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A System Dynamic Approach to Analyse the Impact of Electronic Word of Mouth on Box Office Revenue

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Abstract

Movie industry is one of the most dynamic industries. It has been always an area of interest for movie makers to know in advance that how their movies will be performing at the box office. With the advent of internet, consumers are looking for information through various online sources like blogs, social media, review websites etc. The information about new movie releases can easily be searched by using popular search engines online. The rate of search about a movie shows the interest of movie goers. This can impact the actual no. of movie goers, hence creating a direct impact on box office revenue. This paper is a novice attempt to evaluate the impact of electronic word of mouth on the success of a movie. The impact of eWOM is measured using Google trends search and the success of the movie is predicted by analyzing the Boxoffice revenue. The results show that there is a significant relationship between the number of times a movie is searched on Google and the corresponding box office sales.

Keywords: Box office Sales, Electronic word of mouth, Google trends, Movie forecasting

1. Introduction

India is world famous for its cinema. The first movie *'Harischandra Sakharam Bhatavdekar'* laid the foundations of Indian cinema in 1899. The name Bollywood is a combination of Bombay (Mumbai's old name) and Hollywood and it is often used to summarize all movies produced in India. Bollywood is classified as the biggest movie industry in the world in terms of amount of people employed and number of films produced (Matusitz & Payano, 2012). In just 2011 alone, over 3.5 billion tickets were sold across the globe which in comparison is 900,000 tickets more than Hollywood (Matusitz, J., & Payano, P., 2011). Also in comparison, Bollywood makes approximately 1,041 films yearly, as opposed to less than 500 films made by Hollywood yearly (Matusitz & Payano, 2011).

Movies are promoted using various means like advertising, publicity, press conference, blogs, social media etc. Internet has emerged as a popular mode of search and online booking. The consumer now looks over internet before making the purchase for movie tickets. The easy access and convenience has motivated the consumer to do so. Various booking agents, like *Bookmyshow* have made this process convenient by launching websites and mobile apps for instant booking.

India being on rank number 2 in terms of Internet Usage (IAMAI Report, 2015) has lead the consumer to look towards online posted consumer reviews before making decision for watching a movie. There are several platforms in India which provide review about movies such as Times of India, Indian express, NDTV, Bollywood hungama and India today. The movie reviews posted by experts and anonymous users seem to guide the potential movie watchers. Nowadays, search on internet is an integral part of the consumer decision making process for watching a movie. Therefore, it is crucial to understand the underlying dynamics of the decision making of movie goers and how it is impacted by online search.

The role of opinion leaders has been found to significantly impact the diffusion of information among seekers. The access to internet has motivated the movie goer to look for opinion seeking online. The movie reviews can be searched online. Earlier the movie reviews were based on expert movie reviews limited to certain premium newspapers. But now with the ease of

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information publishing on internet, the availability of consumer reviews for a movie has increased considerably, not only in terms of increase in number of websites due to increase in movie reviews but also active participation of movie goers in contribution towards the growth of movie review. The movie goer who seeks opinion online can also act as information disseminator with the penetration of internet. The google trends search data provides an inclination towards the consumer interest. It gives information about what is *trending* among consumers, whereas,*trending* can be defined as the amount of times a word is being searched by a consumer on internet. This search trend acts as a parameter to measure the interest of consumer towards watching of movie.

The study addresses mainly three objectives. Firstly, it is a novice attempt to identify variables representing effects of eWOM on movie goers using system dynamics approach. Secondly, the study aims to study causality among variables and develop a relationship among variables using causal loop diagram and stock flow. Thirdly, the research aims at understanding the dynamics between the google trend search and the box office sales.

