Video Game Popularity Data Project

A descriptive analysis of the video game market for GameCo to foster a better understanding of how their new games might fare in the market.

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GameCo

Business Query

GameCo's Current Assumption:

Sales for the various geographic regions have stayed the same over time. If not, the marketing budget will need to be redistributed among the regions in order to maximise return on investment.

Needs of Key GameCo Stakeholders:

"We're always eager to know which genres of games are performing the best so we can allocate our marketing budget efficiently." - **Vice President of Marketing**

"It's imperative that we keep tabs on competitors and what share of the market they're gaining or losing. Part of how we communicate our success to investors is by showing how we're able to grow our business in an area where a competitor's business is shrinking." - **Chief Financial Officer**

"It's essential that we understand swings in the market. If one market becomes more dominant over time in terms of sales, we'll want to know so we can make sure we have a sufficient number of sales reps serving that market." - **Senior Vice President of Sales**

Key Questions:

- Have sales for the various geographic regions stayed the same over time?
    - What is likely to happen in future?
- Are certain types of games more popular than others?
    - Have any games decreased or increased in popularity over time?
- Which genres are performing best in the different regions?
    - How have their sales figures varied between geographic regions over time?
- Which gaming platforms are currently the most popular?
    - Are there variations between regions?
- What other publishers will likely be the main competitors in certain markets?
    - What is happening to their market share?

Data Wrangling

Source and Format of the data

The data covering historical sales of video games (for games that sold more than 100,000 copies) spanning different platforms, genres, and publishing studios was drawn from the website VGChartz. - http://www.vgchartz.com/

The data tracks the total number of units of games sold from 1980 to 2016, and the numbers represent **units sold in millions** (not financial figures).

Possible Bias

There may be bias in the data due to the high digital market share. VGChartz advises that more recently the increase in the digital market share for software makes it more difficult to produce reliable retail estimates and the data for the latter years should be treated with caution as they may be unrepresentative of the wider performance of the games in question. https://www.vgchartz.com/methodology.php

There is no mention of how the software sales were produced. If the methodology os the same as for hardware sales it is based on retail sampling and trends in individual countries, which are then extrapolated to the wider region to produce figures typically within 10% of their actual totals. They do state that they feel it is important to prioritise accuracy.

Data Dictionary

Table 1 - Data Dictionary

Variable Name	Data Type	Column Description
Rank:	Qualitative - Ordinal	Each video game is assigned to a particular position based on their global sales (the game with the highest sales is ranked number 1 and the game with the lowest sales at the bottom)
Name:	Qualitative - Nominal	Name of the video game
Platform:	Qualitative - Nominal	The type of computer system specially made for playing video games
Year:	Quantitative - Continuous*	The year the game was released
Genre:	Qualitative - Nominal	The game category / classification
Publisher:	Qualitative - Nominal	The name of the company who published the video game
NA_Sales:	Quantitative - Discrete	Sales in North America *[assuming US & Canada only - i.e. excluding Latin Americas]*
EU_Sales:	Quantitative - Discrete	Sales in Europe *[assuming UK, France, Germany, Spain, Italy, Benelux & the Nordic countries]*
JP_Sales:	Quantitative - Discrete	Sales in Japan *[assuming only Japan]*
Other_Sales:	Quantitative - Discrete	Sales in other countries not covered by NA, EU and JP *[also an assumption]*
Global_Sales:	Quantitative - Discrete	Global sales (summation of NA, EU, JP and Other)

* A Quantitative numeric value used to measure continuous intervals

The unit of observation is the name of each individual game and the platform it is played on, and the characteristics are Year, Genre, Platform, Publisher and Sales.

Data Cleaning

The original dataset (vgsales_dirty) had 12 columns and 16601 rows including the header row.

Results of Data Inspection

Rank:	Possible duplication/mis-numbering
Name:	17 Blanks, possible formatting issues '.hack//' and perhaps erroneous special characters
Platform:	22 Blanks and possible wrongly labelled data i.e. only 3 entries for 3DO - maybe 3DS, 1 for GG - could be either GB or GC, 1 for PCFX maybe PC.
Year:	271 N/As and a) *[Any year above 2016 was removed]*
Genre:	16 Blanks
Publisher:	18 Blanks, 58 N/As and possibly wrongly labelled data e.g. 989 Sports maybe 989 Studios, Activitision Blizzard maybe Activision Value, Altron maybe Alvion, Aques maybe Aqua Plus and Aria maybe Arika, etc.
NA_Sales:	1 Blank and number formatting not consistent
NA_Units:	6 Blanks and consists of all 0
EU_Sales:	7 Blanks and number formatting not consistent
JP_Sales:	7 Blanks and number formatting not consistent
Other_Sales:	577 Blanks and number formatting not consistent
Global_Sales:	7 Blanks and number formatting not consistent

Data Removal, Imputation and Correction

- 1 duplicate record was found and removed; 16599 unique values remained.
- The empty NA_Units column was removed.
- The bottom Row 16600 ranked 16601 was removed.
- The following Data was imputed:

NA_Sales:	1 blank replaced with 0.264651485
EU_Sales:	7 blanks replaced with 0.146696197
JP_Sales:	7 blanks replaced with 0.077797734
Other_Sales:	577 blanks replaced with 0.049521907 *
Global_Sales:	10 blanks replaced with 0.53758814

* 3% of the Other_Sales data has been imputed

- Milestone and Milestone S.r.l were corrected to Milestone S.r.l.

During the analysis the following companies should be grouped: Takara Tomy and Takara; Ubisoft Annecy and Ubisoft; Sony Computer Entertainment with the Europe and American divisions, as well as Sony Music Entertainment and Sony Online Entertainment. [Note: Square EA, Square Enix and Square Soft are related, so check the dates to see when the merger took place.]

Data Formatting

Sales:	All the sales columns were formatted to number.
Name, Platform, Genre and Publisher:	Formatted to text.
Name:	Possible formatting / erroneous character issues e.g. '.hack//' were checked and found to be part of the titles
Rank and Year:	Left as general
Publisher:	Changed the 58 N/As in the publisher column to Unknown which was already in use and the 17 blanks were also replaced with Unknown.
Year:	Left N/A as I felt that unlike sales imputing the year (which is not a number but a point in time) could make the data inaccurate.*
Platform and Publisher:	The possible wrongly labelled data was investigated and found to be correct.
Platform:	21 blanks in the Platform column were changed to Unknown.
Game:	Removed 16 rows where Game (the unique identifier) was blank.
Genre:	Input the genre Adventure for Trick x Logic: Season 2 (ranked 14017)

* For example, if a game with N/A for year is the 3rd in a series is imputed to (the average of the column) 2006, but the first game in the series is not released until 2009.

Data Anomalies

- Puzzle has no sales data for 2016.

The final data set is 11 Columns and 16579 rows including the header row and contains no blank cells.

Exploratory Data Analysis

Initial exploration of the data took place in Excel. For ease of identification in all the graphs the regions are colour coded. Europe is yellow, Global is green, Japan is red, North American is blue and the Other Countries are grey.

Descriptive Analysis of the Sales Variables

The global and regional sales histograms (the data is grouped in intervals of 0.1 million units sold) / Box and Whisker plots show that all the variables are unevenly distributed and skewed to the right (i.e. the outliers are higher sales numbers), in this instance this is partly because it is not possible to have sales numbers below zero

