

## **USER-GENERATED REVIEWS, GENRE, MPAA RATING AND TIME IN THEATER AS CORRELATES OF MOVIE BOX-OFFICE REVENUES**

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### **ABSTRACT**

This research looks at user-generated reviews (digital word-of-mouth), genre, time in theater, and MPAA rating in relation to movie box office and movie box office per theater for movies by the five major studios in the United States. Currently, the largest major motion picture studios hold over three-fourths of the market share. The data for this secondary analysis was collected from online sources. IMDb and Rotten Tomatoes provided user-generated reviews (rating mean score and quantity) and Box Office Mojo provided box-office figures as well as the number of theaters in which movies played. The data were analyzed using correlations or crosstabulation with chi square test. The correlation results showed a positive relationship between the dependent measures of box office and box office per theater with the independent measures of IMDb user ratings, Rotten Tomatoes user ratings, as well as the quantity of reviews on both IMDb and Rotten Tomatoes. In fact, the correlation was actually stronger for the quantity/number of reviews than it was for the overall/mean rating given in the reviews. Additionally, and not surprisingly, correlation analysis found positive relationships between box-office revenues and box-office revenues per theater and the time in theater. However, the correlation for box-office revenues was fairly weak, while the correlation for box-office revenues per theater were moderately strong. The crosstabulation with chi square test provided interesting insight into the differences between the genre and the box-office revenue and box-office per theater revenue, as well as between MPAA rating and box-office revenue and box-office per theater revenue.

*Keywords:* Movie ratings; User generated content; Word-of-mouth; Box-office revenue

### **INTRODUCTION**

The motion picture industry has a strong impact on culture as well as on the economy. In the U.S., the motion picture and television industries contribute approximately \$40 billion per year and \$47 billion in wages (Fried, 2015). The industry boosts not only the national economy but also state and local economies. For example, the filming of “Captain America: Winter’s Solider” boosted Ohio’s economy by \$31 million (Fried, 2015). In addition to spending money for hotel rooms and at small business during on location shootings, they bring film-induced tourism and they employ local workers. Twentieth Century Fox’s “Gone Girl” hired more than 8,750 people, while Sony’s “Breaking Bad” turned parts of Albuquerque into popular tourist attractions (Fried, 2015). The industry has an average annual salary of \$92,000, which is 79% higher than the average salary nationwide (Jenks, 2016). Additionally, as reported by the Economist (2016), the average cost of movie production today is about \$60 million. The cost of marketing averages approximately \$40 million, making the total average cost of producing and marketing a major motion picture roughly \$100 million. However, the impact movies have on the economy goes beyond the money spent on the production of the movie and its theatrical release. For example, Warner Bros. made \$500

million from selling *Batman* merchandise and \$251.1 million from the theatrical release (Lubbers & Adams, 2001). In 2016, the industry made \$262.9 billion from licensed merchandise and \$54.6 billion from corporate trademarks (Szalai, 2017).

As we can see, the motion picture industry has a big influence in the economic sector. Naturally, the major studios in the industry have a stronger impact than small, independent studios. In fact, according to the Box Office Mojo website, as of October 1, 2017 the top studios hold approximately 76% of the industry market share. That percentage is even higher (approximately 78%) if we look at studios' parent companies (Box Office Mojo). It has to be noted that the six major studios tend to release almost double the number of movies that are released by all the other studios combined (Numbers, 2017). Because the major studios have such an impact on the industry, the best way to understand the industry is to understand the major studios.

Because movies are so expensive, the revenue they make is important in deciding if more movies of the same type are made in the future (Berger & Raddick, 2017). One of the ways movie success is measured is through ticket sales at theaters. With the large number of major motion pictures released each year, 136 in 2016 (Numbers, 2017), multiple movies are released each weekend “and there's certainly not enough people to go around” (Einav, 2010). So how do people decide which movie they are going to see? According to Kim, Park and Park (2013) online word-of-mouth (user-generated reviews) and expert reviews are significant factors for the U.S. box office.

Godes and Mayzlin (2004) note that online conversations provide a unique opportunity to collect and measure word-of-mouth in an easy and cost-effective way. According to Baar (2016) 91% of consumers read online reviews. The number of people looking and reading online reviews before making a decision about a product or service is increasing (Baar, 2016). Of the people using online reviews, 88% say they trust the reviews as much as a personal recommendation (DeMers, 2015). This means that people are increasingly using online reviews to make their purchasing decisions and they have a great deal of trust in those reviews.

Analyzing the connection between digital word-of-mouth (reviews) and movies from five major studios will provide an insight into moviegoers' behavior as well as into the industry itself. Understanding how reviews are correlated with the movie box office may help predict future box-office return, which would influence the overall industry's economy.

## LITERATURE REVIEW

This section reviews existing literature on user generated reviews and ratings. More specifically, this section reviews the results of previous studies on reviews/ratings and their correlation with movie box-office revenue. These reviews or ratings can be written or given by either professionals or by consumers. Reviews written by consumers are considered user generated content (UGC) in much of the literature discussed.