2. Literature Review

Word of Mouth (WOM) has played important role in product adoption process (Bass, Krishnan, & Jain, 1994). The importance of WOM was highlighted by Rogers (1962) who identified opinion leaders as active members for spreading WOM. Word of mouth, popularly known as word of mouse, is a very important source of information that can help companies not only to improve their product or service but also brand image. The research scholars have been searching and analyzing word of mouth for over 2400 years (Buttle, 1998). With the advancement of internet based communication, the diffusion of information has multiplied over traditional word of mouth (Lis & Nebler, 2014). The new form of word of mouth which is known as Electronic Word of Mouth (eWOM) is considered to be an important factor in shaping consumer purchase behavior (Cheung & Lee, 2012). When a consumer shares his experience about a product or an intention to buy a product, it is called as eWOM. Hennig-Thurau et al., (2004) defined eWOM as "Any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet". In this paper, eWOM has been considered as the movie reviews posted online. Previous researches have shown that eWOM has significantly affected the purchase of goods by reading online consumer reviews (Chevalier & Mayzlin, 2006; Danescu-Niculescu-Mizil, Kossinets, & Kleinberg, 2009). The effect of Tweets on Movie sales was found to be significant by Rui H et al. (2013). They found that Positive tweets increased movie sales and negative tweets decreased movie sales. However, Zhang & Dellarocas (2006) conducted an empirical study on impact of movie reviews on box office sales but found no significant impact of movie reviews on the sale of movie 'The Lord of the rings'. The results indicate the significant influence of the valence measure (star ratings) of online reviews, but their volume measure (propensity to write reviews) is not significant once we control for quality. Furthermore, the analysis suggests that the variance measure (disagreement) of reviews does not play a significant role in the early weeks after a movie opening. It was estimated that a one-point increase in the valence can be associated with a 4-10% increase in box office revenues (Zhang, 2006). Impact of globalization was examined by exploring the Bollywood influence on Hollywood by Matusitz & Payano (2012). Google, in their white paper titled 'Quantifying movie magic with Google (2013), claims that search on Google can predict upto 94% of box office revenue. However, nosuch study, as of knowledge has been conducted till date that aims to understand this relation in a wholistic manner using systems approach.

3. Research Methodology

The study is descriptive in nature. The data is collected from secondary sources using internet. The measurement of eWOM is done using Google Trends. This paper uses the data collected for movie *Neerja*(released 19 Feb 2016). *Neerja* is a Indian Hindi language biographical thriller film written by Saiwyn Quadras and directed by Ram Madhvani starring Sonam Kapoor, Shabana Azmi and Shekhar Ravjiani (Table 1). Movie *Neerja* has been selected for study as it was found to get success due to word of mouth (DNA 2016). Movie *Neerja* surpassed other women oriented movies in terms of sucees in India (Neerja Budget & Box office collection, 2016).

Table 1. Box Office Analysis of Movie 'Neerja'

Total Collection	Rs. 73.07 Crores(Lifetime)
Budget + P&A	Total 25 Crores (Production cost 18 crores + Print and advertising cost 7 crores)
Profit	Rs. 46.50 Crore
No of screens	700-800 screens Pan India
Amount Spent on research	Rs. 3 crore
Thearetical Business verdict	Superhit

Source: Adapted from *http://mtwiki.blogspot.in/2016/02/neer-ja-movie-budget-profit-hit-or-flop-box-office.html*

The keywords like 'Neerja', 'Neerja movie' were used to measure the movie goers interest by fetching the data from google trends that informs the number of times a keyword has been searched on google. The success of movie is measured by the box office sales data. This data is collected from *boxofficemojo.com*. The daily search datawas collected for 21 days ranging from 19 February 2016 to 10 March 2016. (Table 2)

System dynamics approach is used to study the causality among the factors (Sterman, 2000). System dynamics is defined as a methodology for understanding complex problems which are dynamic and which involve feedback (Forrester, 1961). Once developed, the model improves the ability of management to assess the future impacts of the proposed strategy by developing a management flight simulator (Sterman, 1992). Movie Industry is a dynamic and a complex system. It comprises of several interrelated complex subsystems. Therefore, using system dynamics to understand the interaction between various elements like the movie goer, distributor, director, social media etc. will present a clear picture as how the various elements interact in their micro environment.

The population that is chosen for the study represents people using Internet to book movie tickets online based on movie reviews or at least have an intention. The industry selected for study is Entertainment Industry (Bollywood). The secondary data has been collected from two major sources: Boxoffice sales data is collected from Boxofficemojo and the data for internet search is collected from Google trends search for a period from 19 Feb 2016 to 10 March 2016. The data analysis is done in two parts, making of a Causal loop diagram and Stockflow diagram.

3.1 Box Office Sales

The daily Box office sale data which is collected between 19 Feb 2016 to 10 March 2016 from the website Boxofficemojo.com is presented in Table 2 and is represented in the form of graph in Figure 1.

