

MATH60603A

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1 Overview of database

The database contains 1,000,000 customers with 51.6% of female. The average age is 46 years, ranging from 16 to 90, and the average income is 78,440\$. Regarding education, 64.8% of customers hold a university degree, 32.3% have completed high school, and 2.9% have only elementary schooling. Geographically, customers are distributed across cities (28%), suburban areas (29%), rural locations (25%), and downtown neighborhoods (17.7%). On average, customers have maintained subscriptions for 94.8 months, with an average of 1.4 ads plans and 1.7 choice plans.

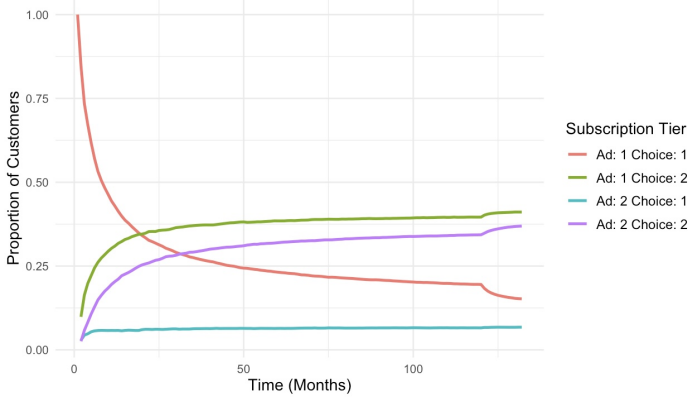


Figure 1: Subscription behavior over time

To better understand the musical preferences of our users, we analyzed their listening habits and identified two main groups : “Refined Passion” and “Modern Simplicity”. These groups were created by analyzing patterns in the data to uncover common themes. “Refined Passion” reflects preferences for sophistication and intensity, suggesting customers value high-quality, elegant, and emotionally engaging experiences. In contrast, “Modern Simplicity” captures an inclination toward mellow, unpretentious, and contemporary attributes, emphasizing a preference for accessible and modern simplicity. These factors provide valuable insights into customer preferences, helping tailor strategies effectively.

2 Cluster on profit per customers and subscription time

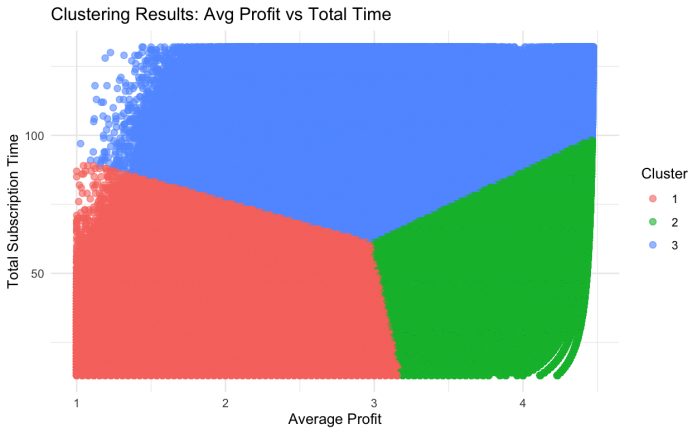


Figure 2: average profit cluster

History data reveals that the “Ads and No Free Choice” tier (1/1) begins with a significant proportion of customers but experiences a steady decline over time, as users either switch to other tiers or churn. In contrast, the “Ads but Free Choice” (1/2) and “Free Choice/No Ads” (2/2) tiers show a consistent increase in adoption, reflecting growing customer preference and retention for these flexible options.

Meanwhile, the “No Ads but Randomly Selected Music” tier (2/1) maintains a stable yet relatively low proportion of users, indicating limited appeal in this offering. These insights underscore the importance of emphasizing flexibility and ad-free experiences to align with customer preferences and enhance retention.

Cluster 1, characterized by low profit and short to moderate subscription time, should be targeted with upselling campaigns offering mid-tier plans or free trials for premium features. Additionally, engagement can be increased by highlighting underutilized benefits and optimizing ad monetization for free-tier users. **Cluster 2**, representing high profit but short subscription time, requires a retention-focused approach. **Cluster 3**, which includes loyal, high-value customers with moderate to high profit and long subscription time, should be retained with loyalty programs and exclusive benefits.