### Reviews

Previous research on reviews has focused on reviews of movie critics and the role those critical reviews have on movie revenues and awards (Adams & Lubbers, 2000; Berger & Raddick, 2017; Lubbers & Adams, 2000). However, more recent research is more likely to focus on the online reviews and ratings of those attending the movie and how they may also influence the success of

a movie. User generated content (UGC) is created by the general public rather than by paid professionals/critics. UGC is most often found on the Internet in the form of blogs (including microblogs) or online ratings/reviews.

Previous research has concluded that blogs (Gopinath, Chintagunta, & Venkataraman, 2013) and microblogging word of mouth (MWOM) can impact movie sales. For example, Rui, Liu and Whinston's (2013) investigation of the role of Twitter chatter on movie sales found that MWOM through Twitter did influence sales and that the influence was escalated for those posting who had a higher number of followers. Additionally, Hennig-Thurau, Wiertz, and Feldhaus (2015) demonstrated that MWOM does influence the product adoption (movie viewing) by immediately disseminating the viewer's evaluation. Thus, organizations may benefit from identifying the influencers in the twittersphere. However, microblogging activity is relatively transient compared to the UGC aggregated at online review sites. Also, these sites can be accessed by millions, even billions of people, as opposed to the limited number of followers of someone on Twitter or similar microblogging medium. Thus, the current investigation attempts to add to the current body of knowledge related to online WOM, by focusing on UGC found in major online ratings and review websites.

It can be said that UGC is the modern version of word-of-mouth. Because of the association between UGC and word-of-mouth, the scale and scope of word-of-mouth has increased dramatically. Online reviews have become a major source of information and can be seen as a motivating factor in consumer purchasing decisions (Bansal & Voyer, 2000; Park, Lee, & Han, 2007). Fergie, Hunt and Hilton (2013) found that young people tend to appreciate UGC and find it useful. Creamer (2007) states that people generally prefer user-generated reviews to expert reviews by a margin of 6 to 1. Consumer reviews are also viewed as more credible and trustworthy (Archark, Ghose, & Ipeiritis, 2011). Moreover, Piller (1999) reported in the Los Angeles Times about a survey conducted by BizRate. Among 5,500 web consumers surveyed, 59% of the respondents considered user-generated reviews more valuable than expert reviews.

Chevalier and Mayzlin (2006) found that an increase in average star rating of a book resulted in higher relative sales of that book over time. Forman, Ghose and Wiesenfeld (2008) also concluded that the larger the number of positive reviews of a product the bigger the positive effect it had on sales.

**Quantity.** When looking at reviews and their relationship with box-office revenue, past research has focused on both quantity and quality. Reviews were found to have significant explanatory power. More importantly, this power comes from the volume of reviews and not necessarily their quality rating (Liu, 2006). Movie rating research has shown similar results. The explanatory power is not in the numerical value but rather in the quantity (Dellarocas, Zhang & Awad, 2007; Duan, Gu & Whinston, 2008).

It might seem contradictory that even though a movie has a low rating that the number of reviews it has could have a positive correlation with the box-office revenue. According to Duan et al. (2008), this is due to the awareness effect, which will increase product (movie) awareness through dispersion. Similarly, Berger, Sorensen and Rasmussen (2010) argue that even bad publicity can increase the likelihood of purchase, because of the increase of product awareness. For instance, if we consider a person browsing a movie website and coming across a bad review, it could be that it is the first time the person hears about the movie. Now that the person knows about the movie,

he/she might decide to go see it, despite the bad review through which he/she came in contact with the movie. Therefore, the negative publicity could lead to a positive effect on the box office.

**Quality.** As opposed to the research in the previous section, other researchers have found that the value or quality of the review has a stronger impact than the number of reviews. According to Chevalier and Mayzlin (2006) users are more likely to read the review text than rely only on summary statistics. They also indicate that a one-star review has a greater impact than the five-star review (Chevalier & Mayzlin, 2006). Forman et al. (2008) state that users not only base their decision on the positive or negative reviews, but that often the information in the reviews is used by the consumer to replace the product information. Hyeon-Cheol and Jae-Yeob (2016) reported the importance of the information source. Their research notes that while celebrity-endorsed marketing is good for posters, when it comes to online word-of-mouth, non-celebrity endorsement messages were more effective (Hyeon-Cheol & Jae-Yeob, 2016). Additionally, Archak, Ghose and Ipeiritis (2011) state that information in a review cannot be captured with a simple scaling system.

The existing literature provides somewhat conflicting results when it comes to quality versus quantity of reviews and their impact on the bottom line. Positive ratings have a significant positive relation to sales (Chevalier & Mayzlin, 2006; Forman et al., 2008). Other research indicates that UGC rating value did not have significant effect on box-office revenue (Dellarocas et al. 2007, Duan et al. 2008). However, Dellacorcas et al. (2007) attempted to predict box-office revenues. The proposed research does not try to predict the box-office revenue but looks at the correlation of reviews and the box-office revenues. This means that we look at the movie when they are no longer in the theaters and how much of that revenue was correlated with the UGC reviews. When looking at the results found in Chevalier and Mayzlin (2006) on ratings on Amazon, we find that the retail site and movie review sites used in our study have similar characteristics. All use the representation of ratings in the format of a scale by stars and show the number of reviews given for the product, and have a basic description of the product next to the rating.

