

Marketing Individual Capstone Project

Question 1:

Action Alternatives:

1. What game should Athena pursue?

- a. Athena should acquire **Warrior Guild** – A multiplayer battle arena game
- b. Athena should acquire **Seraph Guardians** – An immersive single player RPG with extensive strategy and puzzle elements.
- c. Athena should acquire **Evercrest** – A single player or multiplayer game
- d. Athena should not acquire any of these games and maybe focus on a new title or no game at all.

2. How should the game be priced?

- a. Athena can price the game at a premium price.
- b. Athena can price the game according to the competitors in the market who have similar titles.
- c. Athena can price the game lower than its competitors in the market who have similar titles.
- d. Athena can make the game free to play on PC.

3. How should Athena position this game?

- a. Athena can position the game according to their strength in the market which also aligns with their brand which is premium role-playing games (RPGs) for PC play.
- b. Athena can position the game according to specific characteristics of the game that cater to specific players personas, like hardcore gamers, casual players and etc.
- c. Athena can position the game based on player motivations like Action, Social, Achievement and etc.

Action Standards

1. What game should Athena pursue?

- a. The game that Athena pursues should be profitable after royalty, developer cost, game cost and valve cost.
- b. The game should have the most demand in the market and aligns with the trends in the future.
- c. Athena should pursue the game that aligns with their current brand positioning and image.

2. How should the game be priced?

- a. The game should be priced in a way that it generates the most profit for us.
- b. The game should be priced in a way that grabs the most market share.
- c. The game should be priced in a way that generates the most sales.
- d. The game should be priced in a way that maintains profitability in the long term as well.

3. How should Athena position this game?

- a. Athena should position this game according to specific features of the game that attract specific players.
- b. Athena should position this game according to their brand positioning and image so it attracts Athena's loyal customer base like premium RPG's publisher.
- c. Athena should position this game according to player motivations that go with the game to attract certain players.
- d. Athena should position this game according to certain player demographics like age, gender, income and etc.

Question 2:

Using any of the resources from the class or the resources included with this assignment (but no external sources), determine the following.

- a. What is the market size for the types of games Athena sells in 2019? How did you determine this number and which resources did you use?
- b. What do you project the market size to be in 2020, ignoring COVID-19? Why?
- c. How would you expect COVID-19 to impact this market? (No analysis, just a thoughtful response.) Moving forward, you may ignore any effects of COVID-19 on the market.

Answer 2a.

The market size for premium role-playing games (RPGs) for PC in 2019 was approximately \$5.2 billion, according to the SuperData 2019 Year in Review report. Athena Softworks specializes in premium RPGs for PC, which fall under the premium PC games category, with a total market size of \$5.2 billion in 2019. This estimate is derived from the broader premium PC gaming market, which experienced a 5% decline in 2019 due to fewer major game releases compared to the previous year. Despite this decline, RPGs remained a strong genre, generating substantial revenue.

Answer 2b.

The projected market size for premium PC RPGs in 2020 is estimated to be \$5.3 billion, reflecting a modest recovery from the previous year. According to the SuperData 2019 Year in Review report, the premium games segment was expected to grow by approximately 4% in 2020, driven by the launch of highly anticipated premium titles such as Cyberpunk 2077 and The Last of Us Part II. This growth suggests that the demand for premium RPGs will likely increase, reinforcing Athena Softworks' position in the market.

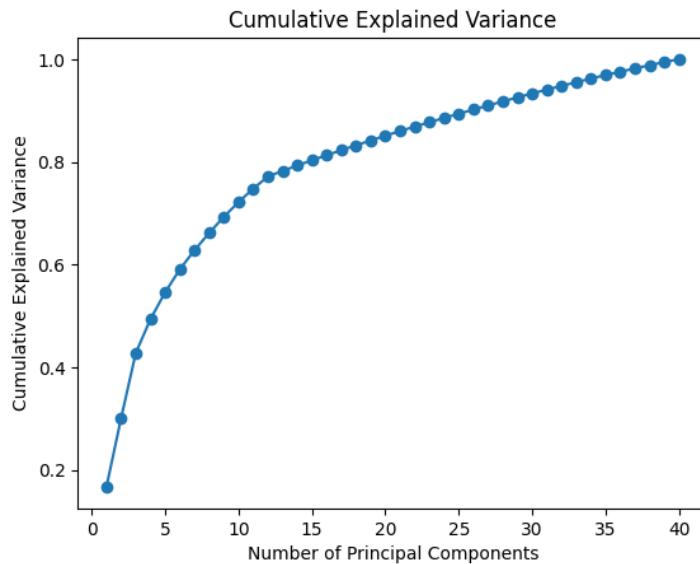
Answer 2c.

The COVID-19 pandemic had a significant positive impact on the gaming industry, leading to increased market share across all segments. With lockdowns and social distancing measures in place, more people turned to video games for entertainment, social interaction, and escapism. This surge in gaming activity was evident across all gaming platforms, including PC, console, and mobile games.

According to industry trends, digital entertainment saw a major boom during the pandemic, with video game sales, playtime, and engagement reaching record highs. Additionally, live streaming, esports, and digital game purchases increased, reinforcing gaming as a primary form of home entertainment. Given these factors, it is reasonable to assume that the demand for premium PC RPGs also grew during this period, benefiting companies like Athena Softworks.

However, moving forward, this surge in demand may stabilize as in-person activities resume, though gaming's expanded audience base and digital growth momentum are likely to have lasting effects on the industry.

Question 3a.



```
array([6.6930014 , 5.35042033, 5.08654204, 2.63196852, 2.09323499,
       1.79060433, 1.49185008, 1.34244474, 1.26272407, 1.14607329,
       1.04575203, 0.9461203 , 0.43730903, 0.41672851, 0.40923929,
       0.39558531, 0.39151915, 0.37984153, 0.37767606, 0.37204413,
       0.35662305, 0.3502892 , 0.33996429, 0.33292758, 0.32947343,
       0.32751998, 0.32053907, 0.31765556, 0.31178708, 0.30282288,
       0.29923353, 0.29216912, 0.28939193, 0.28204642, 0.2716738 ,
       0.26252222, 0.25701791, 0.24804166, 0.24196581, 0.22403024])
```

To identify potential market segments, a factor analysis was conducted on the survey responses, which contained 40 statements rated on a 7-point Likert scale. The goal was to uncover underlying dimensions (factors) that represent key motivations and preferences of gamers.