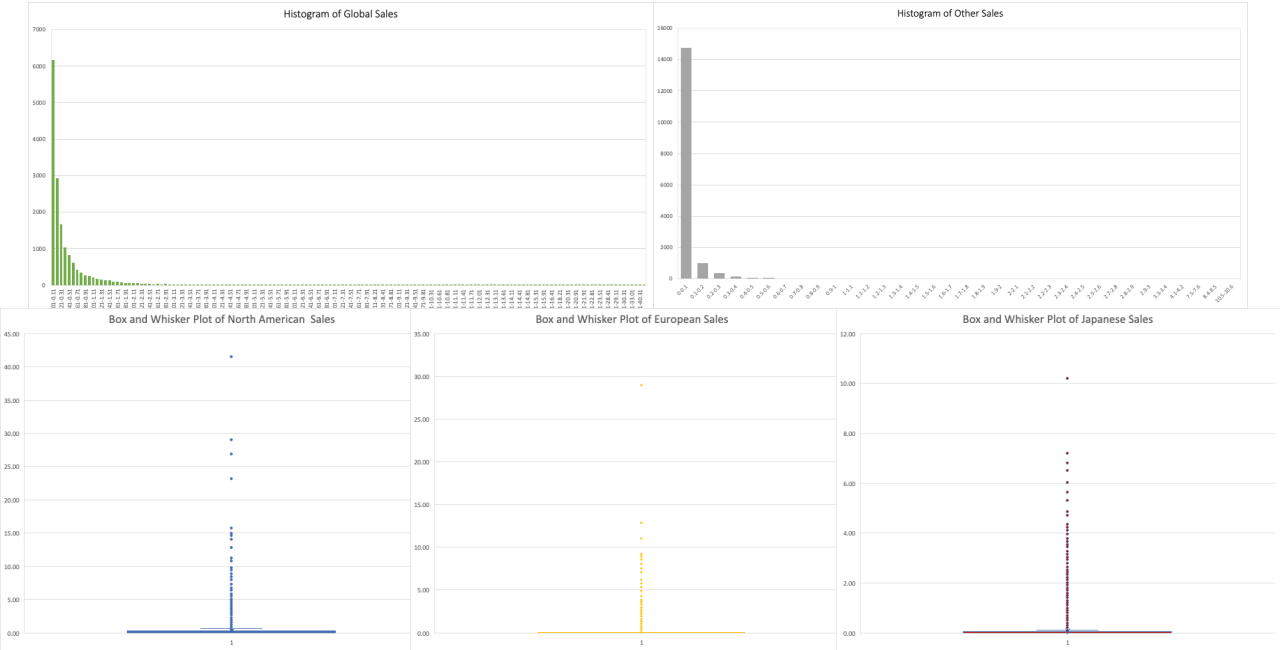


Table 2 - Descriptive Statistics of the Sales Variables

Variable Name	Mean	Median	Mode	IQR	Maximum Value	Range
	Million units sold					
North American Sales:	0.26	0.08	0.00	0.24	0.60	41.49
European Sales:	0.15	0.02	0.00	0.11	0.28	29.02
Japanese Sales:	0.08	0.00	0.00	0.04	0.10	10.22
Other Countries Sales:	0.05	0.01	0.00	0.04	0.10	10.57
Global Sales:	0.54	0.17	0.02	0.42	1.11	82.74

A common definition for an outlier is 'a value that's either lower than Q1 – (IQR * 1.5) or larger than Q3 + (IQR * 1.5)'. For the case of North America sales values that are below - 0.36 (the minimum value) and above 0.6 (the maximum value) million units sold would be outliers. However that would remove around 10% of the data.

The data for the sales variables is not a normal distribution and checking the data confirms there were record sales in some years. For example looking at the row with the 41.49 million units sold it corresponds to the release of the first Sports title for Nintendo Wii in 2006. A quick internet search would confirm that around 82.9 million units were sold globally. The 10.22 million units sold in Japan corresponds to the release of Pokemon Red/Pokemon Blue in 1996.

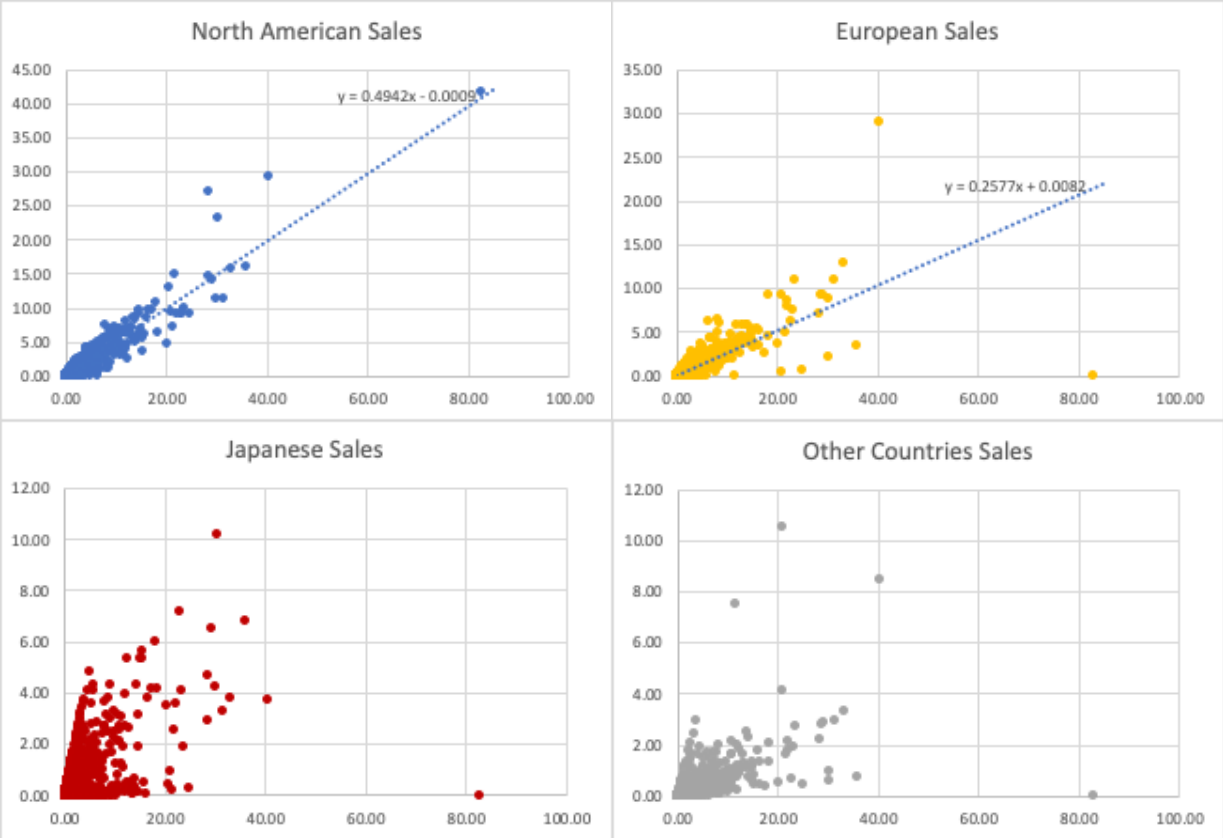
Having checked the distribution in other countries and examined a few of the more extreme outliers (see table below) the decision is not to remove them as the data is not incorrect. These are some of the most popular games and removing the outliers in this instance may impact some aspects of the analysis e.g. when looking at the most popular genres. However, when conducting the analysis it should be highlighted where these outliers have an influencing effect.

Table 3 - Outliers with Regional Sales Above 10 Million Units Sold Between 2007 and 2017

Rank	Name	Platform	Year	Genre	Publisher	Global Sales *
3	Mario Kart Wii	Wii	2008	Racing	Nintendo	35.82
4	Wii Sports Resort	Wii	2009	Sports	Nintendo	33.00
9	New Super Mario Bros. Wii	Wii	2009	Platform	Nintendo	28.62
16	Kinect Adventures!	X360	2010	Misc	Microsoft Game Studios	21.82

* Million Units Sold

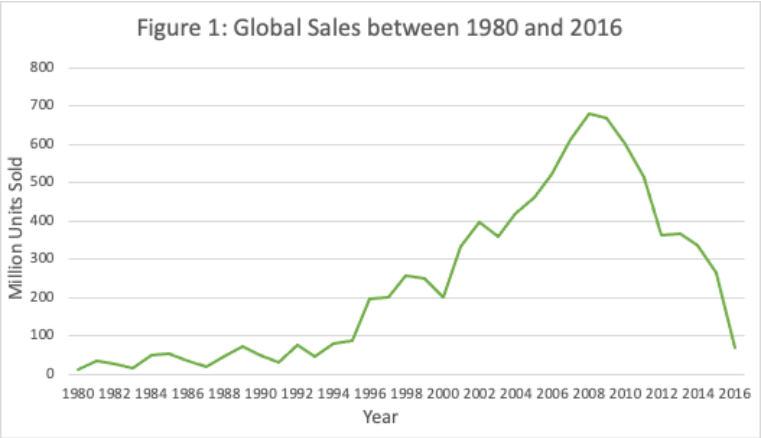
Correlation with Global Sales



- The Global Sales variable has a positive correlation (r>0) with North America and Europe.
- As the global number of million units sold increases the number of million units sold in North America (y=0.4942x - 0.0009) and Europe (y = 0.2577x + 0.0082) increases.
- The scatterplots of Global Sales with Japan and the Other Countries are much more spread out with no clear co-movement.