Nevertheless, there are also some key differences in the way these ratings are calculated and presented to the user. Amazon has a very simple and straightforward calculation and representation of the product rating. Amazon uses all the reviews/ratings to generate the average overall score that is then displayed. Rotten Tomatoes uses the same process but it separates the general public reviews/ratings from the experts. Unlike with Amazon and Rotten Tomatoes, Internet Movie Database (IMDb) does not require its users to write a review to give a rating. Because of this, IMDb has a much larger number of ratings than Rotten Tomatoes. IMDb does offer user and critic reviews, but those do not “pop up” as much as the overall rating. According to Liu (2006) the volume of reviews/ratings has significant effect on box-office revenue. The large number of users rating a movie could have a positive impact on the box-office revenue (Dellarocas et al., 2007; Duan et al., 2008; Berger et al. 2010).

## **Genre**

It is common for people to select movies based on genre, cast of actors/actresses, theme, directors, producers, etc. According to Redfern (2012) there is a relationship between genre and U.S. box office. He indicates that Fantasy/Science Fiction movies tend to have the highest box office. In fact, of the top 20 grossing movies between 1991 and 2010, eight were Fantasy/Science Fiction (Redfern). On the other hand, as Redfern (2012) notes, the highest grossing genre is Family with

a total gross of \$23.6 billion. According to the website *Numbers* (2017), between 1995 and 2017 the highest grossing genre was Adventure with average total earnings of \$46.4 billion. A newer trend shows superhero movies taking the lead on the top-earning list. In 2014, five of the top 11 in box-office earnings were movies featuring superheroes (Moltenbrey, 2014). According to Redfern (2012), all top grossing movies have elements of the Fantasy/Science Fiction genre. This claim is how Redfern (2012) explains the variation of yearly changes in top grossing movies and genres while supporting the idea of the trend that Fantasy/Sci-Fi movies are more likely to be successful at the box office.

Unlike the apparent connection between the genre and box office, there is limited research on the connection between the movie genre and the user-generated reviews. The results of research by Ramos, Calvão and Anteneodo (2015) indicates that movie genre does not have an impact on the number of reviews users generate.

### **U.S. Box-Office**

The term box office is used to refer to the commercial success of a movie in terms of revenue made from movie theater ticket sales. The box office, and more specifically the prediction of a movie's box office, have been a popular topic for researchers ever since motion pictures became an industry. Researchers used different angles and approaches to determine what has an impact on the box office and what most accurately predicts the success of a movie. As noted above, some researchers believe that the movie genre is more likely to predict the box-office success of a movie. For instance, Redfern (2012) uses the genre lens to analyze the movie's box-office success, showing that certain genres are more likely to have a higher box office than others. Other researchers, including Lindner, Lindquist and Arnold (2015), use female presence in a movie as a lens for box-office success. They concluded that movies with female character centered stories generally earn less at the box office. Another lens to analyze the box office is promotion, anything from advertising to word-of-mouth recommendations. For example, Dellarocas et al. (2007) showed the power of online ratings in predicting box office by associating the reviews with word-of-mouth.

### **MPAA Ratings**

The Motion Picture Association of America's (MPAA) film-rating system categorizes movie content as suitable for certain audiences (G=general, PG=parental guidance suggested, R=restricted, etc.). According to Ravid (1999) MPAA ratings have an influence on the box office with G and PG having a higher return. This is consistent with the *Numbers* (2017) statistics, which show PG-13 movies having the highest total gross \$97.9 billion between 1995 and 2107. This gives them 47.27% of the market share (*Numbers*, 2017). Austin, Nicolich and Simonet (1981) found that the MPAA ratings affect the box office in two ways: positively by PG and G ratings and negatively by R and X (current NC-17). The study showed a success ratio of categories based on box office with PG having the highest success ratio (26.7%) (Austin, et al., 1981).

### **Time in Theaters**

Major motion pictures stay in theaters for an average of four weeks and play in 2,000 theaters (Fahey, 2015). Not surprisingly, Fahey (2015) notes that there is a correlation between the time a movie is in theaters and box office. Fahey (2015) also notes that contract terms between studios

and theaters are different for each theater, nevertheless, a general rule is a minimum running time of two weeks. In the last few years there is talk among studios about shrinking the theatrical release window, the time movies are released only in theaters, from a few months to as little as a few weeks. Studios plan movie releases based on the most profitable times for DVD sales, and work within the time frame from theatrical release to the potential profitable sale month (Macnab, Niola, Blaney, Cabeza, & Goodfellow, 2017). Huddleston (2017) states that major movie studios are having discussions with digital distributors on how to offer new films earlier online. The earliest online releases would be 17 days after a film is released in theaters (Huddleston, 2017).

