ($\pm 10\text{-}15\%$) for optimal balance

Price Stabilization Analysis:

% Premium Change



Key Findings:

Category C demonstrates exceptional stability with minimal price volatility (1.70%-1.88%) across all quota scenarios, making it highly predictable for policy interventions. **Categories B and E show highest sensitivity** (4.43%-4.62% premium changes), requiring cautious management, while **Categories A and D exhibit moderate responsiveness** (2.15%-3.55%), providing balanced control.

Potential Enhancement

- **Create a dashboard** showing the recommended quota adjustment rules
- **Improve model performance**, consider including additional factors that may impact the market, such as government policy changes and citizen expenditures.
- **Address stakeholder concerns** - how do these changes affect consumers, dealers, government revenue?

Section 2

Develop a 5-year subzone-level forecasting model for preschool childcare demand (18 months to 6 years) in Singapore, along with a prototype tool that ECDA can use for ongoing capacity planning and location prioritization decisions

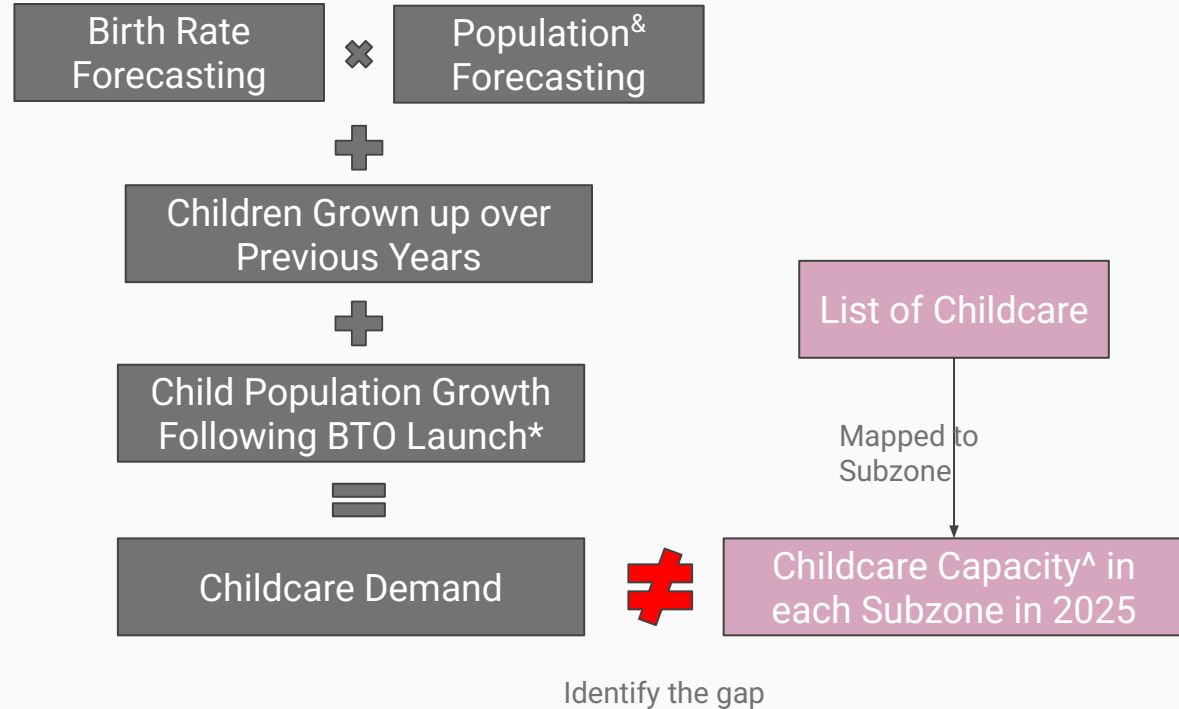
Data Source

- Birth & Fertility Rate (2010-2024)
- List of Childcare Centres (Jan-Jul 2025)
- BTO Planning (2018-2029)
- Resident Population (2010-2020)

Methodology

- Child Population Estimation
- Childcare Center Capacity Analysis
- Compare Demand and Supply to Identify the Gap Over the Next 5 Years

For each **Age Group, SubZone**



*Assume BTO launch can boost the Children number by 2%

^Assume one childcare center can take 100 children

&Females can give birth between the ages of 15 and 49

REPORT

Analyzed 310 Subzone

1. Severe deterioration ahead

Only 12.90% of subzones will meet childcare demand by 2030, down from 46.45% in 2025 - a two-thirds decline.

