Performance Implications of Economic and Network Analytic Concepts in the German Motion Picture Industry – An Empirical Analysis

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Abstract

This study offers a new framework for organizing a motion picture in such a way that chances for box-office success are enhanced. We combine and expand two strands of research for the moviemaking industry: the economic approach and the social network perspective. Specifically, we integrate the product-inherent categories of creative sphere and financial resources as well as the product-induced categories of marketing support and competition with concepts from social network analysis (i.e., connectivity and density). We test our hypotheses on a sample of each year's top ten German movies as to box-office admissions for the period 1990–2004. In particular, we find that extensive care and industry knowledge are required when organizing the economic and social framework in which a film project is undertaken, since ultimately, movie success does not depend on individual star power. On the contrary: The real star is the team.

Keywords: Motion picture industry, network analysis, star power

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1. Introduction

As a general rationale, the national motion picture industry is highly influential in society by reflecting cultural identity (Neumann (2006, 2)) and also, by shaping and spreading norms, ideas and trends. Furthermore, this industry is economically very important with movie project budgets mounting up to double-digit size, huge potential for ancillary products and movie theatre revenues of e.g. around €1 bn in Germany in 2004 or $9 bn in the US in 2005 (Hennig-Thurau/Wruck (2000); SPIO (2005)). Apart from being powerful, though, it is a highly risky industry as regards returns on individual movie projects. Often, movies which were considered "a sure thing" turned out to be *ten ton turkeys*, meaning they totally flopped at the box-office ("Waterworld" being a famous example; De Vany/Walls (1999)). Others, which were supposed to be niche films, unexpectedly showed enormous power to attract audience ("The Passion of the Christ"). These risks resulting from demand unpredictability are intensified by the sunk nature of costs as they occur almost completely prior to film release (Goettler/Leslie (2004)). Tremendous losses are ubiquitous in the movie industry: About 60–70% of movies never win their budget back (Vogel (2001)). Therefore, it is in the producers' fundamental interest to understand how movie success may be promoted prior to production and how success prospects are influenced by external circumstances.

Considerable energy has been invested into determining what factors can be relied on to boost movie success. However, previous studies have produced conflicting results. While some studies found the presence of a star to be important, others found star power to be an insignificant predictor of success (for an overview, see Basuroy et al. (2003)). The same holds for director's popularity (Chang/Ki (2005); Ravid (1999)), and movie genres (Jansen (2002); Litman (1982)). On the one hand, this may demonstrate that audiences' tastes and preferences, as the basis for buying decisions, change over time. But also, on the other hand, this may indicate that important explanatory factors have still been missing in the analysis. Prior studies focussed almost exclusively on the participation of individual stars to explain movie success. But, the role of the film team as a whole has not been studied in detail yet. The team's joint potential to provide creative input and know-how for movie creation is expected to be a crucial contribution to movie performance.

To bridge this gap in literature and add further clarification, we combine the two perspectives of economic and social network analysis to gain evidence from the German movie industry. Our economic framework partly builds on prior research accounting for factors related to star power, financing, marketing and competition. Further widening the scope, we include team structure elements. As a part thereof, social network analysis is used to explore and interpret a movie's position within its industry's structure and derive implications for financial success. Basically, two different attempts can be made to achieve financial success in the movie industry, or show business in general. Most promising, as proposed in this paper, producers should try to manage economic and network structure elements to match consumer demand best and produce *hits*. The Globe-nominated recent movie "The Producers" (a 2005 remake of the 1968 Oscar-winning production) comes up with a different yet creative approach. It proposes a scheme tailor-made for producers who can only make *flops*: Raise far more money than you need, then make sure the show is despised. No one will be interested in it, so you can pocket the surplus. Although this plan seemed to be faultless it does not work out in the end. Thus, as the quick-rich plan seems prone to failure, we attempt to look in the opposite direction by developing hypotheses on factors which contribute to making a film a hit.

The remainder of this paper is organized as follows: In the next section, we review the literature on economic factors influencing movie success and describe the theoretical background against which our investigation into success factors in the movie industry is organized. We proceed to explain the concept of social network analysis and the strand of research relevant to our examination. Thereafter, research hypotheses are developed (section 3), before the data and methods are described (section 4). Subsequently, we report and interpret the results obtained (section 5). The paper concludes with a summary, discussion and implications for further research (section 6).

2. Theoretical Framework

2.1. Economic Success Factors in the Motion Picture Industry

The motion picture industry belongs to the cultural goods industries. Cultural goods are nonmaterial goods directed at a public of consumers for whom they generally serve an aesthetic or expressive, rather than a clearly utilitarian function (Hirsch (1972, 641)). These characteristics make it difficult for consumers to assess movie quality prior to

consumption. Also, they make it hard for producers to predict buying decisions and to figure out why some movies succeed and others fail.

Previous research has tried to examine how buying decisions are made. The two major strands of research focus on individual buying decisions (*communication theory*; Sharda/Delen (2005)) and collective movie attendance decisions (*economic approach*). Communication theory considers movie content as primary criterion for the choice of a certain movie from the available range, once the initial decision for movie-going has been made. The economic approach further regards institutional factors like release timing, marketing and financing (Sochay (1994)). Garrison (1971) established the economic approach first and found that the director, the characteristics of hero and heroine and the settings were significant for distributor film rentals. Kindem (1982) analysed star power and could support the theory of a "bankable star", meaning that a star adds to guaranteeing success. Litman (1983) provided a compelling categorization of areas affecting consumer buying decisions: creative sphere, scheduling and release pattern, and marketing effort. He found that the production budget, critics' ratings, and Academy Award nominations, had significant positive impacts on distributor rents. Sochay (1994) organized variables along the lines of Litman and found that Oscar nominations and wins were significant to the length of run and rents, whereas star power and comedy genre were significant to rents only. Finally, Chang/Ki (2005) observed that sequel, actor, budget, genre, age rating, release season and number of opening screens were significantly related to box-office performance.