## RESEARCH QUESTIONS AND HYPOTHESES

The review of literature has identified five research questions and several hypotheses that will be the focus of the research. The research and hypotheses cover some of the contradicting ideas, such as reviews relationship to box-office success.

**RQ1:** How does the quality of digital word-of-mouth (e.g. user-generated reviews) correlate with box-office revenue for the five major motion picture studios?

H1: The user-generated review ratings score of movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H2: The user-generated review ratings score of movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

**RQ2:** How does the quantity of user-generated reviews correlate with box-office revenue for the five major motion picture studios?

H3: The number of user-generated reviews for movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H4: The number of user-generated reviews for movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

**RQ3:** How does the number of weeks a movie is in the theater correlate with box-office revenue for the five major motion picture studios?

H5: The number of weeks a movie is in the theater for movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H6: The number of weeks a movie is in the theater for movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

**RQ4:** Are there significant differences between movie genres and the associated box-office revenue for the five major motion picture studios?

H7: There will be no statistically significant difference between the movie genre of movies released by the five major studios and the associated gross box-office revenue.

H8: There will be no statistically significant difference between the movie genre of movies released by the five major studios and the associated box-office revenue per theatre.

**RQ5:** Are there significant differences between movie MPAA rating and the associated box-office revenue for the five major motion picture studios?

H9: There will be a statistically significant difference between the movie MPAA rating of movies released by the five major studios and the associated gross box-office revenue.

H10: There will be a statistically significant difference between the movie MPAA rating of movies released by the five major studios and the associated box-office revenue per theatre.

## METHODS

This section describes the variables and analysis that will be used to determine the correlation between online user-generated reviews and box-office revenue. The section will also address the type of data used as well as where the data were collected. Moreover, the reasoning for the sample used in the study is explained.

### Independent Variables

The independent variables were the online user-generated reviews, the movie genre, the movie time in theater, and the MPAA rating. This data was collected online directly from review sites. This type of data collection provided a good sample size that not only incorporated positive and negative comments but also captured the diversity of the population. Since the two largest movie review sites were used for data collection, it is closely related to what people looking at online reviews across the world would see.

The sites used to collect the data are the two most popular and respected movie review sites, Rotten Tomatoes ([www.rottentomatoes.com](http://www.rottentomatoes.com)) and IMDb ([www.imdb.com](http://www.imdb.com)). These are free, user-generated review sites that do not require any login to view the comments. Both sites have a 10-point base rating system, which allows for the reviews to be combined into a single data set with equal weight being given to the review score for each site. IMDb is one of the largest and most popular movie databases on the web, with an audience of “more than 250 million unique monthly visitors” (IMDb). “IMDb is an important resource for improving our understanding of spectator response” (Canet, Valero & Codina 2016). Canet et al. (2016) note the importance of this dataset by addressing the amount of research conducted that uses IMDb.

Rotten Tomatoes is a “leading aggregator” of movie and television show reviews. It offers a comprehensive guide to what is fresh and is used by millions every day “to help with their entertainment viewing decisions” (Rotten Tomatoes).

Another independent variable will be the total number of reviews. The number of reviews left by users will give us the quantitative measure we need to correlate the quantity of reviews and the box-office revenue. The data will be collected from IMDb and Rotten Tomatoes, the same sites used to gather the review data. This provided consistency among the variables.

An additional independent variable is movie genre. A movie genre is a category for films characterized by similarities in narrative elements or emotional response to the film (Tudor, 2003). The variable used basic movie genres such as comedy, drama, horror etc. opposed to hybrids such as action-adventure, romantic-comedy, etc. The data was collected from the IMDb site only, because Rotten Tomatoes does not provide genre information.

The fourth independent variable used was MPAA rating. A committee assigns this rating to the movie based on the film’s content suitability for certain audiences (MPAA). The data was collected from the IMDb and Rotten Tomatoes.

The final independent variable used was time in theater. This variable refers to the number of weeks a movie was available for viewing in theaters across the country. The data was collected from Box Office Mojo only, because IMDb and Rotten Tomatoes do not provide information about the time a movie was in theaters.

### **Dependent Variable**

The dependent variable will be the box-office revenue of the first run theatrical release in the United States of five major studios: Disney Pictures, Sony Pictures, Universal, 21<sup>st</sup> Century Fox, and Warner Bros. The data collected will be divided into two dependent variables. The first will be the gross domestic revenue from theaters. To make a more standardized comparison the second will be the domestic revenue per theater. The five studios were chosen because they had the largest domestic box office in 2016 (Numbers, 2017). These studios together released 67.9% of all the movies released since 1995 (Numbers, 2017). The individual movie revenues will be collected from Box Office Mojo ([www.boxofficemojo.com](http://www.boxofficemojo.com)), a website that tracks box-office revenue in a systematic, algorithmic way (Box Office Mojo). The study will cover the movies released by one of the five studios that closed their first run theatrical release in the years 2011 through 2016. The six-year timeframe was selected because it provides a large number of cases as well as the most recent full data available.