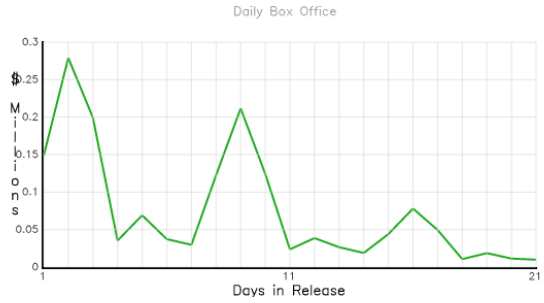

Figure 1. Graphical representation of Box office sales data.
Source: http://www.boxofficemojo.com/movies/?id=neerja.htm

The Graph which expands over a period of 21 days (Figure 1) shows that the Boxoffice sale increased after the release and again gains peak over 10th day of release, which shows that there is an impact of word of mouth on movie goers. Movie*Neerja* has grown throughout the day after opening very low in the morning and purely on word of mouth. (Bollymovie Reviewz, 2015). With the kind of good word of mouth and reviews the movie has it is definitely set to have better performance than last week's release (Bollymovie Reviewz, 2015).

3.2 Google Trends

The amount of search of a particular word can be traced down using Google trends (2016). Google trends analyses and sums the data which represent the number of times a particular word has been searched in Google database. For this study, the search on *Neerja* produced results presented in Table 2. The data has been collected for the similar period of the availability of box office Sales data (Figure 3).

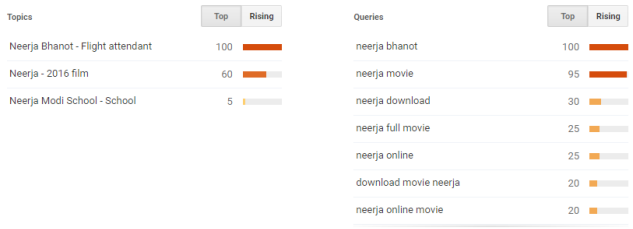

Figure 2. Results of search using keyword 'Neerja' on Google Trends.

Source: Google Trends

Table 2. Data of Neerja movie

Day	Date	Box Office Sales (in US $)	Google Trends Search
Friday	Feb. 19, 2016	-	87
Sat	Feb. 20, 2016	279025	100
Sun	Feb. 21, 2016	199196	87
Mon	Feb. 22, 2016	35350	62
Tue	Feb. 23, 2016	69045	49
Wed	Feb. 24, 2016	37250	41
Thu	Feb. 25, 2016	29694	38
Fri	Feb. 26, 2016	122402	40
Sat	Feb. 27, 2016	211606	47
Sun	Feb. 28, 2016	124234	43
Mon	Feb. 29, 2016	23679	24
Tue	Mar. 1, 2016	38647	20
Wed	Mar. 2, 2016	26491	20
Thu	Mar. 3, 2016	18830	19
Fri	Mar. 4, 2016	43993	20
Sat	Mar. 5, 2016	78053	26
Sun	Mar. 6, 2016	49432	22
Mon	Mar. 7, 2016	10639	14
Tue	Mar. 8, 2016	18598	13
Wed	Mar. 9, 2016	11330	12
Thu	Mar. 10, 2016	9886	11

*Box Office Sales (in US $) (Source: BoxOfficeMojo)

**Search on Google Trends (in No. of people with respect to 100 being highest)

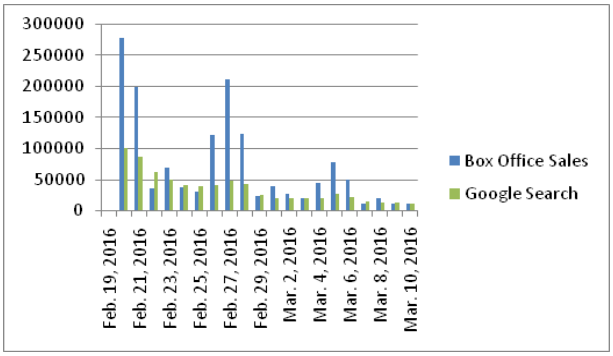

Figure 3. Histogram representing Google Trends Search and Boxoffice Sales

Source: Google Trends&BoxofficeMojo

4. Data Analysis and Interpretation

The data was analysed by using Causal Loop Diagram, Stock Flow Diagram and Correlation.