2. Steepest drop in early years

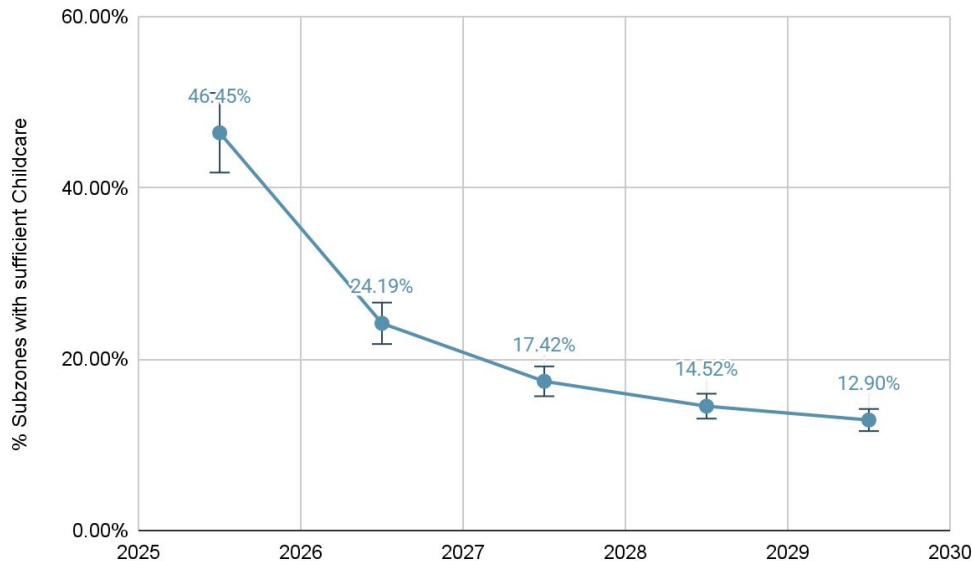
The sharpest decline occurs 2025-2027, then gradually slows, indicating the crisis will hit hardest initially.

3. Critical shortage by 2030

Nearly 90% of subzones will face childcare shortages, requiring urgent policy intervention.

Childcare Crisis: 90% of Subzones Will Face Shortages by 2030

%Assume there is no increase of childcare capacity

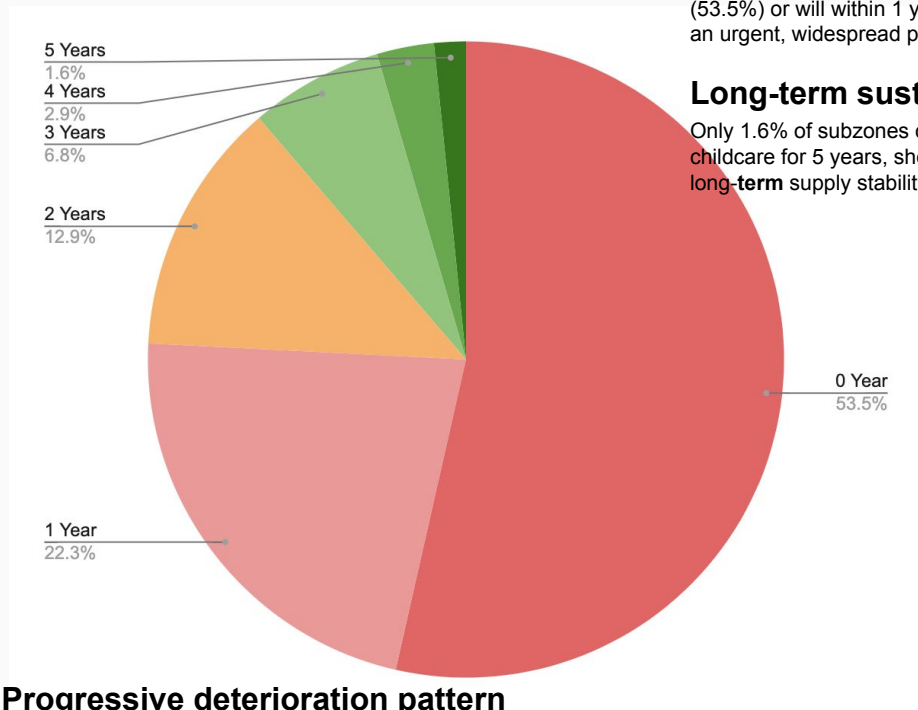


REPORT

1. Only 11% of Subzones can meet childcare demand for at least the next three years, while the majority of Subzones face a shortage of childcare facilities.