So looking at this we have exactly 11 numbers that are greater than 1 so we chose to have 11 factors. (I used ChatGPT's help to generate the names of the factors)

Factor Names & Key Attributes

1. Strategic Thinkers & Mastery Seekers

- enj.decisions (Enjoy decision-making in games)
- enj.strategy (Prefer long-term strategy & planning)
- enj.planning (Like thinking ahead in games)
- imp.mastery (Enjoy practicing & mastering a game)
- freq.study (Study other players to improve skills)

2. Casual & Less Progress-Oriented Players

- (-) imp.unlocks (Not highly motivated by unlockable rewards)
- (-) imp.collect (Less interested in collecting items)
- (-) imp.completion (Not focused on completing every mission)

3. Gameplay-Driven Action Seekers

- (-) imp.storyline (Less interested in story-driven experiences)
- (-) imp.characters (Not focused on character development)
- (-) imp.backstory (Minimal interest in in-depth backstories)

4. Chaos & Destruction Enthusiasts

- enj.guns (Enjoy using firearms & explosives)
- enj.blow.up (Like destroying objects in games)
- enj.gore (Prefer gameplay with blood & gore)
- enj.destruction (Find chaos and destruction fun)

5. Goal-Oriented & Structured Players

- (-) freq.test.world (Less likely to experiment)
- (-) freq.explore (Not driven by open-world exploration)
- (-) freq.experiment (Do not focus on testing game mechanics)
- (-) imp.offbeat (Less interested in unconventional gameplay)

6. Deliberate & Methodical Players

- (-) enj.react (Prefer slower-paced gameplay over quick reflex-based mechanics)
- (-) enj.excitement (Not drawn to high-action sequences)
- (-) enj.fast (Prefer methodical, thought-driven experiences)

7. Practical & Mechanically-Focused Players

- (-) imp.power (Not motivated by becoming the most powerful)
- (-) enj.immersion (Less interested in deep world-building)
- (-) enj.roleplay (Not drawn to role-playing elements)
- (-) imp.fantasy (Do not prioritize escapism in games)

8. Independent & Solo-Oriented Players

- (-) enj.others (Do not prioritize playing with others)
- (-) enj.common.goal (Less motivated by teamwork)
- (-) enj.helping (Do not engage in cooperative play)

9. Customization & Identity Creators

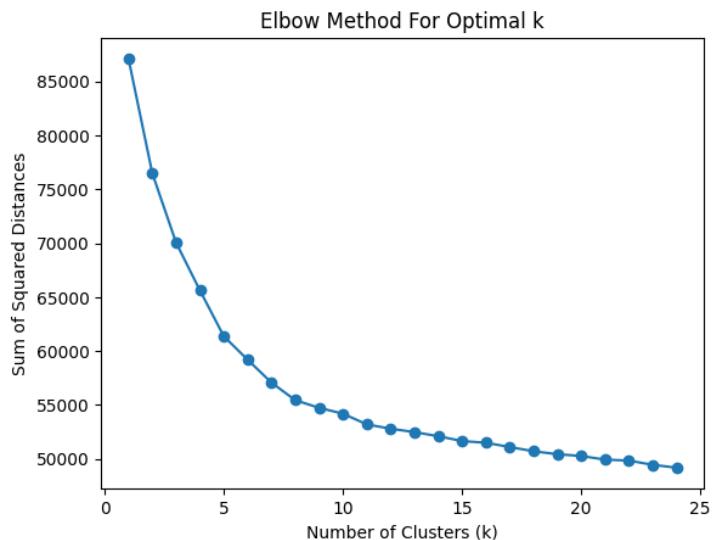
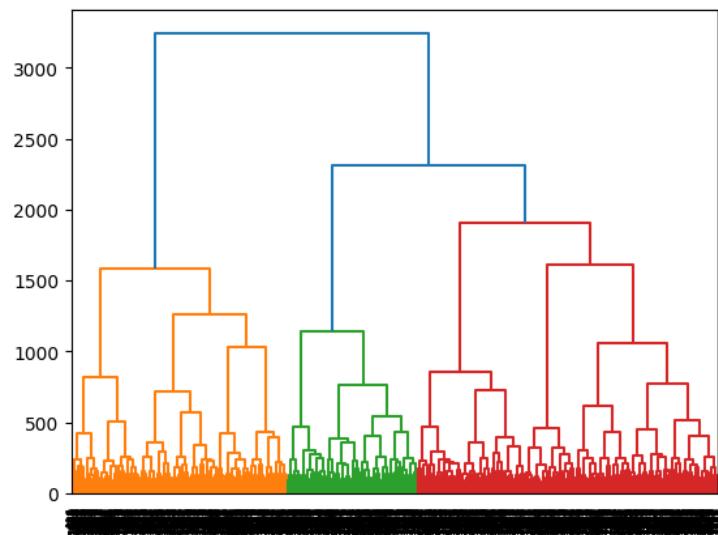
- imp.customize (Enjoy character customization)
- freq.customize (Spend time customizing characters/cities)
- freq.char.creation (Put effort into character creation)

10. Competitive Warriors

- enj.competition (Enjoy competing with others)
- enj.duels (Like direct player-vs-player battles)
- imp.dominate (Want to dominate opponents)

11. Casual & Relaxed Gamers

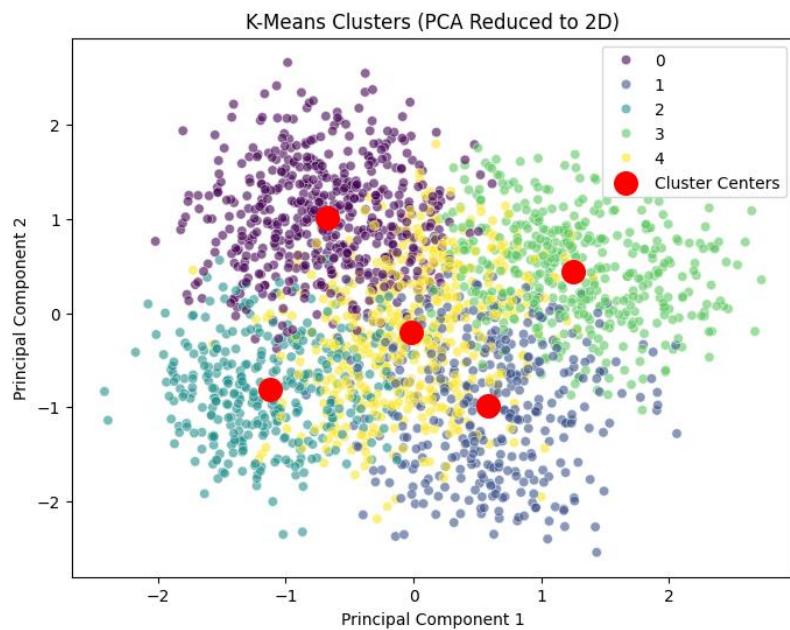
- (-) imp.mastery (Not highly focused on mastering mechanics)
- (-) imp.challenge (Prefer lower difficulty settings)
- (-) imp.difficulty (Not motivated by playing on the hardest difficulty)

Question 3b.

The dendrogram shows the hierarchical clustering structure, which helps in determining an appropriate number of clusters by visualizing how data points are merged.

The Elbow Method plot is used to determine the optimal number of clusters for K-means by plotting the sum of squared distances. The "elbow" in the curve suggests the ideal number of clusters (around 5).

Looking at these 2 graphs I decided to have 5 clusters. Here is a visualization of the clusters and the cluster centers.



After determining the optimal cluster count, K-Means clustering was applied to group similar respondents based on their survey responses.

The scatter plot visualizes clusters using Principal Component Analysis (PCA) to reduce dimensions, with red dots representing cluster centers, showing where the central points of each cluster are located.

These are the assigned Clusters to each Factors and the importance of each factor in each cluster.

	Assigned Cluster
Strategic Thinkers & Mastery Seekers	3
Casual & Progress-Oriented Players	0
Gameplay-Driven Action Seekers	4
Chaos & Destruction Enthusiasts	0
Goal-Oriented & Structured Players	4
Deliberate & Methodical Players	3
Practical & Mechanically-Focused Players	3
Independent & Solo-Oriented Players	1
Customization & Identity Creators	2
Competitive Warriors & PvP Enthusiasts	0
Casual & Relaxed Gamers	1

These are some of the Top Factors in each Cluster.