The studies described above apply evidence from the US movie industry. In general, the comparatively small number of studies on the German movie industry has built on insights from the US industry.[1] Hennig-Thurau/Wruck (2000) distinguished between product-inherent and product-induced factors and stressed the importance of movie quality and symbolicity, defined as a measure of consumers' efforts necessary to group a certain movie into their cognitive frames. Jansen (2002) found the presence of previously successful actors, directors and production companies, the budget size and critics' reviews significant for a movie's success in terms of admissions.

In line with Sochay (1994), we explore the economic approach as it allows for a broad perspective on factors affecting movie performance. For our study, we define the rele-

[1] This finding mirrors the imbalance in public attention to Hollywood and Non-Hollywood productions. As Gianni Amelio, one of Italy's most successful filmmakers, stated: "Italy knows how to produce films, but still have not figured out how to encourage the public to see them." (cited in Sklar (2002, 517)). However, the German movie industry has figured out how to attract, with a market share of 23,8% in 2004 (FFA (2005)).

vant economic concept by the categories of creative sphere, financing, marketing, and competition. We add considerations on organizational structure by focussing on the impact of a film's position within the social network structure in the movie industry. Therefore, we use social network analysis, as will be outlined in the following paragraph.

2.2. Social Network Analysis and the Small World Phenomenon

In project-based industries, organizational forms such as networks may favour innovation and creativity (Guimerà et al. (2005)), both of which are principle reasons why cultural industries can attract audience (Jones et al. (2005)). A movie team's position in the industry's network may improve or hinder its access to creative ideas and know-how. Social network analysis provides a means to analyze these social structures, conceptualized as networks of social ties among actors. In the terminology of network analysis, the term "actor"[2] may refer to people, groups or organizations. Ties may be friendships, collaboration or common membership (Newman (2001b)). Network analysis offers the methodology to detect and interpret patterns of these ties. As Padgett and Ansell (1993) observed, social ties do influence the performance of creative actors in a network: By acting as fans and critics of each other, each actor's creativity can be amplified or stifled. With similar arguments, Delmestri et al. (2005) explored the influence of horizontal and vertical ties of directors in the Italian movie industry. They found that a movie's commercial success is favoured by a director's strong vertical ties with producers and distributors, while artistic merit is positively affected by a director's weak horizontal ties with creative partners. The authors explain these results by the varying degrees of task routineness and creative innovation in movie creation.

One particular form of social organization that has received great attention for its ability to influence creativity and performance is the "small world network" (Uzzi/Spiro (2005)). The term denotes a network structure which features two usually opposing elements: The network is both highly locally clustered, i.e. the network consists of groups of actors and within each group, most or all actors are connected, *and* it has a short path length, i.e. a small mean geodesic distance of all pairs of actors between which a path exists (Watts (1999a, b). "Path" means that actors are linked either directly or via a chain of contacts of other network actors.[3] The more a network exhibits characteristics of a small world, the more actors are directly linked or connected by persons

[2] To be specific, in the following the term "actor" will be referred to as "movie actor" if it denotes a film team member, if else there is a risk of confusing it with the term "actor" used in network terminology.
[3] This idea has been illustrated by Milgram's famous theory of "six degrees of separation".

who know each other through past collaborations or who have third parties in common. Uzzi/Spiro (2005) argued that the small world conditions enable creative material in separate clusters to circulate to other clusters and to gain the kind of credibility unfamiliar material needs to be regarded valuable and productively used by another cluster. However, these advantages may hold only up to a threshold of connectivity, after which they turn negative as ideas in the network become homogenized; then, cohesiveness leads to sharing common rather than novel ideas (Uzzi/Spiro (2005)). As Linus Pauling stated, who attributed his creative success not to his immense brainpower or luck, but to *diverse* contacts: "The best way to have a good idea is to have a lot of ideas." (cited in Uzzi/Dunlap (2005, 2)).

Research has figured out fields which are subject to small world networks and found scientific collaborations, the Hollywood actor labour market or production teams in business firms (Uzzi/Spiro (2005)). Examining scientific co-authoring, Newman (2001a) drew the conclusion that small worlds account for how quickly ideas fly through disciplines. He reformulated the small world theory for *bipartite networks* meaning there are two different sets of actors, such as movies and movie actors (Albert/Barabási (2002); Watts (2004)). Bipartite networks are distinctive in that all network actors are part of at least one fully linked cluster, also called *fully linked clique* (Uzzi/Spiro (2005)). As figure 1 illustrates, the network is made up of these cliques that are connected to each other by actors of multiple team memberships. The movie industry qualifies as an example par excellence of such a small world featuring a bipartite network structure (Marchiori/Latora (2000); Newman (2000)).

[Insert Figure 1 here]

To recapitulate the main points so far, producers in the cultural industry of movie-making are confronted with two problems: 1) Demand patterns that seem highly unpredictable and 2) production processes that depend on the team's joint potential to contribute know-how, creativity and talent to movie creation. Creativity and talent along with innovation are acknowledged as the resources crucial to success (Jones/DeFillipi (1996)). Thus, when organizing a movie, it seems necessary to regard economic circumstances relevant to success as well as teaming up individuals in consideration of network structure, which is the general idea of our paper. As a general hypothesis, the following should hold:

$admissions_j = f\ (creative\_sphere_j,\ financial\_resources_j,\ marketing\_support_j,\ competetion_i,\ network\_structure_j)$, with $j = 1,\ldots,J$ (denotes a particular film); $i = 1,\ldots,I$ (denotes the year in which a film is released).