4.1 Causal Loop Diagram

The various variables affecting the box office sale and the eWOM were identified from the literature. Intention to generate Movie reviews and valence of movie reviews was found to affect the revenue of Boxoffice Sales (Rui H, 2013). Intention to generate movie review represents the antecedents governing a movie goer to write his experience in term of movie review on the e-opinion websites. The Valence of Movie reviews shows that how the message conveyed in a review impacts the potential movie goers. The valence represents the positive or negative feeling conveyed in the consumer review. The Expenditure on promotion was found to affect the Box office sale (Zhang & Dellarocas, 2006). The producers promote their movie using several platforms of media. This promotional expenditure helps in attracting the potential movie goers to the cinema hall. Wenjing Duana (2008) found that there is a significant impact of Volume of eWom on product sales with reference to movie Industry. The volume of eWOM generated represents the number of movie reviews which are being written for a particular movie on the electronic platform. The Movie goers search on internet, google being the top most search engine. The Google search is measured by Google trends. This search on google may also affect the box office sales.

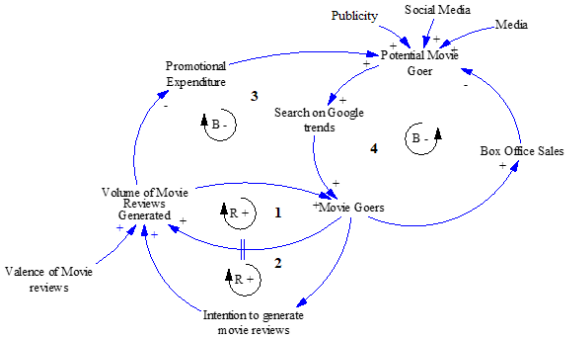

Figure 4. Causal loop diagram representing dynamics of Google Trends Search and Box office Sales.

Source: Authors Compilation

4.1.1 Loop Number 1 (Reinforcing Loop)

(Volume of Movie Reviews Generated, Movie Goers)
Volume of movie reviews generated
A positive/reinforcing loop is a causal loop that self-reinforces itself and increases the value of the stock. If the volume of movie reviews generated increases, it will increase the number of movie goers. If the number of movie goers increase, the volume of movie reviews generated will increase. This is a positive reinforcing loop that will continue to increase both reviews and movie goers.

4.1.2 Loop No. 2 (Reinforcing Loop)

(Volume of Movie Reviews Generated, Movie Goers, Intention to generate movie Reviews, Valence of Movie Reviews)

If the volume of movie reviews generated increase, it will reflect the popularity of the movie. This increased eWOM will influence the potential movie goers. The larger the number of movie goers, the larger number of people will have the intention to generate eWOM. The movie goers will either besatisfied or dissatisfied with the movie. They will write positive or negative comments based on experience. This valence of movie reviews will act as exogenous construct and influence the further volume of movie reviews generated. Thus, this is also a self-reinforcing loop that will continue to run until some external factor stops it.

4.1.3 Loop Number 3 (Balancing Loop)

(Volume of Movie Reviews Generated, Promotional Expenditure, Potential Movie Goer, Search on Google trends, Movie Goer, Box office Sales, Intention to generate Sales Rate of search, Movie goer, Intention to generate movie review, Volume of movie reviews generated, promotional expenditure, Potential movie goer)

The third loop is a balancing loop. If the volume of movie reviews generated is high, there will be less promotional expenditure. If the promotion expenditure is high, there will be more number of potential movie goers. The higher the potential movie goers, more search on google trends takes place. The higher the search on google, the more will be the number of movie goers. If more people will go for movie, they will generate more volume of movie reviews and thus reducing the promotional expenditure.

4.1.4 Loop No. 4

Potential Movie Goer, Box office Sale, Movie Gers, Search on Google Trends, Publicity, Social Media, Media

If the volume of movie reviews generated increases, this will reduce the promotional expenditure of the movie maker. This promotional expenditure will increase the number of potential movie goers. The potential movie goers will look for information on internet, thereby increasing the search on Google trends. The higher the search on google trends, the more will be movie goers. At the same time movie goers are also influenced by exogenous variables Publicity, Media and Social Media. The higher the number of movie goers, there will be more box office sale. The more will be the box office sales, there will be less remaining number of potential movie goers. This lop acts as balancing/ negative loop. Balancing loop is a loop that reduces the increasing stock and brings balance in the system.