Cluster	Avg Profit	Total Time	Avg Age	Woman (%)	Income Mean
1	2.245116	37.29547	46.28215	51.62	79329.02
2	3.869307	46.45848	46.52556	51.68	76978.84
3	2.924213	96.44605	46.31740	51.64	78632.27

City	Most Common Education	Avg Mellow	Avg Unpretentious	Avg Sophisticated	Avg Intense	Avg Contemporary
City	University / College	27.27689	26.17176	18.31609	18.68361	22.88310
Rural	University / College	14.84164	25.10492	17.92213	19.87418	19.59097
Suburban	University / College	24.51405	26.18547	18.87969	19.22610	21.77253

Table 1: Cluster on profit and time Summary Table

Cluster 1 includes urban customers with the shortest subscription time (37.3 months) and the lowest average profit (2.25\$), but they have the highest average income (79,329\$) and show strong engagement with “Mellow” and “Unpretentious” music preferences.

Cluster 2 represents rural customers who generate the highest average profit (3.87\$) but have moderate subscription time (46.4 months). This group favors “Unpretentious” and “Intense” music, suggesting practical yet emotionally engaging tastes. We should maintain profitability and encourage longer subscription times.

Cluster 3 consists of suburban customers who exhibit the longest subscription time (96.4 months) and moderate profit (2.92\$). These loyal and consistent users prefer “Mellow” and “Unpretentious” music. Retention efforts for this cluster should be made.

3 Action 1

For Cluster 1, we should prioritize **upselling campaigns** by highlighting premium features like personalized playlists and ad-free listening, leveraging their high disposable income and urban preferences. For Cluster 2, implement **retention strategies** such as family plans, discounted annual subscriptions, and practical benefits to capitalize on their high profitability and emotionally engaging music preferences. For Cluster 3, **strengthen loyalty** through rewards programs, exclusive benefits, personalized discount and early access to premium content. Additionally, provide personalized playlists featuring “Mellow” and “Unpretentious” music to align with their preferences, ensuring continued satisfaction and engagement to maintain their long-term commitment, enhance satisfaction and deepen their loyalty.

4 cluster on promotion: engagement behavior

To evaluate the effectiveness of customer retention promotions, we focused on 2,980 customers who received offers: 1,017 for the “No Ads” promotion and 1,963 for the “Choice Free” promotion. After excluding customers already subscribed to the respective upgraded plans, the pool of eligible customers decreased to 1,136, with 603 qualifying for the “No Ads” offer and 533 for the “Choice Free” offer. Eligibility was determined by analyzing customer subscription data at month 120, ensuring that only those who could potentially benefit from the promotion were included.

Note: The promotion ran for three months, from week 121 to week 123, thus the maximum observed upgrade duration being nine months (week 124 to week 132).

4.1 Identifying Loyal Customers: No Adds Promotion Effectiveness:

Cluster	Education	City	Upgrade Duration	Customers	Age	Salary
1	University / College	City	0.58	209	45.83	79,878.47
2	University / College	City	8.70	256	48.98	77,844.14
3	University / College	Suburban	4.43	138	48.39	77,368.84

Female Percentage	Refined Passion	Modern Simplicity	Pre-Campaign Profit	Post-Campaign Profit
55.02%	22.58	26.07	2.392722	2.536151
49.22%	15.32	22.29	2.187529	3.454861
48.55%	17.70	23.44	2.387132	2.826087

Table 2: Cluster on Upgrade to no adds duration : Summary including sociodemographic information, music preferences and Pre-Campaign and Post-Campaign Profits.

4.1.1 Decription of the clusters

Sophistication-Driven Campaigns for “The Refined Enthusiasts” :

Cluster 1, characterized by the shortest **adds upgrade duration** (0.58 months), a slightly higher proportion of women (55%), but the highest Modern Simplicity (26.07 hours) and Refined Passion (22.58) listening hours. It represents customers with a preference for sophisticated, exclusive experiences. Marketing strategies should center on personalized content that emphasizes elegance and refinement. For instance, a “Curated Sophistication” playlist featuring classical, jazz, or mellow contemporary music could resonate strongly. Promotions that emphasize the benefits of ad-free listening would attract this audience’s preference for quality and modern features. This approach could help build loyalty and encourage more subscriptions.