Global Sales

Figure 1 shows the global sales over the period 1980 to 2016



[The data has been filtered to remove the N/A year entries]

- Global sales rose during the period 1980 to 2008 from 11.38 to 678.78 million units sold.
- Since 2008 the number of million units sold has fallen to 70.89 million units sold in 2016 (although 343 games were released).
- The average number of global sales is 234.72 million units sold.

- Until 1996 global sales were well below average. From 2006 to 2011 global sales were more than double the average ranging from 521.00 to 678.78 million units sold. Then they dropped well below average in 2016.
- The yearly global sales pattern is similar to the number of games per year. The average is 436 games [Excluding N/A the average is 441 games] and this doubles between 2005 and 2011.

Sales in the Geographic Regions

[Population size as well as material wealth will be different between and within the regions and will have an effect on sales.]

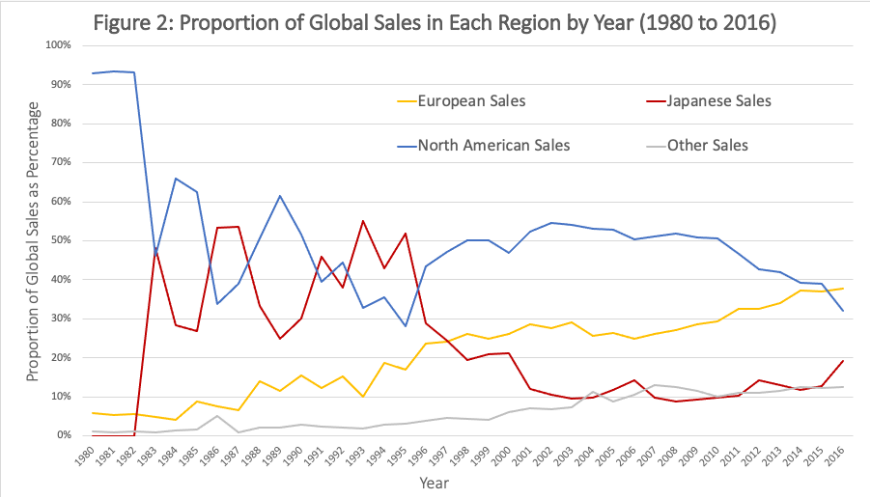


Figure 2 shows the proportion of global sales in the four regions from 1980 up till 2016.

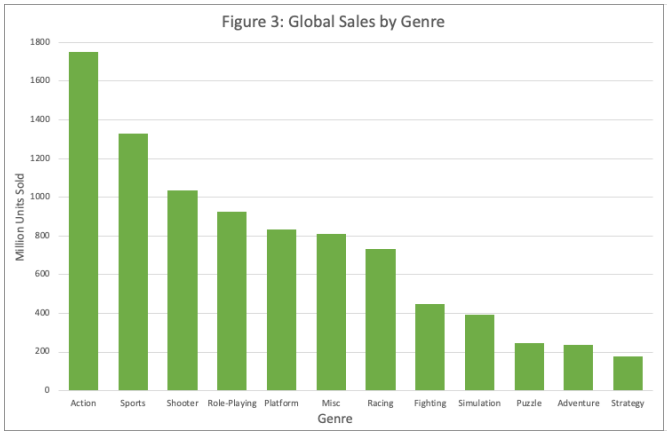
[The proportion was calculated by dividing the sum of the regional sales variable by the global sales variable]

- Until the overheated market crashed in 1983 North America (blue line) had nearly all the market share. Video games only became popular in Japan (red line) after the crash (their global market share jumped from 0% to around 50%; outstripping the European (yellow line) market's 5% share) when Japanese companies became leaders in the industry.
- Between 1993 and 1996 the markets in North America and Japan are volatile and appear to act contrary to each other. Meanwhile the market share in Europe increases steadily over time.

- After 1995 the market share in Japan decreased considerably and in both North America and Europe it increased. The markets then remain relatively stable until 2010 when sales in North America start decreasing.
- From 1980 to 2016 the market share in Other Countries (grey line) only increased from around 0% to just under 13%.

[The analysis will not focus on Other Countries due to the smaller market share and the term Other Countries being vague (who are you marketing to?) and possibly very widespread geographically.]

Popular Genres



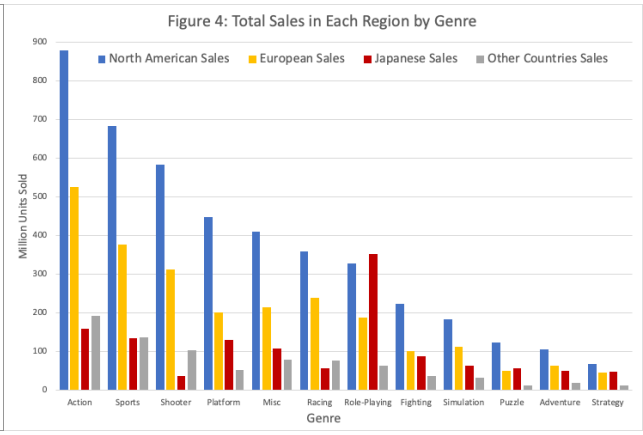


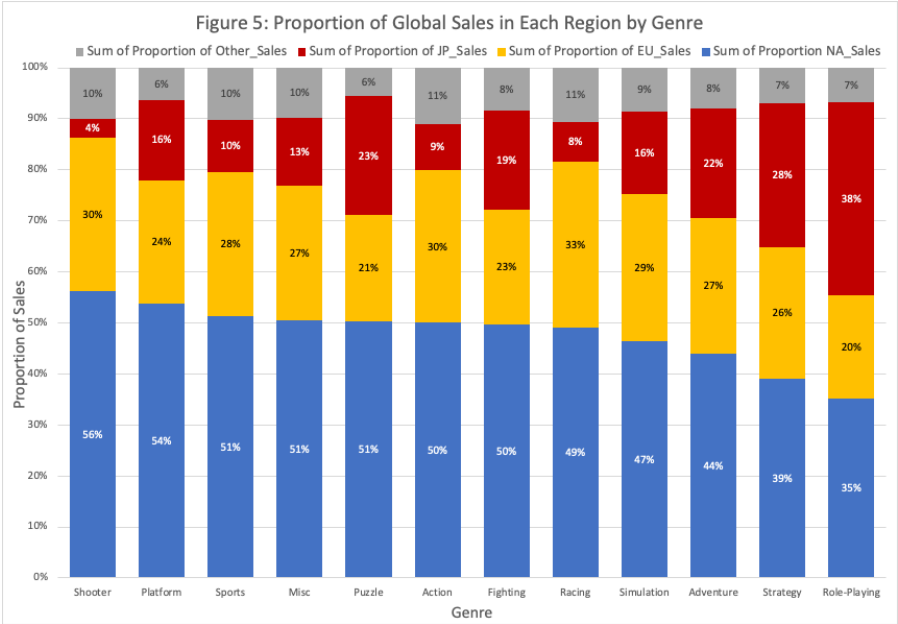
Figure 3 depicts the global sales by genre from 1980 up till 2016.

- Overall Action is the best selling (in terms of number of million units sold) genre followed by Sports, then Shooter and in fourth place Role-Playing.

Figure 4 shows the total sales in each region by genre from 1980 up till 2016.

- Action, Sports and Shooter are the three best selling (number of million units sold) genres in North America and Europe, but in Japan Role-Playing is the best selling genre.
- Over this period North America has the largest share of the global sales market (48%) and is the highest for all genres except Role-Playing (higher in Japan).

Figure 5 shows the proportion of global sales in the four regions from 1980 up till 2016.



- The genre 'Shooter' has the highest proportion (over 56%) of North American sales. 'Platform' is the next highest (54%) followed by Sports, Misc and Puzzle (51%).

- The genres in Europe with the highest proportion are 'Racing' (33%), 'Shooter' (30%) and 'Action' (30%).
- While the genre 'Role Playing' has the highest proportion (38%) in Japan followed by 'Strategy' (28%).
- The genres that do well in Japan are the ones with the lowest proportion of North American sales.