		Top Factor 1 \
Cluster 0	Casual & Progress-Oriented Players	
Cluster 1	Strategic Thinkers & Mastery Seekers	
Cluster 2	Customization & Identity Creators	
Cluster 3	Strategic Thinkers & Mastery Seekers	
Cluster 4	Gameplay-Driven Action Seekers	
		Top Factor 2 \
Cluster 0	Chaos & Destruction Enthusiasts	
Cluster 1	Chaos & Destruction Enthusiasts	
Cluster 2	Competitive Warriors & PvP Enthusiasts	
Cluster 3	Casual & Progress-Oriented Players	
Cluster 4	Goal-Oriented & Structured Players	
		Top Factor 3 \
Cluster 0	Competitive Warriors & PvP Enthusiasts	
Cluster 1	Independent & Solo-Oriented Players	
Cluster 2	Casual & Relaxed Gamers	
Cluster 3	Deliberate & Methodical Players	
Cluster 4	Independent & Solo-Oriented Players	

Cluster	0	1	2	\
Strategic Thinkers & Mastery Seekers	-0.675056	0.585080	-1.122991	
Casual & Progress-Oriented Players	1.015274	-0.980622	-0.804665	
Gameplay-Driven Action Seekers	-0.353813	-0.883168	-0.201102	
Chaos & Destruction Enthusiasts	0.376316	0.340559	-0.702629	
Goal-Oriented & Structured Players	-0.118793	-0.136155	-0.022058	
Deliberate & Methodical Players	-0.054692	-0.164078	-0.119384	
Practical & Mechanically-Focused Players	0.021062	0.020151	-0.013388	
Independent & Solo-Oriented Players	0.020962	0.232017	-0.143587	
Customization & Identity Creators	-0.107316	0.003129	0.134259	
Competitive Warriors & PvP Enthusiasts	0.042312	0.026830	0.004315	
Casual & Relaxed Gamers	0.024071	0.046822	-0.008031	
Cluster	3	4		
Strategic Thinkers & Mastery Seekers	1.249868	-0.018145		
Casual & Progress-Oriented Players	0.445076	-0.202779		
Gameplay-Driven Action Seekers	-0.132228	1.343994		
Chaos & Destruction Enthusiasts	-0.318723	0.115669		
Goal-Oriented & Structured Players	0.056941	0.202289		
Deliberate & Methodical Players	0.185445	0.105597		
Practical & Mechanically-Focused Players	0.037188	-0.063294		
Independent & Solo-Oriented Players	-0.264644	0.142722		
Customization & Identity Creators	0.009955	0.011364		
Competitive Warriors & PvP Enthusiasts	-0.068636	-0.008739		
Casual & Relaxed Gamers	-0.004561	-0.053108		

(I generated the names of the segments with the help of ChatGpt)

1. Strategic Thinkers & Mastery Seekers 🧠🎯

Key Attributes:

enj.strategy (Long-term planning & strategic decision-making)

imp.mastery (Taking time to practice & master a game)

freq.study (Studying other players to improve)

enj.decisions (Gameplay requiring careful decision-making)

Behavior:

- Focus on optimization & efficiency
- Enjoy turn-based strategy, RTS, and deep RPG mechanics
- Prefer chess-like complexity in games

2. Casual & Progress-Oriented Players 🎮📈

Key Attributes:

imp.completion (Completing all missions/achievements)

freq.stats (Focus on increasing level/stats)

imp.challenge (Enjoy gradual challenges, but not extreme difficulty)

freq.explore (Exploring game worlds at a relaxed pace)

Behavior:

- Enjoy casual yet structured gameplay
- Prefer incremental character growth and clear progression
- Likely to engage in story-driven single-player RPGs

3. Gameplay-Driven Action Seekers ⚡️🎮

Key Attributes:

enj.fast (Fast-paced, intense gameplay)

enj.react (Requires quick reaction times)

enj.duels (Enjoys head-to-head competitive matches)

freq.customize (Customization & adapting playstyle)

Behavior:

- Prioritizes fluidity and mechanics over story
- Enjoys high-skill ceiling FPS, fighting games, and action RPGs
- Adrenaline-driven players who love fast reaction challenges

4. Chaos & Destruction Enthusiasts **Key Attributes:**

enj.destruction (Enjoys causing chaos & destruction)

enj.guns (Prefers using guns/explosives)

enj.blow.up (Blowing things up is a core enjoyment)

imp.power (Becoming as powerful as possible)

Behavior:

- Love sandbox destruction & explosive gameplay
- Likely to play GTA, Just Cause, Doom, and Battle Royale games
- Less concerned with story, more with unleashing chaos

5. Goal-Oriented & Structured Players **Key Attributes:**

freq.planning (Thinking and planning in-game strategies)

imp.dominate (Desire to dominate others in structured formats)

imp.storyline (Appreciates engaging storylines)

imp.wealth (Collecting in-game resources & optimizing economy)

Behavior:

- Enjoys structured goals & organized play
- Prefer puzzle-solving, city-building, economic simulators, and structured RPGs
- Likely to be drawn to games with clear rules & goals (e.g., Civilization, XCOM, MMOs)

Based on the Factors the clusters are Classified into 5 Segments and below are the segment names.

```
# Assign segment labels to clusters based on top factors
survey_data['Segment_Label'] = survey_data['cluster'].replace({
    0: 'Strategic Thinkers & Mastery Seekers',
    1: 'Casual & Progress-Oriented Players',
    2: 'Gameplay-Driven Action Seekers',
    3: 'Chaos & Destruction Enthusiasts',
    4: 'Goal-Oriented & Structured Players'
})

print(survey_data[['cluster', 'Segment_Label']])
```

	Cluster	Segment_Label
0	2	Gameplay-Driven Action Seekers
1	2	Gameplay-Driven Action Seekers
2	1	Casual & Progress-Oriented Players
3	4	Goal-Oriented & Structured Players
4	4	Goal-Oriented & Structured Players
...
2173	4	Goal-Oriented & Structured Players
2174	2	Gameplay-Driven Action Seekers
2175	4	Goal-Oriented & Structured Players
2176	0	Strategic Thinkers & Mastery Seekers
2177	1	Casual & Progress-Oriented Players

The code maps clusters to meaningful player personas (e.g., "Strategic Thinkers & Mastery Seekers" and "Goal-Oriented & Structured Players"), making segmentation insights actionable.

Question 3c.