Value-Oriented Campaigns for “The Practical Optimizers” :

Cluster 2, with the longest adds upgrade duration (8.69 months) and the highest pre/post campaign profit increase, represents a significant portion of the customer base. These users listen to less music overall compared to Cluster 1 and 3, as shown by their moderate Modern Simplicity (22.29) and lower Refined Passion (15.32) listening hours, yet they still demonstrate a higher upgrade duration, indicating a preference for simple and practical experiences. Although their average salary is slightly lower than Cluster 1, this group demonstrates consistent engagement with the platform. Marketing strategy should **emphasizing uninterrupted listening and convenience**.

Balanced Engagement Strategies for “The Suburban Seekers” :

Cluster 3, with an average upgrade duration of 4.43 months, strikes a middle ground between Clusters 1 and 2 in terms of engagement. With a slightly higher average salary than Cluster 2 and a suburban lifestyles. Marketing efforts should emphasize balanced, relatable experiences. For instance, curated playlists tailored to suburban settings, such as “Weekend Getaways” or “Suburban Serenity,” could resonate.

4.2 Action 2

Cluster 2, identified as the “Practical and Loyal Listeners,” should be the **primary focus for a no-ads promotion**. The high average upgrade duration (8.7 months), indicates a strong likelihood to continue with the no-ads plan after the promotion ends and the highest increase in profit post campaign. Comprising a slightly higher proportion of **men**, an **older** average age compared to Cluster 1 and overall **spend less hours listening to music, these customers prioritize uninterrupted listening and should be targeted**. Their preferences for a mix of refined passion and modern simplicity suggest they value ad-free experiences for productivity and leisure.

4.3 Identifying Loyal Customers: Free Choice Promotion Effectiveness:

Cluster	Avg Upgrade Duration	Total Customers	Avg Age	Avg Salary	Female Percentage
1	1.42	83	45.30	98,408.43	54.22%
2	5.51	118	45.09	69,377.97	55.08%
3	8.90	332	44.56	78,617.17	49.10%

Education	City	Avg Refined Passion	Avg Modern Simplicity	Pre-Campaign Profit	Post-Campaign Profit
University / College	City	15.24	24.14	1.999836	1.525435
University / College	Suburban	18.80	27.48	1.964551	2.566384
University / College	City	16.61	24.49	1.852293	3.399598

Table 3: Cluster on Upgrade to free choice duration : Summary including sociodemographic information, music preferences and Pre-Campaign and Post-Campaign Profits.

4.3.1 Description of the Clusters Based on Free Choice

Premium-Focused Campaigns for “The High-Earners” :

Cluster 1, characterized by the shortest upgrade duration to the choice plan (1.42 months) but the highest average salary (98,408\$) and a slightly higher proportion of women (54.22%), represents a niche group with significant purchasing power. The campaign had a negative impact on the profit for this group. These customers are highly educated (majority university/college) and predominantly urban, with the lowest listening time in Refined Passion (15.24) and Modern Simplicity (24.14).

Value-Centric Strategies for “The Suburban Optimizers” :

Cluster 2, with an upgrade duration to the choice plan of 5.51 months, represents a key group with a higher presence in suburban areas. This cluster has the lowest average salary (69,378\$) but exhibits the highest proportion of women (55%) and stronger engagement with listening time with Refined Passion (18.80) and Modern Simplicity (27.48). Marketing should focus on affordability and reliability, offering tailored playlists like “Suburban Serenity” that match their lifestyle to appeal free choice.

Balanced Campaigns for “The Urban Listeners” :

Cluster 3, with the longest upgrade duration (8.90 months), the largest customer base (332 customers), the highest pre/post campaign change in profit, and the lowest proportion of women (49.10%) represents consistent, loyal users. This cluster includes urban-dwelling, educated individuals with average salaries (78,617\$), moderate Refined Passion (16.61), and balanced Modern Simplicity (24.49) mean listening hours.

4.4 Action 3

For a free-choice promotion, Cluster 3 (“Urban Listeners”) should be the primary focus due to their longest upgrade duration, consistent engagement with the plan and highest increase in profit post campaign. Marketing should emphasize the benefits of uninterrupted listening and value-driven options, such as bundled subscriptions or multi-year discounts, to sustain their loyalty. Cluster 2 (“Suburban Optimizers”) could be a secondary target, with campaigns highlighting affordability and practical benefits to enhance their retention and loyalty. **It may be strategic to deprioritize high-salary groups (Cluster 1) and women-dominated segments for free-choice promotions as the post campaign profit is lower than the the pre-campaign profit.**