Popular Platforms

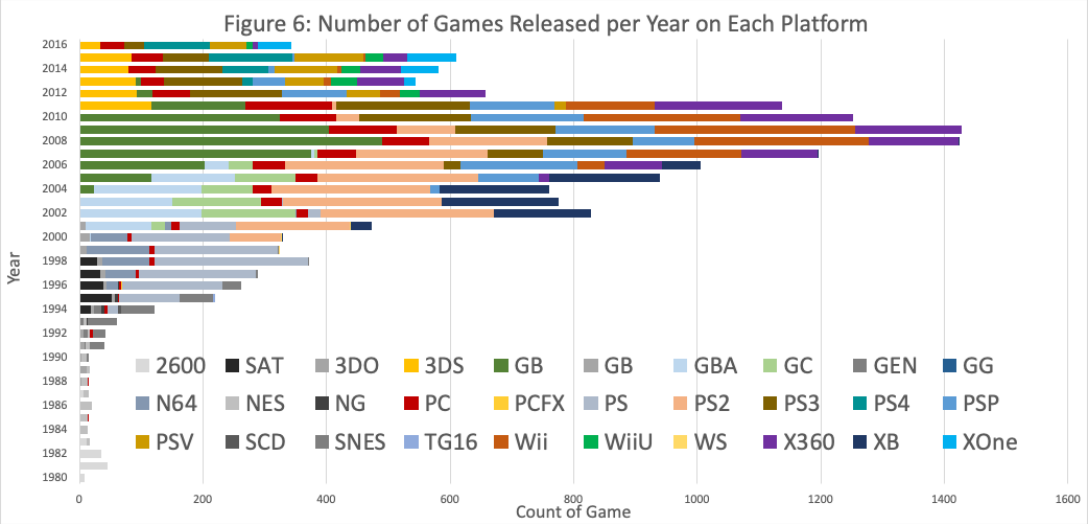


Figure 6 shows the number of games released per year on each platform.

- As expected there have been changes over the years in the number of games released on each platform, with platforms being discontinued and becoming obsolete.
- In contrast to the other platforms the number of units sold increased for PS4 and XOne between 2013 and 2015.
- The popular platforms today (2016) are 3DS, PC, PS3, PS4, PSV, WiiU, X360 and One.

Competitors

Picture of Pivot Table 1 - Top 15 publishers ranked by Sum of Global Sales over the last decade

Sum of Global_Sales	Column Labels											
Row Labels	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Nintendo	205.61	104.18	91.22	128.89	61.07	51.53	56.47	52.79	48.65	27.08	3.47	830.96
Electronic Arts	58.41	71.33	84.12	86.2	81.38	72.25	49.9	52.92	46.8	45.42	12.25	660.98
Activision	17.4	63.57	67.41	78.06	63.39	51.74	53.25	43.49	44.48	35.63	3.67	522.09
Ubisoft	17.27	48.6	57.44	46.96	42.62	48.03	37.31	27.39	41.95	12.79	9.76	390.12
Take-Two Interactive	20.59	19.81	46.18	19.11	35.84	18.03	21.58	52.41	30.26	15.03	2.89	281.73
Sony Computer Entertainment	33.81	37.54	26.6	36.53	34.89	27.4	12.85	12.61	19.02	11.01	6.56	258.82
Microsoft Game Studios	9.98	26.1	15.31	15.61	49.16	21.28	15.33	16.39	10.31	9.95	1.42	190.84
THQ	24.94	33.29	30.45	30.83	22.11	26.76	6.7	0.36				175.44
Sega	15.81	23.69	37.19	24.92	22.89	16.79	9.23	5.26	5.64	1.55	0.77	163.74
Namco Bandai Games	11.7	7.59	10.9	16.77	16.41	22.04	15.93	9.96	9.64	15.56	6.49	142.99
Warner Bros. Interactive Entertainment	0.29	1.4	11.72	14.22	15.57	20.04	14.33	20.36	18.42	21.74	3.52	141.61
Konami Digital Entertainment	14.6	17.21	27.78	16.09	18.51	10.04	7.97	5.37	5.06	6.86	1.21	130.7
Square Enix	13.43	16.3	10.03	10.83	17.44	12.46	10.37	13.86	10.35	8.86	3.53	127.46
Disney Interactive Studios	5.74	16.84	22.09	13.29	20.5	13.09	2.84	7.09	4.22	2.48		108.18
Capcom	11.4	9.92	13.32	19.47	14.38	7.47	14.68	7.63	0.32	5.64	2.12	106.35
Grand Total	**460.98**	**497.37**	**551.8**	**557.78**	**516.2**	**419**	**328.7**	**327.9**	**295.12**	**219.6**	**57.66**	**4232.01**

Picture of Pivot Table 2 - Top 15 publishers ranked by Count of Name over the last decade

Count of Name	Column Labels											
Row Labels	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Electronic Arts	102	107	120	112.00	88	76	46	42	36	32	20	781
Namco Bandai Games	66	49	52	62.00	70	75	85	63	69	68	40	699
Activision	50	75	88	121.00	89	75	42	38	42	39	14	673
Ubisoft	61	88	112	101.00	72	87	32	29	44	32	13	671
Konami Digital Entertainment	66	61	63	59.00	67	44	32	16	18	12	8	446
THQ	57	74	61	72.00	57	76	8	1				406
Sega	47	50	67	43.00	39	35	25	17	23	10	8	364
Nintendo	53	42	32	32.00	28	26	31	23	20	32	10	329
Sony Computer Entertainment	51	41	36	45.00	43	36	24	12	13	10	5	316
Take-Two Interactive	33	37	41	41.00	35	31	28	16	15	17	12	306
Tecmo Koei	26	31	30	20.00	19	17	10	19	27	35	17	251
Warner Bros. Interactive Entertainment	1	5	10	29.00	33	19	21	26	30	26	14	214
Capcom	27	17	26	15.00	22	24	24	21	4	16	18	214
Square Enix	12	23	24	18.00	25	22	11	16	26	16	20	213
Disney Interactive Studios	13	28	33	24.00	35	20	7	12	10	6		188
Grand Total	**665**	**728**	**795**	**794.00**	**722**	**663**	**426**	**351**	**377**	**351**	**199**	**6071**

Picture of Pivot Table 3 - Percentage of Global Sales in the different regions of the top 4 publishers (ranked by Global Sales) over the last decade

	Column Labels											
Row Labels	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Nintendo												
Sum of NA % of Global Sales	44%	41%	43%	41%	40%	39%	37%	36%	37%	34%	33%	41%
Sum of EU % of Global Sales	29%	31%	28%	28%	27%	28%	25%	31%	23%	28%	27%	28%
Sum of JP % of Global Sales	18%	19%	22%	23%	27%	26%	33%	27%	33%	32%	34%	23%
Sum of Other % of Global Sales	9%	9%	8%	8%	7%	7%	6%	6%	7%	8%	7%	8%
Sum of Global_Sales	205.61	104.18	91.22	128.89	61.07	51.53	56.47	52.79	48.65	27.08	3.47	830.96
Electronic Arts												
Sum of NA % of Global Sales	64%	52%	54%	50%	48%	46%	42%	42%	40%	39%	30%	48%
Sum of EU % of Global Sales	23%	29%	30%	36%	38%	39%	43%	43%	45%	47%	56%	37%
Sum of JP % of Global Sales	1%	1%	1%	1%	1%	1%	1%	2%	1%	1%	1%	1%
Sum of Other % of Global Sales	13%	19%	15%	14%	13%	13%	14%	13%	14%	13%	13%	14%
Sum of Global_Sales	58.41	71.33	84.12	86.2	81.38	72.25	49.9	52.92	46.8	45.42	12.25	660.98
Activision												
Sum of NA % of Global Sales	75%	66%	61%	58%	62%	56%	50%	53%	48%	48%	46%	57%
Sum of EU % of Global Sales	15%	21%	24%	28%	27%	32%	37%	34%	37%	38%	38%	29%
Sum of JP % of Global Sales	0%	1%	0%	1%	1%	1%	1%	1%	2%	1%	4%	1%
Sum of Other % of Global Sales	10%	12%	16%	13%	10%	11%	12%	11%	13%	13%	12%	12%
Sum of Global_Sales	17.4	63.57	67.41	78.06	63.39	51.74	53.25	43.49	44.48	35.63	3.67	522.09
Ubisoft												
Sum of NA % of Global Sales	74%	57%	56%	56%	57%	50%	48%	48%	40%	38%	39%	52%
Sum of EU % of Global Sales	14%	31%	33%	32%	33%	37%	38%	39%	45%	48%	45%	35%
Sum of JP % of Global Sales	4%	1%	1%	1%	1%	1%	1%	1%	2%	1%	2%	1%
Sum of Other % of Global Sales	9%	11%	11%	12%	10%	12%	12%	12%	13%	12%	13%	12%
Sum of Global_Sales	17.27	48.6	57.44	46.96	42.62	48.03	37.31	27.39	41.95	12.79	9.76	390.12

From the Pivot Table analysis:

- The average number of games per platform is 518 and the average global sales 278.73 million units sold.
- Global sales drop markedly for the top 15 publishers in terms of sales from 2015 to 2016, but there is not the same drop in number of games released. Is 2016 an outlier with the changes in the way games were released or indicative of the way the market is going?
- With the exception of Square Enix and Capcom the number of video games released by the top 15 publishers (ranking based on number of units sold) has also dropped.
- The top 4 publishers with the highest number of units sold per million over the last ten years have grown their markets outside of North America. Nintendo has grown its sales in Japan, Electronic Arts, Activision and Ubisoft have grown their sales in Europe.