Accordingly, in the following, we develop hypotheses which are grouped within product-inherent (i.e. film intrinsic) and product-induced (i.e. film-related) categories that form the economic perspective of this study. Then, we add hypotheses on network structure.

3. Postulation of Research Hypotheses

3.1. Hypotheses on Product-inherent Categories

3.1.1. Creative Sphere

Team Structure. The professional completion of a number of tasks is of vital importance for a film's success. These tasks encompass acting as well as directing or producing the movie. The experience and know-how contribution of team members (i.e. the input of knowledge-based resources) who have been successful in reaching a large audience before may enhance team performance. Famous movie actors may serve as magnets for attracting audience and media attention; previously successful directors and producers seem to have both the necessary talent and the ability and willingness to meet market demand; successful production companies have better chances to realize further projects due to better financial resources.[4] Although market experience does not guarantee optimal strategic choices – otherwise flops would never be made – the participation of a well-reputed previously successful company may signal a movie's attractiveness to consumers. This reduction in consumers' uncertainty is highly valuable: Well-reputed participants provide a reliable factor to the audience in this project-based industry, where different teams form for each project and outcome depends largely on the joint team effort. Hence, we expect that the more previously successful participants, the better the chances of first, finding the creative and technical know-how to make a complex movie and meet diverse consumer interests, and second, of attracting media attention necessary to influence consumer buying decisions and boost demand.

> *H1: A high number of experienced team members positively influences a film's admissions.*

[4] This is in line with the German reference funding principle, i.e. funding is granted for realizing a new project after making a movie which reached a certain threshold of viewers; FFA (2002).

Star Power. While a movie featuring unknown movie actors is more difficult to market, employing prominent actors with a considerable fan community ("stars") could provide a stronger potential to attract large audiences. As Baimbridge (1997) suggested, often the most significant aspect, or *key ingredient* (Albert (1998)) of any movie is the leading actor upon whose reputation success depends. Previous studies tried to determine the effects of star power on movies' box-office revenues, lengths of run, profits, opening screens and admission numbers (Basuroy et al. (2003)) and produced conflicting results (Ravid (1999)). Litman/Kohl (1989) and Sochay (1994) proved star power to be significant for film rentals. Prag/Casavant (1994) found stars positively impact a film's financial success, whereas other studies found stars were an important factor in the public's attendance decisions (De Vany/Walls (1999)), but were not significant predictors for financial success (Delmestri et al. (2005)). However, the use of stars can be interpreted as *ingredient branding* (Hennig-Thurau/Dallwitz-Wegner (2003)) and providing the audience with a *recognition factor*. Thus, stars may add a quasi-search quality to movies (Hennig-Thurau et al. (2001)) helping to reduce consumers' uncertainty as a dominant feature of movies as experience goods. Although German stars may not be as appealing to the masses as Hollywood stars, still they are likely to increase media attention and help to book the movie on more opening screens. Initial screen coverage is most important as during the first weeks demand for the movie is revealed and follow-up contracts for screens are adjusted. Thus initial coverage forms the basis for bandwagon effects in this industry: Subsequent growth in demand depends on the demand level already attained (De Vany/Walls (2002)). Interestingly, previous research has shown differences in the genders' contribution to box-office success: Previously successful actors may be a weaker success contributor than previously successful actresses (De Vany/Walls (1999)).

> *H2a: The participation of male stars positively influences a film's admissions.*
>
> *H2b: The participation of female stars positively influences a film's admissions. The female star effect on admissions is stronger than male star power.*

3.1.2. Financial Resources

Budget. The impact of budget size on success may be of a dual nature. Investing a high budget conveys the producer's conviction that a movie has great economic potential, but also, consumers may perceive a high budget as an indicator of certain benefits the film

provides, which could positively influence buying decisions. Definitely, high budget films are in an advantageous position: first, they have the resources to afford well-known and talented personnel. Second, they can meet diverse consumer interests as big budget translates into lavish sets and costumes, expensive digital manipulations, and special effects – all of which should lead to heightened attractiveness for consumers (Basuroy et al. (2003)). Third, more can be spent on marketing to further increase demand.

> *H3: A high budget positively influences a film's admissions.*

Funding. Similar to the line of arguments for budget, funding should positively influence admissions. There are several sources of funding in Germany, which together account for more than half of the total film budgets today (Kurp (2004)). However, federal funding is often intended to support films of artistic rather than commercial value. These movies may not appeal to a wider audience as they are perceived as "arty", i.e. of little entertainment value. Still, apart from official funding in a strict sense (federal), TV broadcasting agencies provide funding according to private law contracts with the FFA (German Federal Film Board). In 2004, funding by public TV agencies amounted to €15.6m and €12m by private ones (FFA (2005)). TV-funding is intended to support films suitable for theatrical release as well as for TV, and usually the participating TV agency holds the broadcasting rights. Hence, we expect TV-funding to favour movies of supposed commercial value. Receiving funds also implies that the movie and the team's power to raise interest have already been demonstrated on a smaller scale, having convinced funding committees. This should signal the movie's quality and reduce consumer uncertainty if the fact that funding has been received is made public.