Regression done for Age and Income.

```
MNLogit Regression Results
=====
Dep. Variable:           Cluster   No. Observations:      2178
Model:                 MNLogit   Df Residuals:          2166
Method:                MLE      Df Model:             8
Date:        Wed, 26 Feb 2025   Pseudo R-squ.:     0.07437
Time:            03:47:57    Log-Likelihood:   -3218.7
converged:          True    LL-Null:            -3477.4
Covariance Type:    nonrobust   LLR p-value:  1.402e-106
=====
Cluster=1      coef    std err      z      P>|z|      [0.025      0.975]
-----
const       -4.3346    0.297   -14.616     0.000     -4.916     -3.753
age          0.1442    0.014    10.027     0.000      0.116      0.172
income      -2.791e-06  3.47e-06   -0.805     0.421    -9.58e-06     4e-06
-----
Cluster=2      coef    std err      z      P>|z|      [0.025      0.975]
-----
const       -2.5558    0.293   -8.710     0.000     -3.131     -1.981
age          0.0871    0.015    5.793     0.000      0.058      0.117
income      -3.036e-06  3.56e-06   -0.853     0.394    -1e-05    3.94e-06
-----
Cluster=3      coef    std err      z      P>|z|      [0.025      0.975]
-----
const       1.0134    0.385    2.633     0.008      0.259      1.768
age         -0.0509   0.021   -2.418     0.016     -0.092     -0.010
income      -6.315e-07  4.12e-06   -0.153     0.878    -8.71e-06    7.45e-06
-----
Cluster=4      coef    std err      z      P>|z|      [0.025      0.975]
-----
const       -2.3704    0.280   -8.456     0.000     -2.920     -1.821
age          0.0808    0.014    5.628     0.000      0.053      0.109
income      2.615e-06  3.26e-06   0.803     0.422    -3.77e-06     9e-06
=====
```

Cross Tabulation done for Gender and State and the State was divided into 4 regions:

Cross Tabulation: Cluster vs gender			
gender	female	male	nonbinary
Cluster			
0	192	344	3
1	188	180	3
2	195	151	3
3	227	210	1
4	199	277	5

Chi-squared value: 53.21612523336091
P-value: 9.794198315431064e-09

Expected Values:

gender	female	male	nonbinary
Cluster			
0	247.722222	287.565657	3.712121
1	170.510101	197.934803	2.555096
2	160.398990	186.197429	2.403581
3	201.303030	233.680441	3.016529
4	221.065657	256.621671	3.312672

Chi-squared Contributions:			
gender	female	male	nonbinary
Cluster			
0	12.534063	11.075158	0.136611
1	1.794008	1.625066	0.077468
2	7.464074	6.653470	0.147994
3	3.280300	2.399701	1.348036
4	2.202482	1.618243	0.859450

Cross Tabulation: Cluster vs Region				
Region	Midwest	Northeast	South	West
Cluster				
0	98	103	208	130
1	103	50	141	77
2	71	54	138	86
3	96	71	161	110
4	104	82	181	114

Chi-squared value: 16.633897235464676
P-value: 0.16389548196351147

Expected Values:

Region	Midwest	Northeast	South	West
Cluster				
0	116.808081	89.090909	205.156566	127.944444
1	80.400367	61.322314	141.211662	88.065657
2	75.632691	57.685950	132.837925	82.843434
3	94.920110	72.396694	166.713499	103.969697
4	104.238751	79.504132	183.080349	114.176768

Chi-squared Contributions:				
Region	Midwest	Northeast	South	West
Cluster				
0	3.028420	2.171521	0.039410	0.033025
1	6.352501	2.090508	0.000317	1.390426
2	0.283764	0.235521	0.200598	0.120274
3	0.012286	0.026945	0.195809	0.349761
4	0.000547	0.078353	0.023639	0.000274

The cross-tabulation and regression analysis revealed significant relationships between gender, age, and income across gamer segments, while location had no major impact. Gender distribution was uneven ($p < 9.79e-09$), with action-heavy and competitive segments being male-dominated, while customization and casual progression-oriented games had a more balanced or slightly female-skewed audience.

Age was a strong predictor ($p < 1.93e-61$), with younger players (22.9–24.7 years) preferring fast-paced action and destruction-based gameplay, while older players (30–34 years) engaged more in mastery-driven, structured experiences. Income also varied significantly across segments ($p = 2.43e-13$), with higher-income players favoring progression-based and strategic games (\$60K+), while lower-income players (\$34K–\$38K) leaned towards casual and action-heavy segments. However, income was not a direct determinant of segment membership ($p > 0.4$).

Location did not significantly affect segmentation ($p = 0.1639$), though the South had the highest representation, and the Northeast had the lowest for structured players. This suggests Athena should focus on player motivation and behavior rather than regional targeting. These insights can guide pricing, marketing, and positioning strategies to maximize appeal across different gamer segments.

Demographic Analysis of Segments Based on Cross-Tabulation and Regression Results (5 Clusters)

1. Gender Distribution Across Clusters

The chi-squared test for gender and segment membership resulted in a statistically significant p-value (9.79e-09), indicating that gender is not evenly distributed among the clusters.

- Cluster 0 has a higher proportion of males (63.8%) compared to females (35.6%), suggesting this group is more male-dominated.
- Cluster 1 is the most gender-balanced, with 50.4% females and 48.3% males, indicating a relatively equal preference across genders.
- Cluster 2 has a slightly higher proportion of females (56.2%) than males (43.5%), suggesting this group appeals more to female players.
- Cluster 3 is almost evenly split, with 51.9% males and 46.7% females.
- Cluster 4 has a higher male proportion (58.2%) than female (41.6%), meaning this group has a stronger male presence.

2. Age Distribution Across Clusters

The chi-squared test for age was highly significant ($p < 1.93e-61$), confirming that age is a strong factor in segment differences. The average age per cluster highlights the following trends:

- Cluster 0 (Mean Age: 22.9) attracts younger players, primarily those in their late teens and early 20s.
- Cluster 1 (Mean Age: 34.1) has the oldest average age, consisting of more mature players.
- Cluster 2 (Mean Age: 31.2) falls in the mid-range, appealing to a mix of younger and older players.
- Cluster 3 (Mean Age: 24.7) also consists of younger players, similar to Cluster 0.
- Cluster 4 (Mean Age: 27.3) is slightly older than Clusters 0 and 3 but still attracts a relatively young audience.

The regression analysis confirms that age is a significant predictor of segment membership:

- Clusters 1 and 2 → Age has a strong positive effect (older players more likely to belong to these segments).
- Clusters 0 and 3 → Age has a negative effect (younger individuals more likely to be in these segments).

3. Income Distribution Across Clusters

The chi-squared test for income was highly significant ($p = 2.43e-13$), showing income levels vary significantly among the segments.

- Cluster 0 (Mean Income: \$38,790) and Cluster 3 (Mean Income: \$34,590) have the lowest average incomes, indicating these groups likely consist of younger players or students.
- Cluster 1 (Mean Income: \$68,320) has the highest income, suggesting it includes older professionals with stable financial resources.
- Cluster 2 (Mean Income: \$60,850) also has a relatively high average income but is slightly lower than Cluster 1.
- Cluster 4 (Mean Income: \$48,270) sits between the younger and older segments, indicating a mix of mid-career professionals and younger players with disposable income.

Regression results indicate income is not a statistically significant predictor for any segment (p -values > 0.4).

This means that while income differences exist among clusters, income does not strongly determine which segment a player belongs to.

4. Regional Distribution Across Clusters

The chi-squared test for region was not statistically significant ($p = 0.1639$), meaning geographic location does not play a major role in segment membership. However, some differences are observed:

- The South has the highest representation across all clusters.
- The West is the second most represented region, followed by the Midwest and Northeast.
- Cluster 1 has the lowest representation from the Northeast, suggesting a regional preference in game styles.

Since region is not a statistically significant predictor, we can conclude that geographic location has little impact on segment membership.