Based on the results of the exploratory data analysis the in-depth analysis will cover the last 10 years (2007 - 2016) and concentrate on Europe, Japan and North America. It will only consider the platforms that are currently (2016) in operation: 3DS, PC, PS3, PS4, PSV, WiiU, X360 and One.

Data Analysis

Have sales for the various geographic regions stayed the same over time?

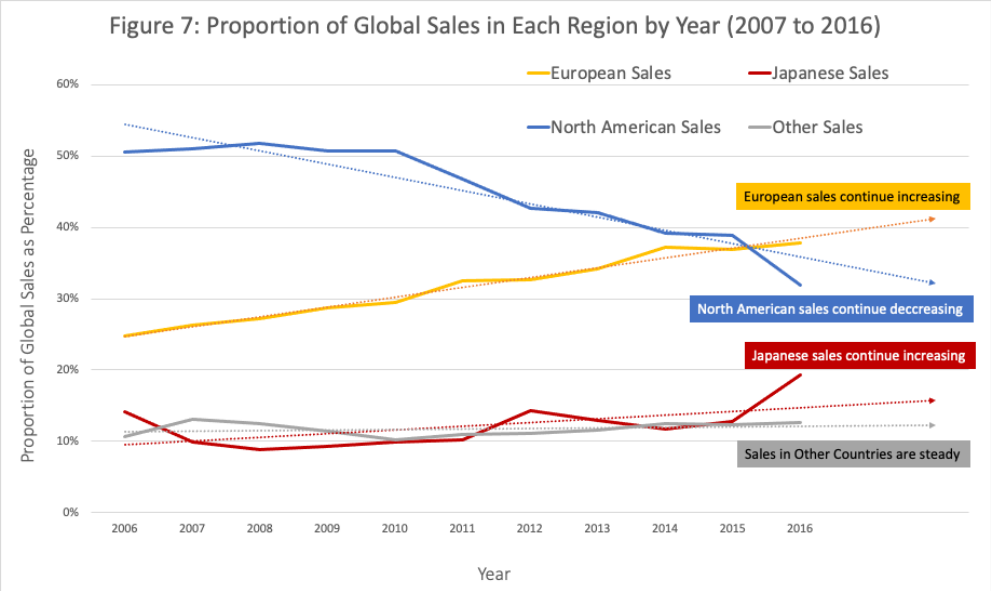


Figure 7 shows the proportion of global sales in each region over the last decade (2007 to 2016).

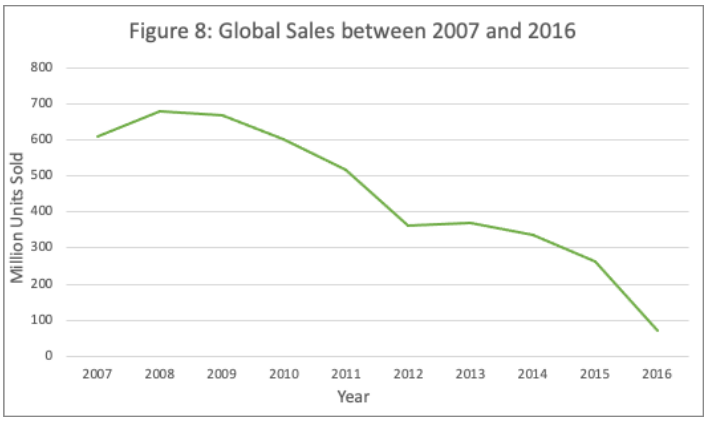
[The data has been filtered to remove the N/A entries and all years except 2007 to 2016]

- In 2006 North America had approximately half the market share (49%), followed by Europe (27%) and then Japan (14%).
- **However, over the decade North America's market share has dropped to around a third.**
- **Europe, whose market share has risen throughout the decade, now has the highest proportion (38%).**
- Meanwhile the Japanese market has stayed between 9% and 19%.
- The market share in the Other Countries has risen from around 11% to 13%.
- **Linear forecasts predict that these trends will continue.**

The data suggests that sales for the various geographic regions have changed over the years. This is not GameCo's current understanding and the marketing budget should be revised to reflect the changes in market share.

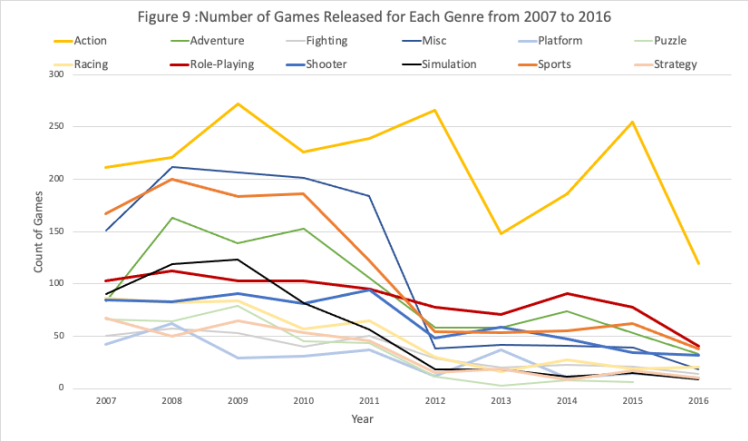
What is likely to happen in future?

Figure 8 shows the Global Sales between 2007 and 2016



- **Since 2008 the number of million units sold globally has declined from 678.78 to 70.89 million units sold.**
- North American Sales which has the highest positive correlation with Global Sales also declined over the last 5 years.
- The drop in sales could be due to the increase in the digital market share for software. Therefore an analysis of the digital market is recommended.

Figure 9 shows the number of games released over the last decade for each genre.



- Since 2008 for all genres (except Action games which is more erratic) **the overall trend shows a decrease in the number of games released over the decade**.
- The drop in the number of games released could be due to the increase in the digital market share for software. Therefore an analysis of the digital market is recommended.

Since 2008 the number of million units sold globally and the number of games released has declined. This could be due to the increase in the digital market share for software and an analysis of this market is recommended.

Are certain types of games more popular than others and has this changed over time?

Table 4 - Sales (number of million units sold) by genre over the last decade.

Year	Action	Sports	Shooter	Misc	Role-Playing	Racing	Platform	Simulation	Fight-ing	Adventure	Puzzle	Strategy
2007	106.50	98.20	71.04	92.27	43.89	39.17	35.59	48.97	17.61	24.43	24.00	9.42
2008	136.39	95.34	59.51	87.03	59.83	**70.66**	35.70	46.76	35.38	24.90	15.59	11.69
2009	139.36	**138.52**	69.89	76.94	47.90	34.19	**41.09**	33.71	32.15	20.60	20.31	12.56
2010	117.64	92.53	77.41	**96.86**	70.52	34.93	31.90	22.15	14.89	16.53	11.18	13.87
2011	118.96	56.99	99.36	56.08	53.37	35.01	28.11	15.28	22.68	15.90	5.11	9.06
2012	122.04	30.93	72.86	22.92	47.81	14.46	18.55	13.38	9.51	5.99	1.76	3.33
2013	125.22	41.55	62.80	25.65	44.92	13.04	25.12	8.67	7.21	6.53	0.99	6.33
2014	99.02	46.66	66.00	23.68	45.86	16.69	8.89	5.55	16.15	6.02	1.50	0.99
2015	70.70	41.54	66.15	11.69	36.44	7.92	6.05	5.62	7.78	7.99	0.70	1.82
2016	19.91	14.60	18.22	1.17	6.76	1.64	2.07	0.39	3.86	1.77		0.50
Total	**1055.74**	**663.24**	**656.86**	**494.29**	**457.3**	**267.71**	**233.07**	**200.48**	**167.22**	**130.66**	**81.14**	**69.57**

* The four numbers in bold include the outliers identified in table 3 above.