> *H4: A high amount of TV-funding positively impacts a film's admissions.*

3.2. Hypotheses on Product-induced Categories

3.2.1. Marketing Support

Critics' Reviews. With respect to the nature of films as experience goods two perspectives on the impact of critics can be taken. Either, critics may act as predictors of success by representing viewers' preferences (Wanderer (1970)). Or, as many studio executives believe (Eliashberg/Shugan (1997)), critics may influence success by en- or discouraging consumers to watch certain movies (Weiman (1991)). In Germany, the Film-

bewertungsstelle Wiesbaden (FBW) acts as an important critic: It can award two alternative certificates, the "recommended" or the "highly recommended" certificate, if it believes a film to be of high artistic value. Since artistic value is not necessarily the primary attendance criterion, these awards are not likely to predict the audience's taste. Rather, they gain relevance according to the influencer instead of the predictor perspective. Thus, admissions do not only correlate with awards (as the predictor perspective suggests), but awards cause part of the success: Certificates can influence movie-goers by signalling valuable movie content. This would be consistent with prior research on US audiences which observed that one third of the audience chose a film due to a favourable review (Reinstein/Snyder (2005)). Additionally, decisive indirect effects may occur: Media reviews may be positively influenced by awards, in turn the distributor may intensify marketing efforts, or consumers attend due to the review and then influence others by word-of-mouth (Austin (1989)). We focus on the more prestigious, the "highly recommended", certificate, expecting effects to be stronger here.

H5: Obtaining the FBW-"highly recommended"-certificate positively influences a film's admissions.

Movie Awards. Awards are another indicator of the benefits watching a certain movie may provide. Taking a competitive perspective, movie performance is rewarded as a result of a comparison between all movies of a year (Hennig-Thurau et al. (2001)). The German and the Bavarian Film Award are the two most important German awards. Here, the rationale is that awarded films get higher attendance due to reducing consumer uncertainty and providing for heightened media attention, and in particular, because awarded films often get a second or third run in movie theatres to capture audience.[5]

H6: Movie awards positively influence a film's admissions.

3.2.2. Competition

Consumers have to make choices as to which movies to watch from the range of available alternatives. Admissions to each movie depend on the competitive strength of films concurrently released in the same market. Movies are an example of a vertically differentiated product, as although each film is unique in some respects, they are not equally attractive to the audience. The logic behind vertical product differentiation is that where prices are invariant between products, it is possible for a small number of products to

[5] It could be argued that awards are an ex-post measure of how much audience a movie obtained. However, awards are granted by an independent jury of movie industry experts for outstanding performance, not for reaching a certain attendance. Hence, reversed causality should not be an issue here.

appear superior in almost all respects – not to just one consumer, but to almost all consumers across a variety of circumstances of time and place (see Ehrmann (2006) for the value map concept). Films with a particularly strong power to gain attendance are called "blockbusters". Our data shows that over 80% of blockbusters are American productions, reducing the status of the German film. If blockbusters have the power to decrease the total box-office and create a one- or two-film market, this phenomenon is known as the "black hole effect" (Sochay (1994)). In this case, the rationale is that blockbusters reduce the attendance at competing films.

> *H7a: There is a negative impact of the number of blockbusters per year on a film's admissions.*

As a competing hypothesis, blockbusters could be able to expand the total box-office potential for all films, which is called the "ripple effect" (Sochay (1994)). This effect manifests itself if spill-overs occur when the hits are sold out: As blockbuster tickets are not auctioned off, being price invariant, extra demand is not rationed but goes to alternative movies. Hence, blockbusters provide positive externalities to other movies, as other movies become recipients of subsidies from the blockbuster since it does not absorb buying power. Moreover, people who enjoyed watching the blockbuster are likely to seek out other movies playing at the same time. Thus, blockbusters could increase the attendance at competing films.

> *H7b: There is a positive impact of the number of blockbusters per year on a film's admissions.*

3.3. Hypotheses on Network Structure

Vertex Degree. Technically, a network consists of a graph and additional information on the vertices or the lines of a graph. That is, a network $N = (V, L, P, W)$ is defined by a graph $G = (V, L)$ where V is the set of vertices and L is the set of lines, whereas P denotes vertex value functions (information on the vertices) and W line value functions (relational strength e.g.). The graph represents the structure of the network. A vertex is the smallest unit in a network, representing an actor. A line is a tie between two vertices indicating any social relation. The *degree* of a vertex is the number of lines incident with it (Watts (1999b)): its neighbours. Here, we have two different sets of vertices; movies, i.e. film teams, and film team members. Two vertices representing single film team members are connected if they have appeared in a film together (Newman (2003)).

A movie vertex, on which our analysis centres in the following, is connected to another one if these movies share any film team member.

Contacts to former team members help ideas and information to spread within the network. Hence, creativity and know-how is not only part of individual talent and experience, but results also from a social system whose members amplify or stifle one another's creativity and contribute to information flow. Creativity aids problem-solving, innovation and aesthetics in a movie and it is spurred when different ideas unite or creative material in one domain inspires fresh ideas in another (Guimerà et al. (2004)). Therefore, a movie team that entertains more contacts has better chances of obtaining creative input and know-how. A combination of distinct relationships could lead to competitive advantage (Gulati/Kletter (2005)) by supporting the movie team's joint performance, which in turn helps to meet consumer interests and render the movie attractive to the audience.