(I took help of class notes and ChatGPT to understand some outputs)

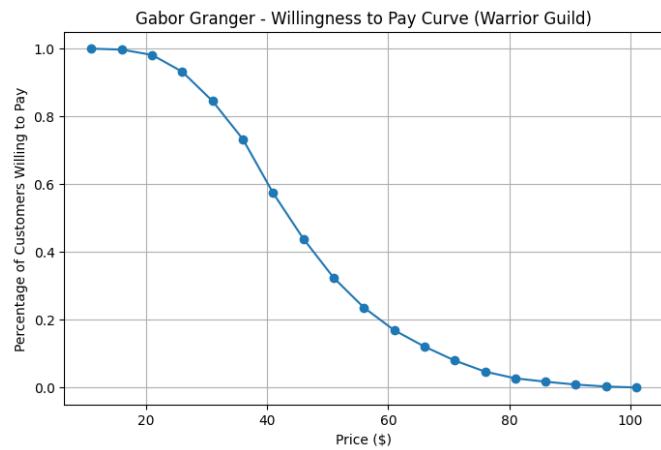
Question 4a.

For handling missing Gabor Granger pricing data, we will drop the missing values, as they are randomly distributed across all games, ensuring that no single game is disproportionately

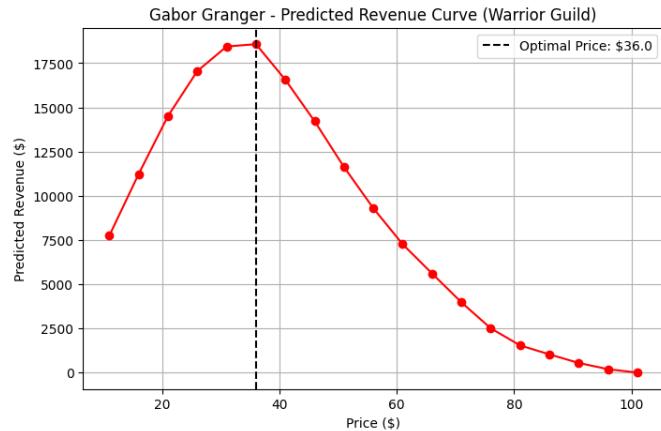
affected. Since the missing data does not introduce systematic bias toward any particular game, removing these values allows us to maintain a clean dataset without distorting revenue predictions. This approach ensures that our pricing analysis is based solely on valid and complete responses, leading to more accurate insights into consumer willingness to pay.

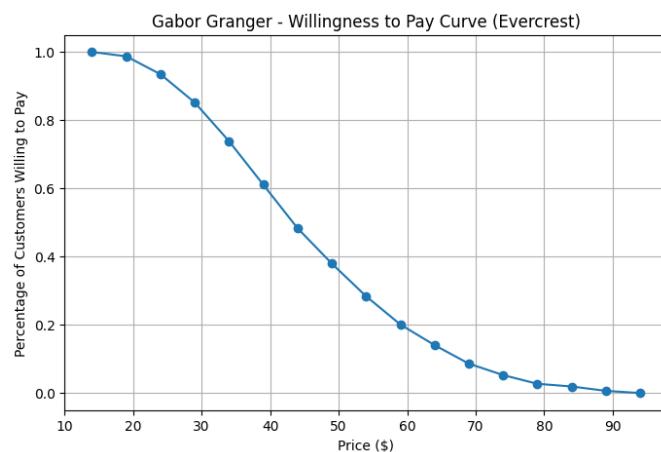
Question 4b.

Warrior Guild:

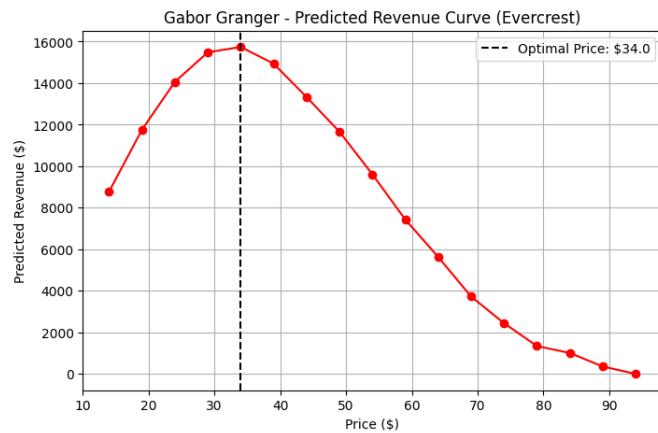
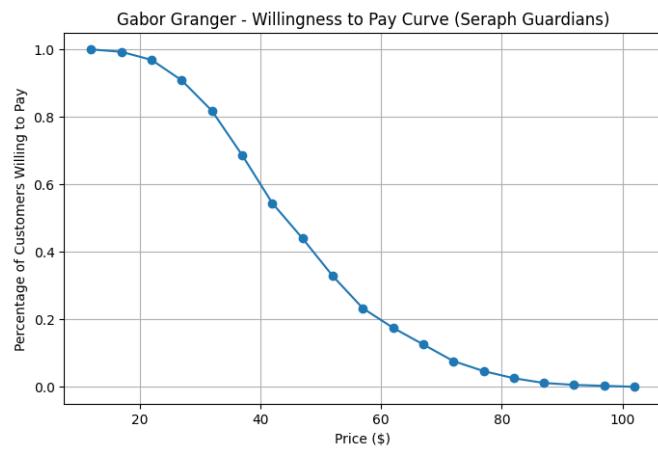


The **Ideal price** for Warrior Guild is **\$36** as it has the maximum revenue. The **willingness to pay** is **73.295455%**.



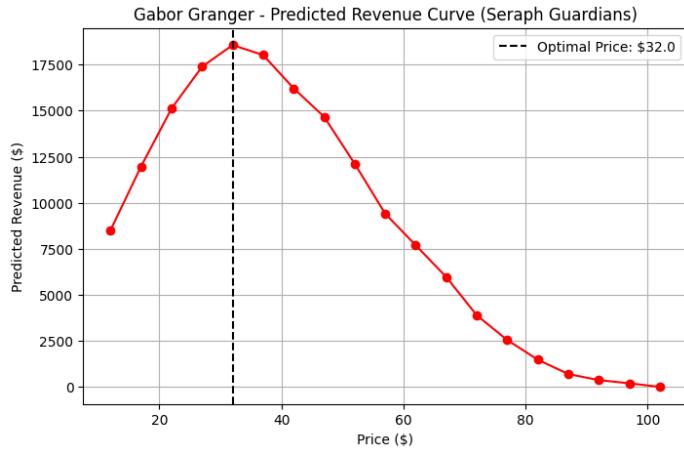
Evercrest:

The **Ideal price** for Evercrest is **\$34** as it has the maximum revenue. The **willingness to pay** is **73.843700%**.

**Seraph Guardians:**

The **Ideal price** for Seraph Guardians is **\$32** as it has the maximum revenue.

The **willingness to pay** is **81.805360%**.