- **Action is consistently the most popular genre (number of million units sold). However it also had the most games released during this time.**
- **The genres Sports and Shooter are the next best sellers, while the genres Strategy and Puzzle have remained in the bottom three; with no games released for Puzzle in 2016.**

The top three (number of million units sold) genres over the last decade are Action, Shooter and Sports. The genres Strategy and Puzzle have remained in the bottom three; with no games released for Puzzle in 2016.

Table 5 - Changes in genre ranking over the last decade.

Year	Rank											
	1	2	3	4	5	6	7	8	9	10	11	12
2007	Action	Sports	Misc	Shooter	Simulation	Role-Playing	Racing	Platform	Adventure	Puzzle	Fighting	Strategy
2011	*Action*	*Shooter*	*Sports*	*Misc*	*Role-Playing*	*Racing*	*Platform*	*Fighting*	*Simulation*	*Adventure*	*Strategy*	*Puzzle*
2015	*Action*	*Shooter*	*Sports*	*Role-Playing*	*Misc*	*Adventure*	*Racing*	*Fighting*	*Platform*	*Simulation*	*Strategy*	*Puzzle*
2016	Action	Shooter	Sports	Role-Playing	Fighting	Platform	Adventure	Racing	Misc	Strategy	Simulation	-

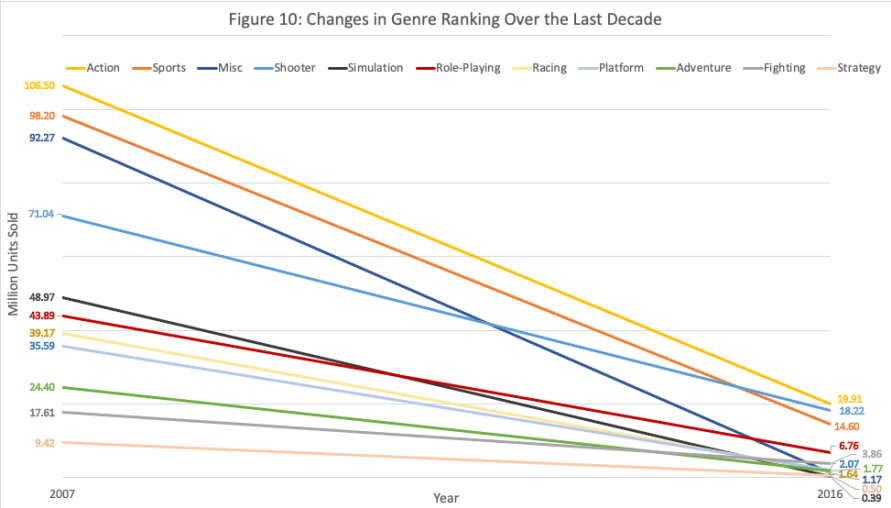


Table 5 and Figure 10 (sales for the Puzzle genre have been excluded in the figure due to no data in 2016) show the changes in genre ranking over the last decade.

- **The genre Shooter is now in second place and had fewer games released during this time than Role-Playing and Sports.**
- The genre Misc has dropped out of the top four and **Role-Playing has moved to fourth place.**
- The Fighting genre has become more popular (moving from eleventh place to fifth), while the Simulation genre has decreased in popularity (moving from fifth place to eleventh place).

Over the years Role-Playing and Fighting have increased in popularity, while the genres Misc and Simulation have decreased in popularity.

Which genres are performing best in the different regions?

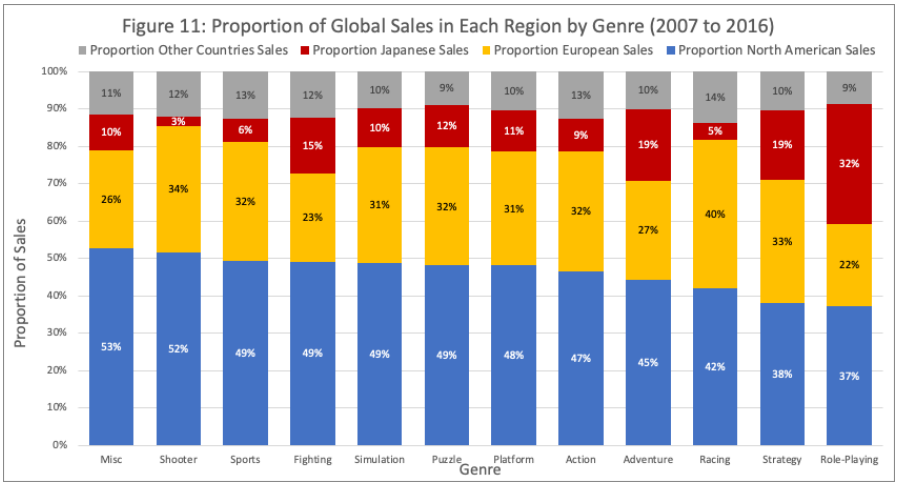
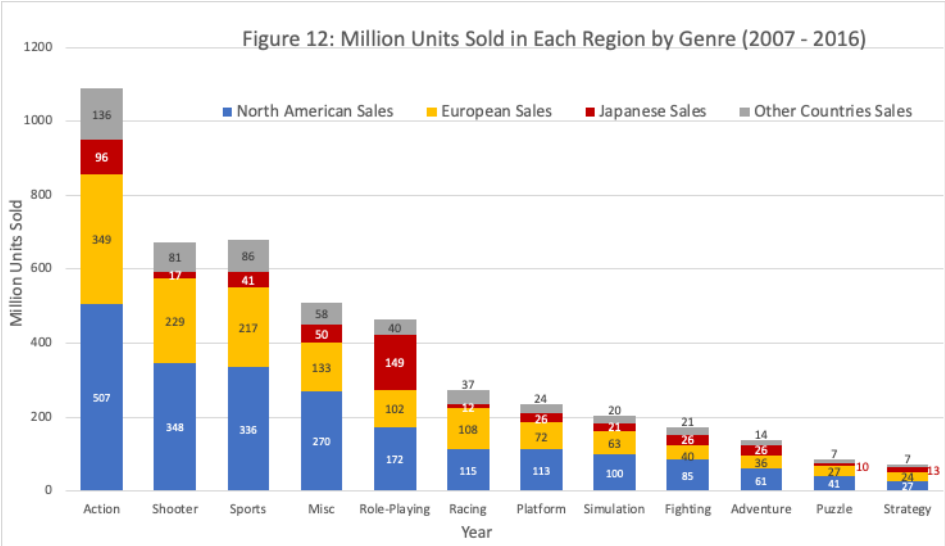


Figure 11 shows the proportion of global sales over the last decade in each region.

- **North America has the highest proportion of global sales for all the genres.**
- Europe has a greater proportion of the global sales than Japan, for all the genres except Role-Playing which has the highest proportion of global sales in Japan (32%).
- Misc (53%) has the highest proportion of global sales in North America followed by Shooter (52%).
- Racing (40%) the highest proportion of global sales in Europe followed by Shooter (34%).

There are regional differences in sales. North America has the highest proportion of global sales for all the genres. Europe has a greater proportion of the global sales than Japan for all genres except Role-Playing.

Figure 12 shows the number of million units sold in each region for the nine highest selling genres.



- **North America has the highest number of million units sold for all the genres.**
- Action has the highest number of million units sold in both North America and Europe, but not Japan where Role-Playing has the highest number of sales.
- Shooter and Sports are the second and third highest selling genres in North America and Europe, but Shooter is one of the lowest selling genres in Japan.

How have the sales figures for the genres varied between geographic regions over time?

The twelve graphs above show how sales for each genre has varied by region over time.