> *H8: A high degree positively influences a film's admissions.*

Structural Holes. A structural hole is present in the ego-network of a vertex (which consists of this vertex, its adjacent vertices and all lines between all these vertices) if two of its neighbours are not directly connected. This idea can be conceptualized looking at a "triad", which is a construct of three vertices: the focal vertex, an alter and a third vertex. According to sociologist George Simmel, a triad which has links between all three vertices (*complete triad*) reduces the individuality of its members: Full connection brings about that vertices share norms and information and makes them behave like a group rather than as a set of individuals (De Nooy et al. (2005)). Transferring this idea to the movie business, more direct links between a movie's neighbours yield a higher degree of homogeneous information (film B builds on film A, while C builds on A and B). In this case, information, know-how and creative input may be less valuable for a movie as others have (had) similar input at their disposal. Hence, it should favour a movie vertex's performance, if there is no connection between its alter and the related third vertex – which means there is a *structural hole* (Guimerà et al. (2005)) – in many of its triads. Then, the vertex can build on more diverse knowledge and obtain ideas from creative personnel that is not in turn directly influenced by one another.[6] This is likely to positively influence movie performance which is necessary to differentiate the movie from its competitors.

[6] On the importance of *diversity* for team collaboration, see Guimerà et al. (2005); Kravitz (2005).

H9: A high number of structural holes positively influences a film's admissions.

4. Data, Variables and Methods

4.1. Sample

The data contain 160 films that were produced in the closed interval 1990–2005. 1990 was chosen as a starting point for the analysis since the reunification of Germany constituted a structural breach in the data. Besides, the movie industry may serve as a source of cultural identity (Jarvie (1978)); as the reunification initiated a re-interpretation of Germany's cultural identity, it may have impacted the industry.

For each year, the top ten German films as to admissions in German cinemas were selected from the FFA database.[7] The sample was pared down as data for 2005 had not been available completely yet at the time of the analysis. Furthermore, seven films were excluded due to abnormally low or high admissions.[8] The movies produced in the period of 1990–1992 were used to form the initial network; to select each year's top movies, they were grouped according to the year of production. This was important to analyse the network which influenced movie production. For the testing of hypotheses, however, films were categorized according to their release years (as, for instance, films face competition in the year of release, not of production). Two more films produced in 2004 had to be excluded as they were released in 2005. Therefore, the testing of hypotheses was performed on 111 films[9] released in 1993–2004.

[7] Following the definition applied by Filmportal, a movie was considered "German" if produced under significant participation of a German production company. For the purpose of network analysis, we required each movie to feature at least one German participant under the main functions (here, producer, director, camera person, scriptwriter) or the three leading movie actors, unless the movie was animated.

[8] With the sample admissions' mean being larger than the median and per definition non-negative admission numbers, the distribution is left-truncated and right-tailed. We excluded those films with admissions higher than the mean plus four times the standard deviation, and also those failing to reach the bottom-line admissions for successful directors and production companies, which is 100,000.

[9] At the beginning of the 1990s, there were approx. 80 theatrical releases per year, growing to 120 in 2004. Hence, our sample covers a reasonable percentage of films in this period.

4.2. Variables and Descriptive Statistics

4.2.1. Dependent Variable

To operationalize success, we used the total number of admissions to each respective movie, labelled as *ADMISS*. Data were taken from the FFA database. Within the sample, admissions range from 159,026 to 4,951,385.[10]

4.2.2. Independent Variables

Team Structure. Information on a movie's cast was obtained from the Filmportal database (a cooperation of the German Film Institute and several other official institutions). We took the three leading movie actors and, in line with Jansen (2002), categorized those that had been long-time well-known, or were "celebrities", or starred in a film with at least 400,000 admissions, as successful. This number implies a threshold value which only approximately the top 20% of German films released in 1990–2005 reached. The same threshold was used for producers. Following Jansen (2002), we further identified directors and production companies (for a company, we considered the average admissions of its German films released in 1990–2005 outside the sample) that reached at least 100,000 admissions as successful. Summing up the number of previously successful team members – 103 sample movies employed at least one – we defined the variable *STEAM*.

Star Power. We constructed the binary dummy variables *ACTOR* and *ACTRESS.* Again we used the threshold of 400,000 admissions to indicate whether a movie was supported by star power. Successful actors participated in 50 sample movies, while 28 movies had successful actresses in the cast.

Budget. Budget data were not publicly available for the sample movies. We expected human resources to be the biggest cost block in a movie budget. In Germany, star fees are not as high as in the US. The top 25 German stars earn €100,000–200,000 per movie, in contrast to some Hollywood stars who may demand $25m (Hennig-Thurau/Wruck (2000)). Furthermore, the German workers' union "ver.di" provides guidelines for tariffs developed with several producers' organizations. Hence, wages for comparable tasks should not vary much across movies. Thus, in Germany, costs should not be determined by employing stars but rather by how many functions must be fulfilled for making a movie that require the employment of personnel. Hence, we expected: *budget = f (functions performed by personnel)*. Using Filmportal, we counted

[10] Also, we collected data for a sub-sample and applied a logit model with the dependent variable of success or failure as to winning the "Box-Office Germany Award" and a reduced independent variables set to demonstrate result stability.

the total number of direct (director, scriptwriter, etc.) functions, movie actors and indirect functions (general management e.g.) and defined the sum *BUDGET* as a budget proxy.[11]

Funding. TV-funding for individual films ranged up to €2.23 m and was represented by the variable *TVFUND*. Funding was granted to 16 movies and data were provided by the FFA. As the absolute correlation value between *TVFUND* and *BUDGET* was low (.08), we included both variables.

FBW-certificate"highly recommended". The binary variable *FBWHR* shows whether a movie was awarded this certificate, which was the case for 38 movies in the sample. Information on certificates was acquired from the FBW.

Movie Awards. Information on movie award wins was collected from www.kino.de and www.imdb.com. The number of awards was mirrored by the variable *AWARDS* encompassing the German and Bavarian Movie Award. With the number of awards ranging from 0 to 4 in the sample, 44 movies managed to win at least one award.