Question 4c.

```
### Regression Analysis for Warrior Guild ###
OLS Regression Results
=====
Dep. Variable: gg.maxprice R-squared: 0.056
Model: OLS Adj. R-squared: 0.050
Method: Least Squares F-statistic: 10.29
Date: Wed, 26 Feb 2025 Prob (F-statistic): 4.22e-08
Time: 03:48:21 Log-Likelihood: -2904.0
No. Observations: 704 AIC: 5818.
Df Residuals: 699 BIC: 5841.
Df Model: 4
Covariance Type: nonrobust
=====
      coef  std err      t    P>|t|    [0.025    0.975]
-----
const   43.0699   1.102   39.099   0.000   40.907   45.233
Cluster_1  9.1659   1.746   5.250   0.000   5.738   12.594
Cluster_2 -1.3304   1.764  -0.754   0.451  -4.793   2.132
Cluster_3  0.9993   1.717   0.582   0.561  -2.373   4.371
Cluster_4  4.5671   1.661   2.749   0.006   1.306   7.828
=====
Omnibus: 47.355 Durbin-Watson: 1.872
Prob(Omnibus): 0.000 Jarque-Bera (JB): 55.190
Skew: 0.672 Prob(JB): 1.04e-12
Kurtosis: 3.274 Cond. No. 5.18
=====
```

```
### Regression Analysis for Evercrest ###
OLS Regression Results
=====
Dep. Variable: gg.maxprice R-squared: 0.131
Model: OLS Adj. R-squared: 0.126
Method: Least Squares F-statistic: 23.50
Date: Wed, 26 Feb 2025 Prob (F-statistic): 4.12e-18
Time: 03:48:21 Log-Likelihood: -2573.5
No. Observations: 627 AIC: 5157.
Df Residuals: 622 BIC: 5179.
Df Model: 4
Covariance Type: nonrobust
=====
      coef  std err      t    P>|t|    [0.025  0.975]
-----
const    37.5732   1.175   31.971   0.000    35.265  39.881
Cluster_1 17.1232   1.821    9.402   0.000    13.547  20.700
Cluster_2  5.5187   1.968    2.804   0.005    1.654   9.384
Cluster_3  6.7001   1.715    3.907   0.000    3.332  10.068
Cluster_4  9.8889   1.739    5.687   0.000    6.474  13.304
=====
Omnibus: 25.048 Durbin-Watson: 2.078
Prob(Omnibus): 0.000 Jarque-Bera (JB): 27.389
Skew: 0.512 Prob(JB): 1.13e-06
Kurtosis: 2.973 Cond. No. 5.33
=====
```

```
### Regression Analysis for Seraph Guardians ###
OLS Regression Results
=====
Dep. Variable: gg.maxprice R-squared: 0.162
Model: OLS Adj. R-squared: 0.157
Method: Least Squares F-statistic: 34.06
Date: Wed, 26 Feb 2025 Prob (F-statistic): 5.24e-26
Time: 03:48:21 Log-Likelihood: -2912.4
No. Observations: 709 AIC: 5835.
Df Residuals: 704 BIC: 5858.
Df Model: 4
Covariance Type: nonrobust
=====
      coef  std err      t    P>|t|    [0.025  0.975]
-----
const    38.3099   1.129   33.927   0.000    36.093  40.527
Cluster_1 20.8359   1.883   11.064   0.000    17.139  24.533
Cluster_2  7.1817   1.758    4.084   0.000    3.729  10.634
Cluster_3  4.5265   1.627    2.783   0.006    1.333   7.720
Cluster_4  10.6287   1.616    6.576   0.000    7.455  13.802
=====
Omnibus: 43.051 Durbin-Watson: 1.952
Prob(Omnibus): 0.000 Jarque-Bera (JB): 49.521
Skew: 0.642 Prob(JB): 1.76e-11
Kurtosis: 3.160 Cond. No. 5.43
=====
```

### Segment Interest Summary for Each Game ###		
	Most Interested Segment	Least Interested Segment \
Warrior Guild	Segment 1	Segment 2
Evercrest	Segment 1	Segment 2
Seraph Guardians	Segment 1	Segment 3
	Highest Coefficient	Lowest Coefficient
Warrior Guild	9.16588	-1.330397
Evercrest	17.12318	5.518706
Seraph Guardians	20.835892	4.526536

The most interested segment for each game is Segment 1 (Casual and Progress Oriented Players) while the lease interested for Warrior Guild and Evercrest is Segment 2 (Gameplay-Driven Action Seekers), for Seraph Guardians it is Segment 3 (Chaos and Destruction Enthusiasts).

Question 4d.

Market Share	Warrior Guild	Seraph Guardians	Evercrest	rank.DevilsGate	rank.Marksman	rank.QuestoftheTitan	Total
	287	1090	213	405	50	133	2178
	13%	50%	10%	19%	2%	6%	100%
Total Customers	3000000						
Market Share Based on Users	395316.8044	1501377.41		293388.4298	557851.2397	68870.52342	183195.5923
Price of Games	\$36	\$34		\$32			
Willingness to pay	73%	82%		74%			
Gross Revenue	\$10,430,973.02	\$41,759,044.65		\$6,932,763.90			
Royalties	\$521,548.65	\$2,087,952.23		\$346,638.20			
Valve Cost	3107743.254	10939761.16		\$2,079,829.17			
Net Revenue	\$6,801,681.11	\$28,731,331.26		\$4,506,296.54			

For this question I took out the market share of each game by counting the times of number 1 rank in each game. That means that when there is a number 1 rank that customer will buy that game. Then I multiplied it with the willingness to pay which we got in the previous question and the ideal price for each game and got the gross profit by multiplying all 3 of these. Then on the gross revenue I added a 5% royalty cost to each game. Finally after subtracting the valve cost and royalty cost we get the net revenue for each game respectively.

Warrior Guild : Gross Revenue - \$10,430,973.02

Warrior Guild : Net Revenue - \$6,801,681.11

Seraph Guardians: Gross Revenue - \$41,759,044.65

Seraph Guardians: Net Revenue - \$28,731,331.26

Evercrest: Gross Revenue - \$6,932,763.90

Evercrest: Net Revenue - \$4,506,296.54

Question 5a.

	Game	Market Share (%)
0	WarriorGuild	13.177227
1	SeraphGuardians	50.045914
2	Evercrest	9.779614
3	DevilsGate	18.595041
4	Marksman	2.295684
5	QuestoftheTitan	6.106520

Question 5b.

1. Equal Pricing Assumption

The current assumption assumes that all games are priced equally, which may not accurately reflect consumer willingness to pay. However, pricing plays a crucial role in purchasing decisions, as some games may justify a higher price point due to factors like brand recognition, gameplay depth, or unique features. To better align pricing with consumer demand, an alternative approach would be to use Gabor-Granger pricing analysis. This method allows for adjusting price points based on demand elasticity, ensuring that each game is optimally priced to maximize both sales volume and revenue potential.

2. Survey Representativeness

The current assumption is that the surveyed customers accurately represent the broader gaming market, but this may not hold true. The survey sample could be biased toward specific demographics or gaming preferences, leading to misleading insights about consumer behavior. To address this, an alternative approach would be to weight survey responses based on demographic distributions such as age, income, and gaming behavior, using data from industry

reports like Newzoo and SuperData. This adjustment ensures that the analysis better reflects the overall Steam user base, leading to more accurate demand predictions and pricing strategies.