### **Analysis**

The data will be analyzed through correlation using the Pearson's correlation coefficient. The correlation analysis will be run using the statistical analysis program SPSS. The test will be run on all dependent variables for all movies. This means that each dependent variable will be compared with its corresponding independent variable. Additionally, the results will be compared between the two review sites. The results will also be divided by movie genre and compared to box-office revenues. For the categorical test of genre and MPAA ratings a Chi Square was used.

## **RESULTS**

This section reports and explains the research findings. The section discusses findings answering the research questions and hypothesis as well as descriptive findings. The descriptive findings help understand the results and the data by providing some general information. All the data was analyzed using SPSS 25, software designed to perform statistical analysis.

### **Description of the Variables**

**Movie studios.** The five major studios released 457 movies in theaters from 2011 through 2016. As can be seen in Table 1, Warner Bros. released the highest number of movies. Disney, on the other hand, released the fewest movies.

Table 1. *Studio’s Movie Release Totals*

	Frequency	Percent
Disney	54	11.8
Sony	79	17.3
Universal	104	22.8
WB	126	27.6
21 <sup>st</sup> Century	94	20.6
Total	457	100.0

**User ratings – IMDb.** On the IMDb site, the average movie rating had a mean of 6.47 stars. The range was 5.3 with the minimum 3.3 and the maximum 8.6, and standard deviation was 0.86.

**User ratings – Rotten Tomatoes.** On the Rotten Tomatoes site, the average movie rating had a mean of 5.95 stars. The range was 7.4 with the minimum 1.8 and the maximum 9.2, and standard deviation was 1.73. The standard deviation for Rotten Tomatoes is twice that of IMDb indicating that the individual scores were more dispersed than those found on IMDb.

**Number of reviews - IMDb.** On the IMDb site, the number of movie reviews had a mean of 54,174.22. The scores range was 1,258,135 with the minimum 235 and the maximum 1,258,370, and standard deviation was 168,651.88.

**Number of reviews - Rotten Tomatoes.** On the Rotten Tomatoes site, the number of movie reviews had a mean of 96,991.33. The scores maximum was 1,208,945 and the minimum 78 with the range 1,208,867, and standard deviation was 119,206.96.

**MPAA rating.** As can be seen in Table 2, of the 457 movies released by major studios four did not have MPAA ratings. The majority of the movies in the data set were rated PG-13 (186) closely followed by R rated movies (156). Because there are so few G-rated movies, for later analysis the G-rated movies will be coded with the PG movies.

Table 2. *MPAA Rating*

	Frequency	Percent
G	15	3.3
PG	96	21.0
PG-13	186	40.7
R	156	34.1
Total	453	99.1
No MPAA Rating	4	.9
Total	457	100.0

**Genre.** The movies were sorted into 12 primary (first) genres. Table 3 shows the frequency of movies that were assigned a particular genre. Because some genres have so few movies that it would invalidate statistical tests, for later analysis the five genres with less than 20 movies will not be included.

*Table 3. Genre Totals*

Genre Title	Number of Movies
Action	141
Comedy	94
Animation	54
Drama	53
Biography	26
Horror	22
Crime <sup>a</sup>	14
Documentary <sup>a</sup>	9
Fantasy <sup>a</sup>	2
History <sup>a</sup>	1
Romance <sup>a</sup>	1
Total	457

<sup>a</sup> Indicates that the genre was excluded from later analysis because of the low frequency count.

**Box office.** The mean for Box-Office revenue was \$86,755,536.45. The scores range was \$652,267,810 with the minimum \$2,815 and the maximum \$652,270,625, and standard deviation was 90,090,384.47.

**Box office per theatre.** The mean for box-office revenue per theater was \$26,055.74. The scores range was \$279,055 with the minimum \$117 and the maximum \$279,172, and standard deviation was 25,042.78.

**Time in theater.** The median for the time a movie was in theaters was 13 weeks. The scores range was 265 weeks with the minimum stay being 1 week and the maximum 266 weeks. The standard deviation was 15.53.

## Results for Research Questions and Hypotheses

This section reports the results for each research question and the associated hypotheses. Thus, the results answer the question and provide support for or reject the hypotheses associated with the research question.

**RQ1:** How does the quality of digital word-of-mouth (i.e. user-generated reviews) correlate with box-office revenue for the five major motion picture studios?

H1: The user-generated review ratings score of movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H2: The user-generated review ratings score of movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

A 2-tailed Pearson product-moment correlation test was conducted to assess the relationship between review ratings and box office as well as between review ratings and box office per theater. In both cases there was a positive, statistically significant correlation between the variables. The correlation between both IMDb is ( $r_{(455)} = 0.417$ ,  $p = 0.000$ ) and Rotten Tomatoes is ( $r_{(454)} = 0.473$ ,  $p = 0.000$ ) review ratings and box office was moderate in strength. The correlation between the Rotten Tomatoes review ratings and box office per theater was moderate,  $r_{(454)} = 0.434$ ,  $p = 0.000$ , while the correlation between IMDb review ratings and box office per theater was weak to moderate,  $r_{(455)} = 0.380$ ,  $p = 0.000$ . This means that both H1 and H2 were supported by the results. Additionally, the positive correlation values indicate that as the rating score increased, so did the box-office return and the box-office return per theater.