Blockbusters. The number of blockbusters (movies with over 1m admissions) was calculated on a yearly basis from the FFA database. The sum was represented by the variable *BLOCKB*. Over the period on hand, the yearly number of blockbusters ranged from 29 to 48.

Vertex Degree. As described above, a network consists of a graph and additional information on vertices or lines. An undirected line is an "edge" (an unordered pair). A simple undirected graph consisting of edges was used for the analysis.

Within the industry's bipartite structure, movies on the one hand and the functions of director, producer, camera person and scriptwriter and the three leading movie actors on the other hand, are two sets of vertices. An edge was drawn if a person had participated in a particular film, constituting a vertex pair (movie *A* – person *B*). Within network logic, vertices can only be related to vertices in the other set. This structure is also called "two-mode". For the analysis, each year's two-mode data were transformed to one-mode data using the Ucinet 6 program. Thereafter, all vertices of the functions set that had been linked to the same movie were connected, rendering fully linked cliques. In the movies set, films which had personnel in common were incident to a line. For in-depth analysis, each year's one-mode movie network was modelled in the Pajek 1.14 program, which is used for analyzing and visualizing large networks. To construct the

[11] However, we could obtain budget data for a third of the sample. The correlation between budget data and the budget proxy was as high as .415 for a significance of .013, which further validates the proxy.

variable *NDEGREE*, we computed the degree for each movie in its production year. In order to account for the fact that the network grows over time, thus increasing the probability that a movie entertains many ties, we calculated the *normalized degree* of vertices (i.e. each vertex's degree divided by the number of its potential network neighbours). The mean normalized vertex degree ranges between 0 and 0.317, the average is 0.07, indicating that over time, on average 7% of all possible ties exist.

Structural Holes. We used the *density* of the ego-network of each movie (this density is the number of lines existing among a focal vertex's neighbours in proportion to the number of maximum possible lines between them, see figure 2) to indicate the proportion of structural holes in the vertex's relations. Following the notation of Watts (1999b), formally, the ego-network density of vertex *i* is measured by the vertex's local clustering coefficient:

$$C_i = \frac{\left|E(\Gamma_i)\right|}{\binom{k_i}{2}}$$

where $\left|E(\Gamma_i)\right|$ is the number of edges in the neighbourhood Γ_i of *i*, i.e. the subgraph that consists of the vertices adjacent to *i* not including *i* itself, and $\binom{k_i}{2}$ is the total number of possible edges in Γ_i. That is, given k_i vertices in the subgraph Γ_i, at most $\binom{k_i}{2}$ edges can be constructed in that subgraph.[12]

[Insert Figure 2 here]

The variable *EGODENS* serves as an indicator of homogeneity of information. Vertices with low ego-network density are hypothesized to perform better (see 3.3; De Nooy et al. (2005)). We computed a movie's egocentric density by taking into account all movies produced from 1990 onwards up to and including the production year of the movie currently analysed. Density may range from 0 to 1, where a value of 1 means that all a vertex's neighbours are connected (Barabási (2003)). The sample movies' densities showed a mean of 0.477, which indicates that on average nearly half of all possible lines between a vertex's neighbours exist.

[12] More general, clustering coefficients can be illustrated by this phenomenon: For a pair (*u*, *v*) of vertices, the event that an edge between *u* and *v* exists is highly negatively correlated with the graph distance between *u* and *v* in the network with the possibly existent edge (*u*, *v*) deleted (Liben-Nowell (2005)).

4.2.3. Control Variables

Competition from Piracy. We focussed on the competitive environment to control for further factors influencing admissions.[13] Piracy encompasses offering hardcopies or illegal internet downloads. A 2005 FFA-survey revealed that in the first half of the year, 11.7m movies had been downloaded in Germany, about 10% of those prior to release and about 34% after release but prior to DVD release. Watching downloaded movies may result in lower admissions. This logic is confirmed by 29% of the download users who stated they had reduced movie-going due to downloading, while 13% did not go to the movies at all any more (FFA (2006)). As a piracy behaviour proxy, we used the yearly number of proceedings initiated by the GVU, denoted as *PIRACY*.

Competition from Film Imports. Our data suggested that over time, the increase in movie-going was considerably lower than the increase in released movies. Thus, the more movies there are, the less may be the chances of each movie to get attention as the audience spreads over the alternatives on hand. We controlled for effects of competition from imported movies with the variable *IMPORT*. Import statistics were obtained from the BAFA (Federal Office of Economics and Export Control) and SPIO ("Spitzenorganisation der Filmwirtschaft e.V.", the German film industry umbrella organization).[14]

Distribution Revenues. Distribution revenues indicate the number of German movie copies which distributors have rented out multiplied by the copies' prices. Higher revenues imply that screen coverage has risen. As the screen number has increased only moderately over the period analysed (SPIO (2005)), a higher number of German movie copies should go at the expense of foreign movie copies. Higher screen coverage increases the chances of attendance for German movies. However, with increasing popularity of German films, rental fees may have risen. Thus, we found that we could control for distribution revenues best with a logarithmic term. The variable was denoted *LDISTREV*. Revenues were obtained from SPIO.

Genre. While Austin/Gordon (1987) observed that "the idea that movie audiences do have movie type preferences is widely acknowledged", studies on genre impact on box-office performance produced different results. Comedy was positively significant in the work of Litman (1982); Sochay (1994); science-fiction and horror were empirically

[13] However, we controlled for factors like FSK, season, competition from events and market position of multiplex theatres separately, which were not found to be significant.