3. Single Purchase Per Customer

The current assumption is that each customer purchases only one game, which may underestimate total sales potential. Many gamers, particularly those who play RPGs and multiplayer games, tend to buy multiple titles within a year. To better reflect realistic purchasing behavior, an alternative approach would be to factor in multiple game purchases per customer and adjust the market share estimates accordingly. Using historical Steam sales data for similar game releases, Athena can analyze cross-purchasing trends and refine its sales projections, ensuring a more accurate revenue forecast.

4. Competitor Influence & Market Saturation

The current assumption treats the demand for other games in the market as fixed and independent of Athena's choices. However, in reality, consumer preferences are highly dynamic, influenced by new releases, expansions, and competitor marketing efforts. Ignoring these factors could lead to inaccurate demand forecasts. A more realistic approach would be to incorporate competitor strategies into the analysis by considering marketing budgets, player reviews, and historical sales performance. Using a simulation model, Athena can better predict how competitor actions impact market demand, allowing for more informed pricing and positioning decisions.

5. Marketing & Brand Awareness Impact

The current assumption suggests that market share is solely determined by player rankings, overlooking the significant role of marketing efforts in driving game adoption. In reality, factors such as advertising spend, influencer partnerships, and promotional campaigns can greatly influence consumer awareness and purchasing decisions. To better capture this impact, an alternative approach would be to adjust market share projections using a marketing response model, where investment in marketing directly affects demand elasticity. This would allow Athena to optimize marketing strategies, ensuring that pricing and promotional efforts effectively drive higher game adoption and sales.

6. Distribution and Platform Considerations

The current assumption assumes that all sales occur exclusively through Steam, which may limit revenue projections by ignoring alternative distribution channels. While Steam is a dominant platform, other options like direct-to-consumer sales, Game Pass, or Epic Games Store exclusivity deals can significantly influence sales volume, pricing flexibility, and overall market reach. To account for this, an alternative approach would be to evaluate multiple distribution platforms and assess their impact on price sensitivity, customer reach, and potential revenue

streams. This strategy would allow Athena to maximize sales opportunities and optimize platform-specific pricing strategies.

Question 6.

Game Recommendation:

Among the three candidate games—Warrior Guild, Seraph Guardians, and Evercrest—the optimal choice for Athena Softworks is **Seraph Guardians**. This selection is based on several critical factors. Seraph Guardians has the highest market share and interest, particularly among the Casual & Progress-Oriented Players segment, which represents the largest market share and demonstrates the highest willingness to pay. Additionally, the game offers strong revenue potential, with projections indicating sustained profitability even after accounting for Steam's commission and developer royalties and has the most net revenue overall. Importantly, Seraph Guardians aligns seamlessly with Athena's brand identity, as the company specializes in premium RPGs for PC, emphasizing strategy, deep narratives, and puzzle-solving mechanics—all of which are core elements of the game. Furthermore, Seraph Guardians faces lower competitive risk compared to Warrior Guild, which competes directly in the crowded multiplayer battle arena market. By targeting a niche yet lucrative segment of strategy-focused RPG players, Seraph Guardians presents the best opportunity for Athena, maximizing both profitability and brand consistency while ensuring long-term market success.

Pricing Strategy:

The Gabor-Granger pricing analysis determined that the optimal price for Seraph Guardians is **\$32**, striking a balance between consumer willingness to pay and revenue maximization. This pricing strategy considers several key factors. From a market positioning perspective, pricing the game too low could diminish its perceived value, as premium RPGs typically command higher prices. Additionally, this price ensures broad adoption while maintaining strong financial returns, even after accounting for royalties and platform fees. Therefore, setting Seraph Guardians at \$32 is the most effective strategy to maximize both sales volume and profitability.

Positioning Strategy:

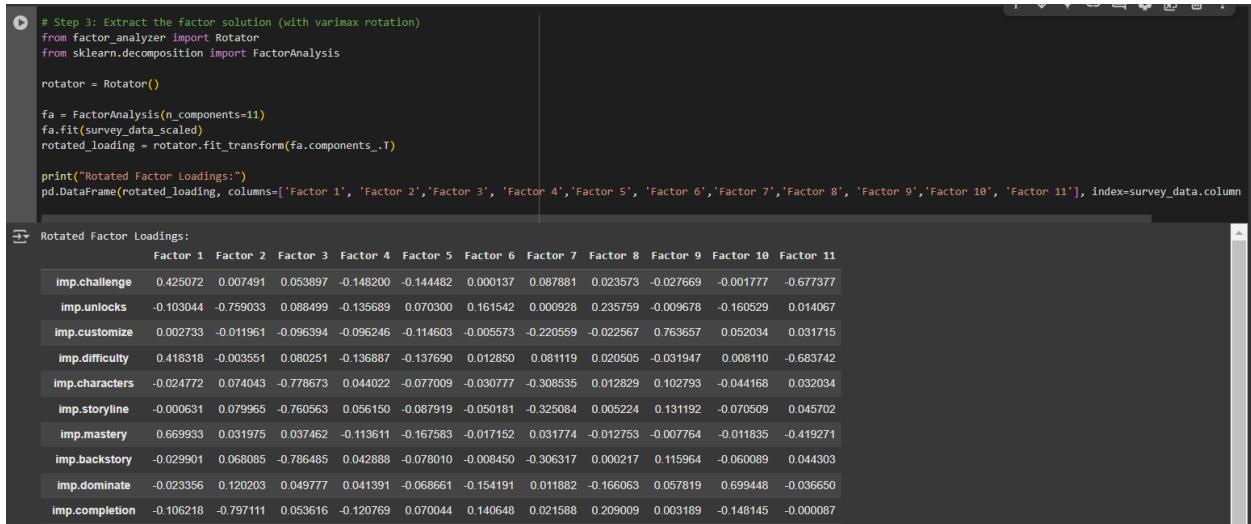
Athena should adopt a **targeted approach** by focusing on Casual & Progress-Oriented Players and Goal-Oriented & Structured Players, as these segments showed the highest willingness to pay. Casual & Progress-Oriented Players are motivated by exploration, story progression, and gradual challenges, and they are particularly interested in immersive narratives and character-building. They prefer games that allow steady growth without overwhelming complexity. On the other hand, Goal-Oriented & Structured Players enjoy well-defined objectives, structured gameplay, and strategic depth. They favor games that reward long-term engagement and problem-solving. By prioritizing these two segments, Athena can ensure the game aligns with

player preferences and maximizes its market appeal.