**RQ2:** How does the quantity of user-generated reviews correlate with box-office revenue for the five major motion picture studios?

H3: The number of user-generated reviews for movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H4: The number of user-generated reviews for movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

A 2-tailed Pearson product-moment correlation test was also conducted to evaluate the relationship between the number of user-generated reviews and box office as well as between the number of user-generated reviews and box office per theater. In both cases there was a positive, statistically significant correlation between the variables. The correlation between both IMDb's ( $r_{(455)} = 0.674$ ,  $p = 0.000$ ) and Rotten Tomatoes' ( $r_{(454)} = 0.650$ ,  $p = 0.000$ ) number of reviews and box office was strong. The correlation between the IMDb number of reviews and box office per theater was moderate to strong,  $r_{(455)} = 0.560$ ,  $p = 0.000$ , while the correlation between the Rotten Tomatoes number of reviews and box office per theater moderate,  $r_{(454)} = 0.522$ ,  $p = 0.000$ . This means that both H3 and H4 were also supported by the results of the correlation analysis. Additionally the positive correlation coefficients indicate that as the number of user-generated reviews increased, so did the box-office return and the box-office return per theater.

**RQ3:** How does the number of weeks a movie is in the theater correlate with box-office revenue for the five major motion picture studios?

H5: The number of weeks a movie is in the theater for movies released by the five major studios will be significantly correlated with the associated gross box-office revenue.

H6: The number of weeks a movie is in the theater for movies released by the five major studios will be significantly correlated with the associated box-office revenue per theatre.

A 2-tailed Pearson product-moment correlation test was also conducted to evaluate the relationship between the movie's time in theater and box office as well as between the movie's time in theater and box office per theater. In both cases there was a positive, statistically significant correlation between the variables. The correlation between the movie's time in theater and box office was weak,  $r_{(454)} = 0.203$ ,  $p = 0.000$ . The correlation between the movie's time in theater and box office per theater was moderate to strong,  $r_{(454)} = 0.586$ ,  $p = 0.000$ . Therefore, both H5 and H6 were confirmed. Additionally, the positive correlation coefficients indicate that the longer a movie stays in theaters, the box-office revenue increases, especially for box office per theater.

**RQ4:** Are there significant differences between movie genres and the associated box-office revenue for the five major motion picture studios?

H7: There will be no statistically significant difference between the movie genre of movies released by the five major studios and the associated gross box-office revenue.

H8: There will be no statistically significant difference between the movie genre of movies released by the five major studios and the associated box-office revenue per theatre.

A crosstab table (see table 4) with chi-square calculation was used to evaluate the relationship between movie genre and box office as well as between movie genre and box office per theater. Because the box office and box office per theater data was continuous it was necessary to divide the data into categories to compare it to the categorical genre data. Five categories were created by sorting the movies low to high box office and dividing the movies into 20% categories of the total number of movies. The same process was used for the box office per theater categories.

Table 4. *Crosstabulation Genre and Box Office*

Genre	Box Office <sup>a</sup>					Total
	<\$26.9	\$26.9-\$54.0	\$54.0-\$90.4	\$90.4-\$201.1	\$201.1+	
Action	17	28	27	34	35	141
Adventure	6	8	8	8	10	40
Animation	3	3	7	15	26	54
Biography	9	5	5	5	2	26
Comedy	16	25	25	20	8	94
Drama	18	14	8	7	6	53
Horror	9	3	7	1	2	22
Total	91	92	92	91	91	457

<sup>a</sup> per \$100,000

The chi-square test showed that there is a statistically significant difference between the movie genre and its box-office success,  $X^2_{(20)} = 67.28$ ,  $p = 0.000$ . The results for the relationship between genre and box office per theater were very similar to the one for the genre and box office,  $X^2_{(20)} = 50.13$ ,  $p = 0.000$ . The crosstabulation analysis for genre and box office (table 4) indicated that Action, Animation and Biography had lower count in the lower box-office category than expected and a higher count in the higher box-office category than expected. On the other hand, Drama had double the number than expected in the lower box-office category and about half the expected count in the higher box-office category. This means that movies in the Action, Animation and Biography genres are more likely to have a higher box-office return.

The crosstabulation analysis for genre and box office per theater (table 5) indicated that Animation had a significantly lower count than expected in the lower box office per theater category and a significantly higher count than expected in the higher box office per theater category. Drama, again, and Comedy had a higher than expected count in the lower box office per theater category, and a lower than expected count in the higher box office per theater category. Also, Action and Adventure genres had an expected count in the lower box office per theater category but had higher than expected counts in the higher box-office per theater category. This means that movies in the Animation genre are more likely to have a higher box-office per theater return. Based on these the null hypotheses H7 and H8 were rejected because there were statistically significant differences.