[14] Although the categories of blockbusters and imports may overlap partly as blockbusters may also be imports, blockbusters (showing a mean of 39 for the whole period) were only a small fraction compared with total imports (here, the mean is 832) and correlations were not high either. Therefore we took both categories into account.

supported by Litman/Kohl (1989); drama negatively impacted success in the study of Jansen (2002)). We conducted a factor analysis for the eight genres into which we had categorized films according to Filmportal. We used the anchor points of the entertainment factor *ENTERTAIN* and the documentary factor *DOCU* as controls.

Symbolicity. Symbolicity (Hennig-Thurau et al. (2001)) may encompass that first, a movie is a sequel which can be understood as a brand extension (Chang/Ki (2005). Second, it could be based on a well-known idea like historic characters or scripts adapted from other media. As symbolicity partly builds on prior success, it reduces uncertainty and promotes individual utility as consumers believe to have some knowledge of the film in advance. As the number of sample sequels is very limited, we focus on the well-known idea aspect constructing the variable *KNOWNIDEA*.

Table 1 provides a summary of the postulated hypothesis and the related variables as well as the controls. Table 2 displays the descriptive statistics and correlations for each of the variables.

[Insert Table 1 and Table 2 here]

4.3. Methods of Statistical Analysis

Our design uses a stepwise Ordinary Least Squares Regression (OLS) to model the effects of the independent variables and controls on the dependent variable.[15] To avoid violation of model premises, we controlled for absence of multicollinearity, for homoscedasticity and normal distribution of disturbance terms, using Variance Inflation Factors (VIFs) and correlations, White- and Newey-West-Tests and the Kolmogorov-Smirnov-Test. VIFs were all lower than 2, thus beyond the critical tolerance limit of 10 suggested by Hair et al. (1998). Both the White- and the Newey-West-Test proved heteroscedasticity for all models, such that the premise of constant variance of the disturbance terms had to be rejected. Hence, we employed heteroscedasticity-consistent error estimates using Newey-West consistent covariances. Thereafter, OLS could be carried out.

5. Regression Results

Table 2 displays the regression results of the OLS analysis. First, we introduced the controls. Then, we added variables on the product-inherent and -induced categories, and the network structure.

[Insert Table 3 here]

[15] We also used a logit model to test result stability.

Together, the controls explain about 23% of the variation in admissions according to the adjusted R^2. Distribution revenues *LDISTREV* are positively significant on a 1% level, whereas symbolicity *KNOWNIDEA* is positively related to admissions on a 5% significance level. Taking the product-inherent and product-induced categories' variables into account, the adjusted R^2 increases by about 24% and reaches its maximum value, which is nearly 48%, after inclusion of the network structure variables.[16]

In the second model, two variables are significant on a 1% level (*FBWHR*, *AWARDS*), as well as three of the controls (*LDISTREV*, *ENTERTAIN*, *KNOWNIDEA*), all of which show positive coefficients. Three more variables (*STEAM*, *TVFUND*, *BLOCKB*) are positive and significant on a 5% level, whereas *BUDGET* is marginally positive and significant. Of the variables for which we posited hypotheses, *AWARDS* and *FBWHR* exert the most influence with standardized coefficients of .289 and .217, followed by the variables *TVFUND* (.194), *BUDGET* (.192), *BLOCKB* (.154) and *STEAM* (.150). These results as to the significance levels of variables (with *STEAM* excluded) are confirmed by model 3, with the only differences of *BUDGET* and *FBWHR* being significant on a 5% level here. Additionally, in the third model, the network variable *NDEGREE* is positively significant for a movie's admissions. The strongest influence can be attributed to awards (.294), FBW-certificates (.205), budget (.204), funding (.203), blockbusters (.151) and the normalized degree (.146). Regarding the controls, symbolicity is strongly influential (.386), followed by the entertainment factor (.239) and distribution revenues (.186).

Concluding from these observations, most hypotheses are supported: With respect to the product-inherent variables of creative sphere, the positive significance of the number of successful team members *STEAM* confirms our hypothesis that experience from prior projects positively influences a movie's success. In contrast, independent from gender, individual star power is insignificant in both models.[17] This supports the statement of Delmestri et al. (2005) that the star system does not seem to be relevant in Europe in predicting movies' economic performance. As to the financial resources variables, *BUDGET* is positive and significant, so that we can accept the hypothesis that a larger budget allows to reach more viewers. This is in line with Jansen (2002,) who suggested that high budgets allow high quality choices for "below the line" inputs such as technical equipment, as well as for "above the line" input like creative personnel. The same

[16] It is intuitive that the adjusted R^2 does not increase further for model 3, since *STEAM* was excluded from the third regression (due to highly significant correlations of up to .614 with the network variables).
[17] Including a variable representing the joint (male and female) star power did not prove significant either.

line of arguments holds for TV-funding; funded films can afford more expensive input. Also, funding may signal movie quality and is allocated to films that have proven their ability to convince, as funding committees found the movie attractive.

Regarding the product-induced category of marketing support, the FBW-certificate and movie awards are both highly positively significant and also, they exert strong influence. Thus we find support for the hypothesis of admissions being positively influenced by the signalling quality of certificates and awards, by second runs due to awards and indirect effects from positive critiques. Turning to competition, interestingly, the number of blockbusters in the year in which a sample movie was released influences admissions positively. Thus, the ripple effect prevails as blockbusters increase overall movie attendance.