4.2 Stock Flow Diagram

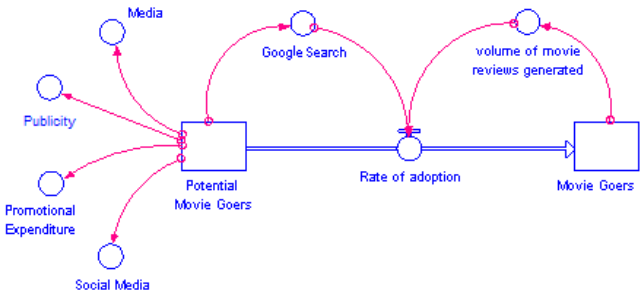

Figure 5. Stock Flow diagram representing adoption of reviews
Source: Authors Compilation

The stock flow has been developed on the basis of the causal loop diagram. There are two main variables known as '*stock*', namely, Potential Movie Goers and Movie Goers. They are represented in rectangular boxes. The remaining variables are identified as '*flow*', represented by circles. Five variables namely, Potential Movie Goers, Rate of Adoption, Movie Goer, Volume of movie review generated, Google search, act as endogenous constructs while Media, Twitter, promotional expenditure, social media act as exogenous constructs. Endogenous constructs contribute directly to the stock and flow, creating a cyclical loop. The exogenous constructs, also known as external variables can influence the endogenous constructs, but do not get affected by them.The '*flow*' can increase or reduce the '*stock*'. Potential Movie goers look for information about the upcoming movie using Google Search (*rateof flow*). This acts as an information input and increases the rate of adoption. The rate of adoption increases the *stock*, Movie Goers, thus increasing boxoffice sales. The number of Movie Goers will impact the volume of movie reviews generated. If the number of movie goers is high, there are possibilities that large volume of movie reviews gets generated or vice versa. This rate of review generation gain impacts the rate of adoption. The reviews with positive valence can add up to rate of adoption while negative reviews can reduce the rate of adoption. Other exogeneous variables like Media, Social Media, Promotional Expenditure and Publicity will also increase the *stock*Movie Goers.

Potential Movie Goers are converted to Actual movie goers (measured by box office Sales) through certain rate of adoption. This rate of adoption is influenced by Google Search rate and Volume of movie reviews generated. The Potential adopters are also influenced by Several other variables like Media, Twitter, Promotional expenditure of company and Social media.

4.3 Correlation Analysis

Correlation analysis was conducted to analyse the impact of Google Trends Search on Box office Sales (Table 3). It was found that there is a positive correlation between Google Trends Search and Box office sales. The correlation of coefficient was found to be 0.82 (significant at the 0.01 level, 2-tailed). A value between 0.8 to 1 shows a very strong degree of correlation. (Cohen, 1988). The Google Trends Search measures the potential movie goers while the Box office Sales measures the actual movie goers. The strong positive correlation shows that potential movie goers can be converted to actual movie goers by managing the online reviews.

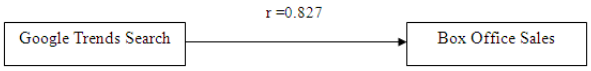

Figure 6. Correlation analysis.

Source: Author's Compilation

5. Conclusion

System thinking and system dynamics are valuable tools to assist in evaluation e business strategy as there is a great deal of complexity and feedback between various opportunities and risks. The interrelationships can first be mapped using the technique of system thinking before the significant relations are identified and further explored by developing a system dynamics model. The underlying effect of various interlinked elements that effect the sale of a movie is identified and represented using CLD and Stock flow. This model can be used to understand and forecast the effect of eWOM on box office sales. The study shows that there exists a strong positive correlation between Google trends search and Boxoffice Sales. Therefore, the box office sales can be predicted by analyzing the number of times the keyword is searched on Google trends.

6. Limitations and Future Implications

The study tries to correlate the box office revenue in reference to the number of times it is searched on google. This study will benefit movie makers in understanding the role of google search (measured by google trends) in the prediction of success of a movie (measured by Boxoffice Sales). This research has been done on a single movie. The future research can include the similar study on a large number of movies. The study can also be extended by developing an equation which can be used for prediction of movies in future using the google search data.