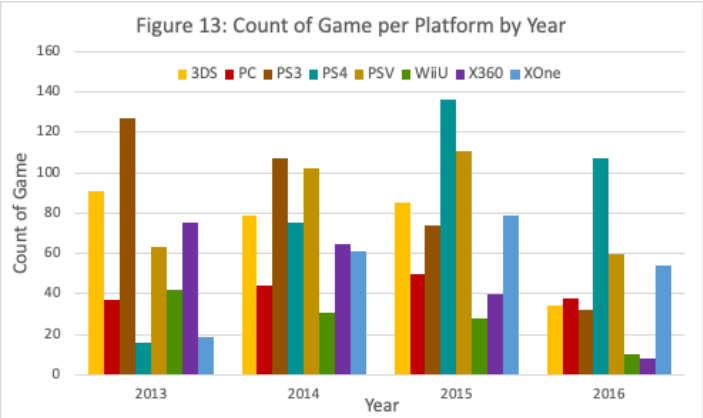
- **For all the genres the number of million units sold have decreased over the last decade. The decrease in sales is most noticeable between 2015 and 2016.**
- Until 2015 sales for the Action genre were increasing in Europe then they started to fall and in Japan they have been relatively stable.
- In Europe and North America sales of the Shooter genre increased up to 2011, then in 2012 the fell but remained relatively stable until 2016. Sales in Japan are much lower but more consistent.
- Sales of the Role-Playing genre were relatively constant until 2015 and then they fell in 2016.
- In Japan sales of the Racing genre were only above 2 million units sold in 2008 and 2011. Since 2021 sales have been higher in Europe than North America.
- Since 2011 in all the regions sales of the Puzzle genre have been below 1 million units sold and there is no data for 2016.
- In all the regions sales of the Strategy genre have been below 1 million units sold since 2014.

In the North American, European and Japanese regions the number of million units sold have decreased over the last decade for all genres. The decrease in sales is most noticeable between 2015 and 2016.

Which gaming platforms are currently the most popular?

[PS4 and XOne were released in 2013 therefore the years were filtered to only include the last four]

Figure 13 shows the number of games released per platform over the last four years.



- **Fewer games were released in 2016 for all the platforms than in 2015.**
- PS4 now has the highest number of games; previously it was its predecessor PS3.
- PSV has the second highest number of games followed by XOne, which is replacing X360.
- WiiU had the lowest number of games and its popularity appears to be declining with no apparent successor.

The platforms that are currently (2016) in operation: 3DS, PC, PS3, PS4, PSV, WiiU, X360 and One. There were fewer games released in 2016 for these platforms compared to 2015. Over half of the games released were for PS4, PS3 and PSV.

Are there variations between regions?

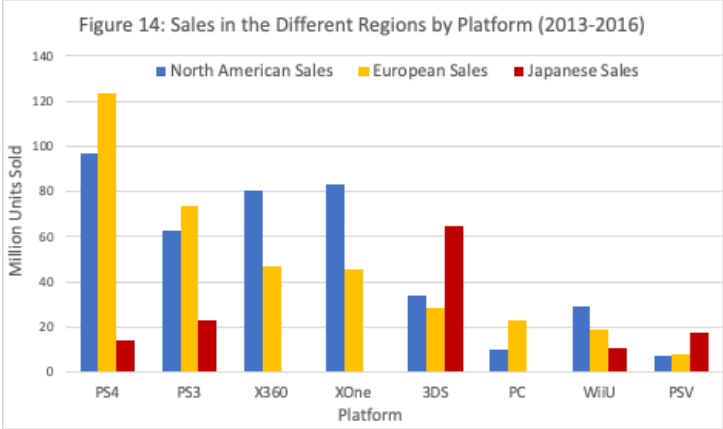


Figure 14 shows the number of million units sold per region for the most recent platforms.

- **Over the last four years the highest number of million units sold are for PS4; nearly double the number of units sold for XOne and more than double that of 3DS.**
- **There are regional differences in the number of million units sold on each platform.**
- PS4 has the highest number of million units sold in Europe followed by PS3. However Japan has the highest sales for PSV.
- There are more sales for X360 and XOne in North America than Europe, but sales are below 1 million units in Japan.
- Japan has the highest number of million units sold for 3DS, but zero for PC.

Currently PS4 is the best performing platform. There are regional differences in the number of million units sold on each platform. PS4 has more sales in Europe, XOne has more sales in North America and 3DS has more sales in Japan

What other publishers will likely be the main competitors in certain markets?

[This analysis will only look at the four genres Action, Sports, Shooter and Role Playing and the platforms 3DS, PC, PS4, PSV, WiiU and XOne over the last four years. All Sony Computer Entertainment publishers were grouped together - Sony Computer Entertainment, Sony Computer Entertainment America and Sony Computer Entertainment Europe (Sony Online Entertainment had no sales during this four year period) - and the top 6 Publishers (number of million units sold over the last decade) were filtered out.]

Table 6 - Top 6 publishers (million units sold) sales per platform over the last four years.

Publisher		Total	Per Platform					
			3DS	PC	PS4	PSV	WiiU	XOne
Nintendo	Sales	131.99	**84.91**	-	-	-	**47.08**	-
	No. of Games	*85.00*	*50.00*	-	-	-	*35.00*	-
Electronic Arts	Sales	97.05	0.70	**10.07**	**55.32**	1.34	0.28	**29.34**
	No. of Games	*78.00*	*2.00*	*20.00*	*26.00*	*2.00*	*1.00*	*27.00*
Activision	Sales	72.73	1.51	4.31	40.26	0.17	2.93	23.55
	No. of Games	*79.00*	*14.00*	*9.00*	*21.00*	*2.00*	*13.00*	*20.00*
Ubisoft	Sales	58.41	0.04	4.97	31.66	0.49	3.34	17.91
	No. of Games	*84.00*	*1.00*	*20.00*	*24.00*	*5.00*	*9.00*	*25.00*
Sony Computer Entertainment (Grouped)	Sales	45.86	-	-	38.88	**6.98**	-	-
	No. of Games	*39.00*	-	-	*22.00*	*17.00*	-	-
Take-Two Interactive	Sales	42.20	-	3.04	25.31	0.85	-	13.00
	No. of Games	*36.00*	-	*10.00*	*12.00*	*2.00*	-	*12.00*

* The numbers in bold are the **highest** for each platform and the numbers in purple have a high number of games with lower sales.

- The top 6 publishers over the last four years ranked by number of million units sold are: Nintendo, Electronic Arts, Activision, Ubisoft, Sony Computer Entertainment (Grouped) and Take-Two Interactive.
- The number of video games released by the top 6 publishers (million units sold over the last four years) follows the overall trend and has also dropped.
- Nintendo who only publish on 3DS and WiiU has the highest sales for these platforms. Take-Two Interactive do not publish on 3DS and WiiU.
- The Sony Computer Entertainment Group (who publish exclusively on PS4 and PSV) have the highest sales for the PSV platform and Electronic Arts has the highest sales for the PC, PS4 and XOne platforms.
- Activision produce a high number of games for 3DS and WiiU, but the number of million units sold is low. Similarly Ubisoft produced 20 games for the PC with sales below 5 million units sold.

Table 6 - Top 6 publishers (million units sold) sales per platform over the last four years.

Publisher		Total	Per Genre											
			Action	Adventure	Fighting	Misc	Platform	Puzzle	Racing	Role-Playing	Shooter	Simulation	Sports	Strategy
Nintendo	Sales	131.99	19.59	0.92	**12.47**	**8.01**	**20.82**	**2.61**	**6.96**	**42.74**	4.92	**8.55**	3.02	1.38
	No. of Games	*85.00*	*22.00*	*1.00*	*2.00*	*12.00*	*12.00*	*6.00*	***1.00***	*15.00*	*2.00*	*4.00*	*5.00*	*3.00*
Electronic Arts	Sales	97.05	0.78	-	-	-	0.52	-	6.21	3.61	28.31	4.66	**52.96**	-
	No. of Games	*78.00*	*2.00*	-	-	-	*3.00*	-	*7.00*	*3.00*	*18.00*	*5.00*	*40.00*	-
Activision	Sales	72.73	5.38	0.13	-	1.50	1.60	0.07	-	2.74	**57.86**	-	0.31	**3.14**
	No. of Games	*79.00*	*31.00*	*1.00*	-	*3.00*	*6.00*	*1.00*	-	*4.00*	*23.00*	-	*2.00*	*8.00*
Ubisoft	Sales	58.41	**29.53**	-	0.19	6.38	2.33	0.01	3.19	0.40	15.91	-	0.13	0.34
	No. of Games	*84.00*	*36.00*	-	*1.00*	*16.00*	*5.00*	*1.00*	*6.00*	*4.00*	*9.00*	-	*4.00*	*2.00*
Sony Computer Entertainment (Grouped)	Sales	45.86	16.84	**2.45**	-	6.46	5.23	-	2.00	1.50	9.50	-	1.88	-
	No. of Games	*39.00*	*14.00*	*3.00*	-	*3.00*	*5.00*	-	*1.00*	*4.00*	*4.00*	-	*5.00*	-
Take-Two Interactive	Sales	42.20	18.14	-	-	-	-	-	-	-	5.54	-	17.83	0.69
	No. of Games	*36.00*	*3.00*	-	-	-	-	-	-	-	*14.00*	-	*13.00*	*6.00*

* The numbers in bold are the **highest** for each platform and the numbers in purple have a high number of games with lower sales.