Table 5. Crosstabulation Genre and Box-Office per Theater

Genre	Box-Office per Theater					Total
	<\$9.7	\$9.7-\$15.5	\$15.5-\$23.4	\$23.4-\$37.5	\$37.5+	
Action	24	26	26	30	35	141
Adventure	6	7	9	6	12	40
Animation	3	5	9	15	22	54
Biography	7	4	7	6	2	26
Comedy	13	29	23	20	9	94
Drama	17	12	8	10	6	53
Total	70	83	82	87	86	408

**RQ5:** Are there significant differences between movie MPAA rating and the associated box-office revenue for the five major motion picture studios?

H9: There will be a statistically significant difference between the movie MPAA rating of movies released by the five major studios and the associated gross box-office revenue.

H10: There will be a statistically significant difference between the movie MPAA rating of movies released by the five major studios and the associated box-office revenue per theatre.

A 2-tailed Pearson product-moment correlation test was conducted to evaluate the relationship between the movie MPAA rating and box office as well as between the movie’s MPAA rating and box office per theater. There is a very weak negative correlation between the movie MPAA rating and box office as well as MPAA rating and box office per theater,  $r_{(451)} = -0.179$ ,  $p = 0.000$  and  $r_{(451)} = -0.191$ ,  $p = 0.000$  respectively. Although the correlation is significant to the 0.01 level, it is not meaningful because of the very weak correlation coefficients. However, because the MPAA rating is not a continuous variable an additional non-parametric measure was used.

A crosstab table with a chi-square calculation was also used to evaluate the relationship between movie MPAA rating and box office as well as movie MPAA rating and box office per theater (see table 6 and 7). There is a statistically significant differences in the expected relation between the MPAA rating and the movie box office,  $X^2_{(8)} = 30.41$ ,  $p = 0.000$ , as well as between the MPAA rating and the box office per theater,  $X^2_{(8)} = 22.01$ ,  $p = 0.005$ . This means that H9 and H10 were supported by the results. The crosstabulation analysis for MPAA rating and box office (table 6) indicated that G/PG had an expected count in the lower box-office category and a higher than expected count in the higher box-office category; while, PG-13 had a lower than expected count in the lower box-office category and a higher than expected count in the higher box-office category. In contrast, the R rating category had a higher than expected count in the lower box-office category and a lower than expected count in the higher box-office category. The crosstabulation analysis for MPAA rating and box office per theater had similar results (table 7). The only difference is that G/PG had a slightly lower count than expected for the lower box-office per theater category.

Table 6. *Crosstabulation MPAA Rating and Box Office*

MPAA	Box-Office <sup>a</sup>					Total
	<\$26.9	\$26.9-\$54.0	\$54.0-\$90.4	\$90.4-\$201.1	\$201.1+	
G/PG	21	13	24	24	29	111
PG-13	21	40	42	41	42	186
R	46	39	25	26	20	156
Total	88	92	91	91	91	453

<sup>a</sup> per \$100,000

Table 7. *Crosstabulation MPAA Rating and Box Office per Theater*

MPAA	Box-Office per Theater					Total
	<\$9.7	\$9.7-\$15.5	\$15.5-\$23.4	\$23.4-\$37.5	\$37.5+	
G/PG	18	15	27	23	28	111
PG-13	27	37	42	40	40	186
R	44	39	22	28	23	156
Total	89	91	91	91	91	453

### CONCLUSION/DISCUSSION

This study analyzed the relationship between user-generated reviews and the movie box office. The results showed that there is significant, positive correlation between the quality and quantity of user-generated reviews with the movie’s success at the box office. The study also looked at other possible elements that could have a relation with the movie box-office revenues, such as genre, MPAA ratings and time in theater.

The findings have provided sufficient significant results to draw some conclusions. The results for RQ1 on user-generated online ratings show that there is a strong, positive correlation between the user-generated rating of the reviews and the movie box office as well as between user-generated rating quality and box office per theater. These results support previous findings by Chevalier and Mayzlin (2006) as well as by Forman et al. (2008) that the positive and negative reviews (user-generated ratings) have a significant impact on decision-making.

The results for RQ2 and its hypotheses on the number of user-generated reviews show that there is a strong connection between the number of user-generated reviews and the movie box-office revenue, as well as between the number of user-generated reviews and box-office revenue per theater. These results are similar to Liu’s (2006) findings. A possible explanation is the awareness effect, as discussed by Duan et al. (2008) and Berger et al. (2010). This is the idea that even negative reviews can have a positive effect on the box office by bringing awareness of the movie to more people.

Based on the results for the first two research questions, the conclusion is that both ratings and number of reviews are connected to box-office revenue and box-office revenue per theater. These

results indicate that movie studios need to carefully consider the quantity and quality of user-generated reviews that their movies receive. Studios may wish to develop strategies leading to more, and higher, user-generated reviews as a way of encouraging greater box-office revenues.