7. References

1. Bass, F. M., Krishnan, T. V., & Jain, D. C. (1994). Why the Bass model fits without decision variables. *Marketing Sci-*

ence, 13 (3(Summer)), 204–223.
2. Buttle, F. A. (1998). Word of mouth: understanding and managing referral marketing. *Journal of Strategic Marketing*, 6 (3), 241–254.
3. Cheung, C. M., & Lee, M. K. (2012). What drives consumers to spread electronic word of mouth in online consumer opinion platforms. *Decision Support system*, *53*(1), 218–225.
4. Chevalier, J. A., &Mayzlin, D. (2006). The Effect of Word of Mouth on Sales: Online Book Reviews. *Journal of Marketing Research*, *43*, 345–354.
5. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
6. Danescu-Niculescu-Mizil, C., Kossinets, G., Kleinberg, J., & Lee, L. (2009, April). How opinions are received by online communities: a case study on amazon. com helpfulness votes. In *Proceedings of the 18th international Conference on World wide web,* ACM, pp. 141–150.
7. DNA, (2016), Retrieved from: http://www.dnaindia.com/entertainment/report-neerja-flies-at-box-office-sonam-kapoor-starrer-grows-on-word-of-mouth-rakes-rs-760-crore-on-day-2-2180424
8. Duan, W., Gu, B., &Whinston, A. B. (2008). The dynamics of online word-of-mouth and product sales—An empirical investigation of the movie industry. *Journal of retailing*, *84*(2), 233-242.
9. Forrester, J. W. (1961), *Industrial dynamics*, MIT press: Cambridge, MA
10. Google Trends Retrived from: https://trends.google.com/trends/explore?q=neerja
11. Henning-Thurau, T., Gwinne, K. P., Walsh, G., & Gremler, D. D. (2004). Electronic word of mouth via consumer opinion platform: What motivates consumers to articulate themselves on internet? *Journal of Interactive Marketing*, *18*(1), 38–52.
12. HrithikShah (2016 March 19). Neerja movie budget profit hit or flop box office collection : verdict : Superhit. Retrived from: http://mtwiki.blogspot.in/2016/02/neerja-movie-budget-profit-hit-or-flop-box-office.html
13. *IAMAI Report.* (2015, November 17). Retrieved from: IAMAI: http://www.iamai.in/media/details/4486,%20New%20Delhi,%20November%2017,%202015
14. IANS. (2016, January 31). 'Neerja' starring Sonam Kapoor made in Rs.21 crore budget. Retrieved from: http://indianexpress.com/article/entertainment/bollywood/neerja-starring-sonam-kapoor-made-in-rs-21-crore-budget/
15. Lis, B., &Nebler, C. (2014). Electronic Word of Mouth. *Business and Information system Engineering*, *6*(1), 63–65.
16. Matusitz, J., &Payano, P. (2011). The Bollywood in Indian and American Perceptions: A Comparative Analysis. *India Quarterly: A Journal of International Affairs, 67*(1), 65–77. doi:10.1177/097492841006700105
17. Matusitz, J., &Payano, P. (2012). Globalisation Of Popular Culture: From Hollywood To Bollywood. *South Asia Research, 32*(2), 123-138. doi:10.1177/0262728012453977
18. Neerja (2016), Retrived from: http://www.boxofficemojo.com/movies/?id=neerja.htm
19. Neerja Budget & Box Office Collection: Steady. (n.d.). Retrieved from: http://www.bollymoviereviewz.com/2016/02/neerja-budget-box-office-opening-decent.html
20. Panaligan, R., & Chen, A. (2013). Quantifying movie magic with google search. *Google Whitepaper—Industry Perspectives+ User Insights.*
21. Ram Madhvani (Director), 2016. Neerja [Fox Star Studios]. India: Hindi
22. Rogers, E. M. (2010). *Diffusion of innovations*. Simon and Schuster.
23. Rui, H., Liu, Y., &Whinston, A. (2013). Whose and what chatter matters? The effect of tweets on movie sales. *Decision Support Systems*, *55*(4), 863–870.
24. Sterman J.D. (2000).*Business Dynamics: System Thinking and Modelling for a Complex World*. Irwin Mcgraw-Hill, Boston.
25. Sterman,J.D.(1992).Teaching Takes off: Flight simulators for management education. *MS Today* (october), 40–44
26. Zhang, X., &Dellarocas, C. (2006). The lord of the ratings: is a movie's fate is influenced by reviews?. *ICIS 2006 Proceedings*, 117.