- For the Fighting, Misc, Platform, Puzzle, Racing, Role-Playing and Simulation genres Nintendo has the highest sales. They produced one game Mario Kart 8 for the Racing genre which sold 6.96 million units.
- Activision has the highest sales for Shooter and Strategy, but they do badly in the Action genre producing a high number of games with low sales.
- Electronic Arts has the highest sales for the Sports genre, Ubisoft for the Action genre and the Sony Computer Entertainment Group for the Adventure genre.

Table 7 - Top 15 games (million units sold) over the last four years.

Publisher	Game	Genre	Platform						Total
			3DS	PC	PS4	PSV	WiiU	XOne	
Activision	Call of Duty: Black Ops 3	Shooter	-	0.23	14.24	-	-	7.3	21.77
Take-Two Interactive	Grand Theft Auto V	Action	-	1.08	11.98	-	-	5.08	18.14
Nintendo	Pokemon X/Pokemon Y	Role-Playing	14.35	-	-	-	-	-	14.35
Activision	Call of Duty: Advanced Warfare	Shooter	-	0.41	7.6	-	-	5.13	13.14
Nintendo	Super Smash Bros. for Wii U and 3DS	Fighting	7.45	-	-	-	5.02	-	12.47
Bethesda Softworks	Fallout 4	Role-Playing		1.23	6.96			4.09	12.28
Electronic Arts	FIFA 16	Sports	-	0.18	8.49	-	-	3.23	11.9
Electronic Arts	Star Wars Battlefront (2015)	Shooter	-	0.54	7.67	-	-	3.49	11.7
Nintendo	Pokemon Omega Ruby/Pokemon Alpha Sapphire	Role-Playing	11.33	-	-	-	-	-	11.33
Electronic Arts	FIFA 15	Sports	0.45	0.3	6.59	0.84	-	2.15	10.33
Sony Computer Entertainment (Grouped)	Minecraft	Misc	-	-	4.02	2.25	0.43	2.41	9.11
Activision	Destiny	Shooter	-	-	5.65	-	-	3.28	8.93
Ubisoft	Assassin's Creed: Unity	Action	-	0.55	3.92	-	-	3.46	7.93
Activision	Call of Duty: Ghosts	Shooter	-	0.73	3.63	-	0.36	2.86	7.58
Nintendo	Mario Kart 8	Racing	-	-	-	-	6.96	-	6.96

- Out of the top 15 games only one was produced by a publisher not in the top six - Fallout 4 a Role-Playing game by Bethesda Softworks.

- There were only two games not in the top five genres - Minecraft a Misc genre game from the Sony Computer Entertainment Group and Nintendo's Mario Kart 8 a Racing genre game.

The top six (number of million units sold) publishers the last four years are Nintendo, Electronic Arts, Activision, Ubisoft, Sony Computer Entertainment (Grouped) and Take-Two Interactive. They publish over a range of genres that include the top three.

What is happening to their market share?

- Nintendo with the highest sales (million units sold) has grown its market in Japan.
- Electronic Arts with the second highest sales has grown its market in Europe. Ubisoft and the Sony Computer Entertainment Group have also grown their markets in Europe.
- Activision has grown its market in both Europe and Japan.
- Take-Two Interactive is the only publisher to increase its market share in North America. They have the second highest selling game - Grand Theft Auto V an Action genre game and this genre is popular in North America.

The majority of the top six publishers over the last four years grew their market share in Europe. Only one managed to grow their market share in North America.

Actions and Recommendations

- The marketing budget should be revised to reflect the decrease in North America's market share and the increase in both Europe and Japan.
- Check that GameCo is:
    - publishing over a range of genres that include the top three - Action, Sports and Shooter.
    - promoting the top 3 genres in Europe and North America and focusing on games for PS4 and XOne.
    - promoting the top 3 genres and Role-Playing in Japan and focusing on games for 3DS.

Before making any recommendations about the future an analysis of the digital market share for software is recommended.

Since 2008 the number of million units sold globally and the number of games released has declined. The 2008 financial crisis may have had an impact, but the market has never recovered. Why? Is there something else lacking in recent years e.g. innovative games, groundbreaking consoles?

A further decrease in sales is noticeable between 2015 and 2016. If this is not due to the digital market share what is happening?

- Further analysis of the best selling games and market developments in consoles (e.g. will anything replace the WiiU) may offer an insight.

Project Reflections

Step 1

The first step was to read the GameCo brief, pulling out the assumptions, needs of the key stakeholders and the key questions to form the business query.

Then came the data wrangling which gave me a better understanding of the data.

The exploratory data analysis was broken down into three parts:

- A descriptive analysis of the sales variables to examine their distributions and check for outliers / anomalies.
- An investigation to see if any of the sales variables are correlated with global sales.
- An exploratory data analysis of all the years to get an overview of the following areas on the key questions are based: global sales, sales within the regions, popular genres and popular platforms. During this phase a lot of pivot tables were constructed and some highlighting used when the table was too complex to graph quickly to discern any trends. This gave me an insight into some of the trends within the data, and the genres, platforms and regions to focus on during the in-depth analysis.

Based on the results of the exploratory data analysis the in-depth analysis covered the last 10 years (2007 - 2016) and concentrated on Europe, Japan and North America. It only considered the platforms that were popular in 2016: 3DS, PC, PS3, PS4, PSV, WiiU, X360 and One. The PS3 and PS4 were not grouped and neither were the XOne and X360. It would have distorted their sales figures

Finally for each key question an attempt was made to analyse the data in a way that would provide the answer.

The steps, summaries, groupings, filtering and visualisations are all on the previous pages and where groups, filters, etc. have been used this is mentioned in *[italicised square brackets]* .

Step 4

The visualisations that best answered the key question clearly and concisely were chosen for the presentation. They were all graphical as the tables in the report had too much information in them to be read quickly and easily in a presentation. In some cases the graphs in the presentation were the same as the exploratory analysis, but instead of all the years only focused on the last decade or for the platforms last four years filtering out all other years and the N/A entries.

Market Share Slide

The figure in this slide was chosen because it clearly shows how the proportion of global sales in each region has behaved over the last decade. Unlike the initial line graph it focuses only on the last ten years and a linear forecast has been added to predict the future trend.

It has all the information needed to answer GameCo's key question - Have sales for the various geographic regions stayed the same over time?

The insights derived from the other graphs and tables have been added as statements.

Popular Genres Slide

This graph summarises the information in Table 5 leaving out the intermediate years. It clearly shows the decline in sales for all genres and how their positions have changed over the last ten years. It was a refreshing change from making the usual bar charts, line graphs, etc.

Regional Sales Slide

This graph was chosen over Figure 11 showing the proportion of global sales over the last decade in each region. The stacked bar chart clearly shows the total number of units sold as well as the number in each region and you can still get an idea of the proportion of market share. Having the columns side by side would make it cluttered and difficult to read. The information from Figure 11 was placed in the top box as a statement.

Using some of the graphs of the regional sales for each genre would have made it more visually challenging and too cluttered. Instead the key information was added as statements.

Platforms Slide

For the presentation a simple column chart was chosen to show the number of million units sold on each platform in the different regions. With only 8 platforms each bar stands out and the low/zero sales in Japan for some platforms much more noticeable. The chart in the exploratory analysis was a stacked column chart.

Competitors Slide

The stacked bar charts were chosen to show market share. They are a bit cramped and the percentages not the easiest to see, but you can clearly see the trends in each graph.