2. Most central & developed areas have sufficient childcare supply—for example, **Clarke Quay, Bukit Merah, Toa Payoh West, and Katong**—while emerging areas and suburban neighborhoods such as **Tampines, Serangoon, Woodlands, Yishun, and Sengkang** require additional support.

Childcare Shortage Timeline: Only 1.6% of Subzones Sustainable for 5 Years



Immediate crisis dominates

75.8% of subzones already face shortages (53.5%) or will within 1 year (22.3%), indicating an urgent, widespread problem.

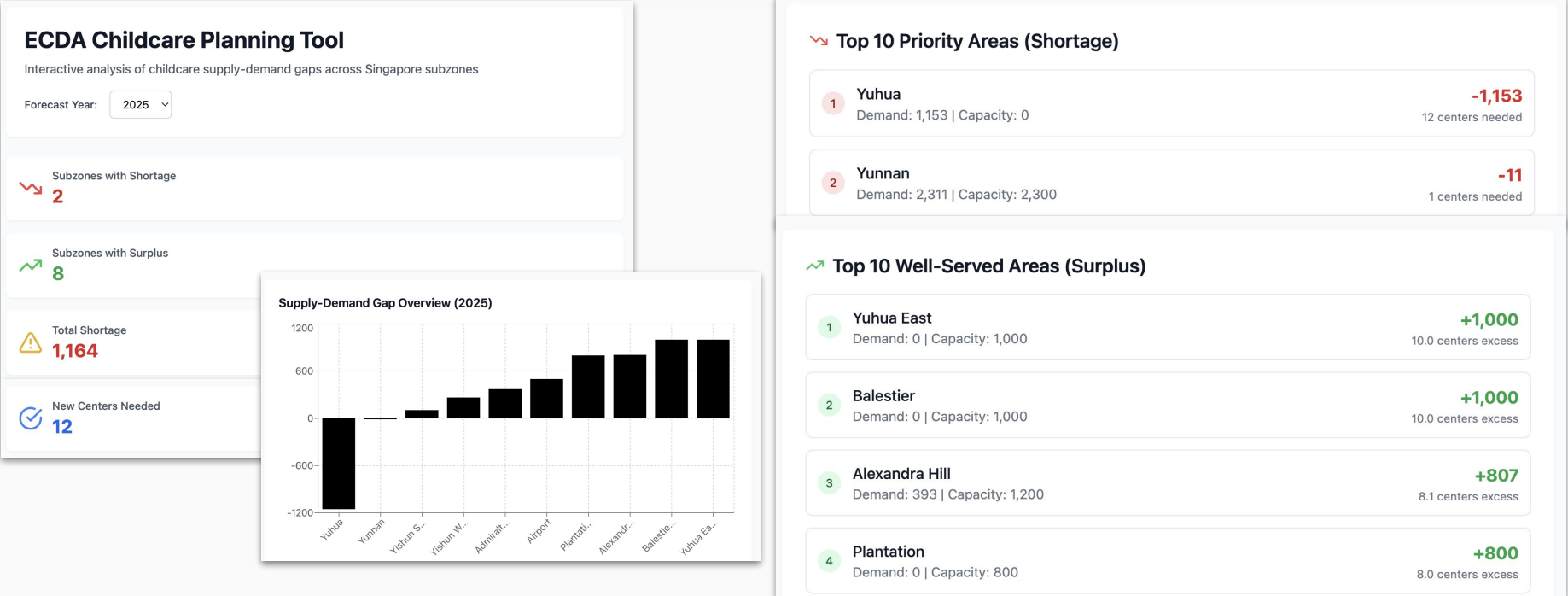
Long-term sustainability is rare

Only 1.6% of subzones can maintain adequate childcare for 5 years, showing extremely limited long-term supply stability.

Progressive deterioration pattern

Shortages spread gradually over time, requiring phased policy interventions to address supply gaps at different intervals.

Preschool Childcare Demand Monitor Board (mockups)



Further Improvement

1. **Forecast the changes of childcare capacity** by analyzing market growth trends and other relevant factors.
2. **Incorporate additional variables** to improve the accuracy of population forecasts, such as socioeconomic factors, migration patterns, and birth rate fluctuations.
3. **Consider detailed segmentation of childcare types and pricing structures** to better understand demand variations and affordability issues.
4. **Develop and wrap the forecasting code into a web application** that connects live to the database, enabling real-time updates on supply-demand gaps and supporting timely decision-making.



Thank you