Previous research has concluded that microblogging word of mouth (MWOM) can impact movie sales (Hennig-Thurau, Wiertz & Feldhaus, 2015; Rui, Liu & Whinston, 2013) and that the influence was escalated for those posting who had a higher number of followers. However, microblogging activity is relatively transient compared to the UGC archived at online review sites. These sites can be accessed by millions, even billions, of people as opposed to the limited number of followers of someone on Twitter or other microblogging medium. Thus, the current investigation has added to the current body of knowledge related to online WOM, by focusing on UGC found in major online ratings and review websites.

The results for RQ3 showed that even though time in theater does not have a strong relationship to the movie's overall box-office success, results that some may consider counterintuitive, time in theater definitely has a stronger connection to the box office a movie makes per theater. The strong correlation between the time in theater and the box office per theater indicates that there still is a strong relationship between the studios and the theaters. These results further support Huddleston's (2017) claim that even though major studios are discussing reducing the time of the theatrical window, they do not want to eliminate it.

Based on the RQ3 results, a possible explanation for the difference is that the number of theaters a movie plays in is a more accurate measure than the time it is available in theaters, since a movie could be playing in a small number of theaters or thousands. The difference in the result between box office and box office per theater, in regards to the movie's time in theater, could be related to the different release strategy used for a movie. Sometimes a movie is released to the largest number of theaters during the first two weeks, and then in subsequent weeks the number of theaters in which the movie is available slowly decreases. The opposite strategy is to first release the movie only in a small number of theaters, and then, over a number of weeks, slowly increase the number of theaters the movie is available at reaching the peak later on in the theatrical run. The latter strategy is employed when studios believe that word-of-mouth, including user-generated reviews, will be positive and that word-of-mouth from the early limited release helps to drive later increases.

The results for RQ4 show significant difference between a movie genre and its box-office success as well as between the movie genre and box office per theater. These results support previous research stating that there is a difference between genres and their box-office success (Redfern, 2012 & Numbers, 2017). As for the leading genre, the results do not support the previous finding of Fantasy/Science Fiction (Redfern, 2012) and Adventure (Numbers, 2017) being the highest grossing genre. The difference can be explained by the categorization of movies into genres. Often movies are assigned to more than one genre or a genre-hybrid (two genres combined into one, such as RomCom). Depending on which categorization is used it may change the results.

The results of the crosstabulation analysis indicate that Action, Adventure and Animation are more likely to have a higher box office and box office per theater revenue, while Comedy and Drama are more likely to have a lower box office and box-office per theater revenue. A possible explanation for such difference could be in the production cost, as Action, Adventure and Animation tend to have bigger production budgets than a Biography or Drama. It is important to keep in mind that bigger revenue does not always mean bigger profit, which is where the movie

production cost plays a vital role. Thus, a Biography may have smaller box-office revenue than an Animation movie, but the Biography also has smaller production cost, which can lead to a higher overall profit.

The chi-square results for RQ5 showed a statistically significant difference between the movie's MPAA rating and its box-office success. Although slightly smaller, there is also a statistically significant difference between movie MPAA rating and the box office per theater. Additionally the crosstabulation analysis indicates that PG-13 movies are more likely to have a higher box-office revenue and box-office per theater revenue. On the other hand, R rated movies are more likely to have low box-office revenue and box-office per theater revenue. These results are similar to Ravid's (1999) findings regarding the influence MPAA rating has on the box-office success. Additionally the results support findings from Austin et al. (1981) and Numbers (2017) that the PG-13 rating has the highest average box-office. A possible explanation for this is that the MPAA can limit the audience that goes to the movies, and the PG-13 rating is a "happy medium" where kids and adults can enjoy the entertainment. The PG-13 category is the one that the majority of audiences feel comfortable attending, thus including the widest age range. This is significant because it gives insight to what type of movies are most likely to be successful at the box office and it explains why studios may release more movies in certain categories or modify movie content to change the rating. The other categories appeal to a smaller portion of the age spectrum, therefore, limiting the number of people that are willing and/or are able to attend the movie.

The research was based on two assumptions. The first assumption is that the diversity of theater sizes cancel each other out, thus not impacting the results. The second assumption is that the inflation rate over the years in which data were collected was fairly insignificant, thus the overall effect on box-office revenues would also be insignificant. In addition, the research does not account for production cost. While an analysis controlling for production cost might lead to better results, no consistent source reporting production costs was available at the time the research was conducted. Another weakness of the study is that the data were collected at a single point in time, which allowed different time spans for users to rate and review movies on the websites.

There is still a lot to learn about the importance of online word-of-mouth and its impact on the entertainment industry. Future research should be designed to avoid the limitations identified in the previous paragraph. Another development of the research would be to collect the data at a specific time after each movie is released (e.g. six months after the theatrical debut), to eliminate the different time periods in which the reviews/ratings were provided by users. Finally, future investigations may wish to employ computer algorithms of online reviews (Shikalgar & Dixit, 2014) as a way of doing online mining of the rich data available in reviews.

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