Appendix:

(I used ChatGPT's help in creating the names, debugging the code and understanding some outputs in this assignment)

Factor Loadings:



```
# Step 3: Extract the factor solution (with varimax rotation)
from factor_analyzer import Rotator
from sklearn.decomposition import FactorAnalysis

rotator = Rotator()

fa = FactorAnalysis(n_components=11)
fa.fit(survey_data_scaled)
rotated_loading = rotator.fit_transform(fa.components_.T)

print("Rotated Factor Loadings:")
pd.DataFrame(rotated_loading, columns=[ 'Factor 1', 'Factor 2', 'Factor 3', 'Factor 4', 'Factor 5', 'Factor 6', 'Factor 7', 'Factor 8', 'Factor 9', 'Factor 10', 'Factor 11'], index=survey_data.columns)
```

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Factor 11
imp.challenge	0.425072	0.007491	0.053897	-0.148200	-0.144482	0.000137	0.087881	0.023573	-0.027669	-0.001777	-0.677377
imp.unlocks	-0.103044	-0.759033	0.088499	-0.135689	0.070300	0.161542	0.000928	0.235759	-0.009678	-0.160529	0.014067
imp.customize	0.002733	-0.011961	-0.096394	-0.096246	-0.114603	-0.005573	-0.220559	-0.022567	0.763657	0.052034	0.031715
imp.difficulty	0.418318	-0.003551	0.080251	-0.136887	-0.137690	0.012850	0.081119	0.020505	-0.031947	0.008110	-0.683742
imp.characters	-0.024772	0.074043	-0.778673	0.044022	-0.077009	-0.030777	-0.308535	0.012829	0.102793	-0.044168	0.032034
imp.storyline	-0.000631	0.079965	-0.760563	0.056150	-0.087919	-0.050181	-0.325084	0.005224	0.131192	-0.070509	0.045702
imp.mastery	0.669933	0.031975	0.037462	-0.113611	-0.167583	-0.017152	0.031774	-0.012753	-0.007764	-0.011835	-0.419271
imp.backstory	-0.029901	0.068085	-0.786485	0.042888	-0.078010	-0.008450	-0.306317	0.000217	0.115964	-0.060089	0.044303
imp.dominante	-0.023356	0.120203	0.049777	0.041391	-0.068661	-0.154191	0.011882	-0.166063	0.057819	0.699448	-0.036650
imp.completion	-0.106218	-0.797111	0.053616	-0.120769	0.070044	0.140648	0.021588	0.209009	0.003189	-0.148145	-0.000087

imp.wealth	0.050519	-0.075147	-0.060647	-0.047629	-0.126188	-0.055320	-0.204483	0.255464	0.143067	-0.024072	-0.022631
imp.fantasy	-0.016412	0.007439	-0.135757	-0.076770	-0.105544	0.002382	-0.782159	0.011347	0.137986	-0.021381	0.032611
imp.items	0.004024	0.012126	-0.288416	-0.066347	-0.085983	0.002992	-0.714561	-0.006048	0.116384	-0.042590	0.021849
imp.power	-0.008159	-0.008863	-0.144372	-0.051490	-0.111958	0.007767	-0.771293	0.000940	0.116661	-0.016070	0.016333
imp.offbeat	0.187162	0.042963	-0.056219	-0.065283	-0.789825	-0.013878	-0.156222	0.003700	0.101689	0.040067	-0.084779
imp.collect	-0.126419	-0.793674	0.087224	-0.118938	0.057289	0.146908	-0.002785	0.235397	0.008326	-0.155531	0.006377
enj.excitement	0.024348	0.111341	-0.028562	0.169403	-0.022419	-0.743345	-0.000328	-0.036839	0.008134	0.122873	-0.010773
enj.destruction	-0.114601	0.095348	-0.012746	0.787674	0.069325	-0.106829	0.099819	-0.021396	-0.096525	0.049770	0.062594
enj.others	0.009633	0.172170	-0.028425	0.020409	-0.058716	-0.076789	0.005184	-0.700612	0.043606	0.306453	0.010688
enj.react	0.005993	0.118558	-0.029794	0.112754	-0.041402	-0.718520	-0.000043	-0.009008	0.057230	0.131052	0.000787
enj.duels	0.004873	0.130151	0.048060	0.084257	-0.055137	-0.143022	0.034781	-0.224572	0.033747	0.751452	0.013224
enj.strategy	0.805544	0.068397	-0.011351	-0.112501	-0.149547	-0.018590	-0.012619	-0.010162	0.018450	-0.010634	-0.037766
enj.roleplay	-0.015865	0.018498	-0.133025	-0.051317	-0.104314	0.006498	-0.780950	0.027528	0.125815	0.016282	0.029594
enj.competition	0.000099	0.145141	0.063129	0.088080	-0.027070	-0.142344	0.031866	-0.216223	0.039651	0.761668	0.027278
enj.decisions	0.824847	0.070823	0.003604	-0.107516	-0.140158	-0.037535	-0.034115	-0.011631	0.011365	0.017928	-0.023387
enj.common.goal	0.035269	0.178487	-0.004158	0.019373	-0.071657	-0.045604	-0.034070	-0.781098	0.064459	0.161702	0.008858
enj.planning	0.794412	0.099287	-0.008296	-0.092631	-0.156888	-0.023961	0.003237	0.012561	0.009209	-0.004598	-0.070601
enj.immersion	0.001484	0.015103	-0.136371	-0.099913	-0.096446	0.023810	-0.779068	0.024425	0.124653	-0.005492	0.047461
enj.helping	0.016330	0.167361	-0.010811	0.011441	-0.041485	-0.039781	-0.011202	-0.786982	0.059306	0.168798	-0.014739
enj.fast	0.041802	0.111255	-0.009595	0.124313	-0.030542	-0.752370	0.006777	-0.031435	0.046680	0.136680	0.016656
enj.guns	-0.138052	0.086328	-0.044837	0.797456	0.055401	-0.090221	0.090570	-0.029252	-0.079375	0.043175	0.077505
enj.gore	-0.110205	0.074163	-0.025570	0.793810	0.088434	-0.145640	0.083848	-0.024749	-0.081086	0.057157	0.054423
enj.blow.up	-0.110205	0.074163	-0.025570	0.793810	0.088434	-0.145640	0.083848	-0.024749	-0.081086	0.057157	0.054423
enj.blow.up	-0.130764	0.078342	-0.035002	0.796494	0.081614	-0.121202	0.071219	-0.044680	-0.106113	0.069706	0.050787
enj.guns	-0.138052	0.086328	-0.044837	0.797456	0.055401	-0.090221	0.090570	-0.029252	-0.079375	0.043175	0.077505
enj.gore	-0.110205	0.074163	-0.025570	0.793810	0.088434	-0.145640	0.083848	-0.024749	-0.081086	0.057157	0.054423
enj.blow.up	-0.130764	0.078342	-0.035002	0.796494	0.081614	-0.121202	0.071219	-0.044680	-0.106113	0.069706	0.050787
freq.explore	0.179192	0.035954	-0.046566	-0.081188	-0.772298	-0.022254	-0.136373	-0.025510	0.075083	0.025644	-0.061143
freq.experiment	0.176737	0.033284	-0.052498	-0.078319	-0.778977	-0.028083	-0.123560	-0.024535	0.095134	0.035358	-0.052174
freq.study	0.662109	0.051424	0.040322	-0.110886	-0.183422	0.006758	0.029928	-0.010444	-0.010375	-0.016116	-0.382576
freq.char.creation	-0.017774	0.013174	-0.104980	-0.129406	-0.112242	-0.080055	-0.181874	-0.022635	0.729918	0.025977	0.002160
freq.stats	0.036006	-0.080639	-0.048560	-0.065883	-0.140908	-0.091125	-0.207687	0.236721	0.142165	-0.030182	-0.026316
freq.customize	0.020696	0.010174	-0.095199	-0.108435	-0.093433	-0.028085	-0.201104	-0.015795	0.739293	0.061641	0.013922
freq.test.world	0.179298	0.081476	-0.077690	-0.066388	-0.770664	-0.045859	-0.126602	-0.019305	0.090122	0.073650	-0.068688