If we take the network variables into account, we find that the number of connections a film team entertains due to previous projects adds to reaching a wide audience. This supports the small world theory of creative ideas being transmitted through the network and proves that the movie's network position is important to financial success. The advantageousness of entertaining more contacts confirms the hypothesis that higher information flow to the movie supports performance and helps to meet consumer demand. However, ego-network density is insignificant. This may be attributed to the fact that the industry is still at the beginning of its life-cycle, indicating that numerous creative ideas exist which have not been realized before. For instance, in recent years movies have emerged dealing with topics that had not been shown on screen extensively before, but are considered "German interest" (e.g. themes related to the reunification of Germany or the Second World War).

6. Restrictions and Discussion

6.1. Main restrictions of the Study

There are several limitations to this study. First, our analysis does not consider the success of German movies outside Germany, as reliable data are hard to obtain. Additionally, external result validity requires the sample to be chosen at random. However, the sample was chosen according to the movies' box-office performances in terms of admissions, as the focus of the analysis was placed on *successful* productions. Moreover, we could only regard "survivor" movies which were actually released, as we could not include data on movies that died in production. This survivor bias, however, is a common restriction to economic research.

Also, the logic behind the *STEAM* variable suggests that experience and know-how are gained by previous success. However, it may also be possible to learn from failure. Still, the ability and willingness to meet market demand has been proven by participants of successful productions, which remains unproven with unsuccessful films.

6.2. Discussion

The objective of this research was to widen the scope of the investigation into success factors in the project-based cultural industry of motion pictures by taking into account important explanatory variables that had been missing in the analysis so far. We aimed at providing clarification as to how producers can first, cope with demand patterns that are highly unpredictable, and second, with production processes that are difficult to control as they depend on a team's joint potential to contribute creativity and know-how. Therefore, we combined two strands of research, focussing on the two concepts of economic and network analysis. We tested our general hypothesis stating that a movie's financial success in terms of admissions is a function of product-inherent categories (i.e. creative sphere and financial resources), product-induced categories (i.e. marketing support and competition) as well as of network structure (i.e. a movie's position within its industry).

According to this hypothesis, we defined specific hypotheses which were tested and widely supported. With respect to the first of the two product-inherent categories, creative sphere, it was confirmed that the number of previously successful film team members positively influenced admissions, whereas individual star power whether male or female had no effect at all. For the second category, financial resources, both the variables budget and funding positively influenced admissions. This held also for the first product-induced category, marketing support, represented by the variables critics' reviews and movie awards. Interestingly, the second product-induced category, competition, showed that a high market presence of blockbusters positively influenced a movie's success. As to network structure, whereas the diversity of a movie team's contacts had no effect, its normalized degree (the number of teams to which it entertained contacts in relation to the total number of other teams existing in the network) proved to positively impact its box-office success. Therefore, we find support for the basic hypotheses: $admissions_j = f\ (creative\_sphere_j,\ financial\_resources_j,\ marketing\_support_j,\ competition_i,\ network\_structure_j\ )$. As regards the control variables, distribution revenues in the industry as well as the genre of entertainment and symbolicity were related to a movie's success.

First, on the demand side, considering the economic concept outlined in this paper should help producers to overcome uncertainty as to which factors influence the audience‘s buying decisions. In line with Cassidy (1997, 43), we find that “there is a distribution of success in the movie business that can be impacted by management”. Here, gathering successful team members, acquiring a larger budget and funding, aiming to obtain critics’ appraisal and producing an entertaining movie based on a well-known idea should be promising. Moreover, it would promote success if there was a larger number of blockbusters in the year of the release as well as high distribution revenues, meaning that the industry in general has a successful year. Second, on the supply side, creativity, talent and innovation are provided not only by individuals, but by a social structure which can enhance or hinder performance according to the small world theory. Thus, successful project-management in cultural industries implies to recruit and motivate those individuals who seem to possess talent, know-how and an understanding of how to develop and make use of structures which leverage creative resources without stifling them. Therefore, we conclude: For team formation, when it comes to star power, the team is the star.

Future research could concentrate on further exploring the relation between network structure and economic implications as this study was subject to the restrictions outlined above. Moreover, we abstracted from the assumption that relations decay over time, as the industry was still young. Also, the acquisition of knowledge, particularly within the framework of tie strength in this industry, should be analysed in greater detail.

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Figures and Tables

Figure 1. Schematic Representation of an Actor-Movie Network. Following Uzzi/Spiro (2005).

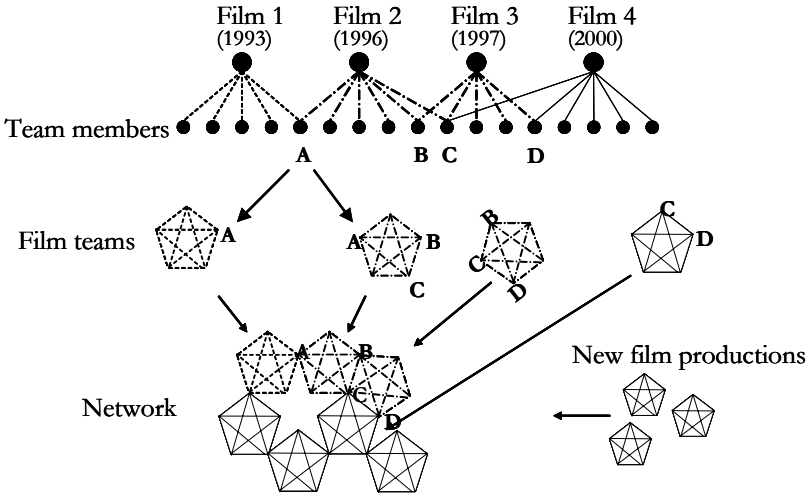

Figure 2: Ego-network Density. Measured by the local clustering coefficient C_1.

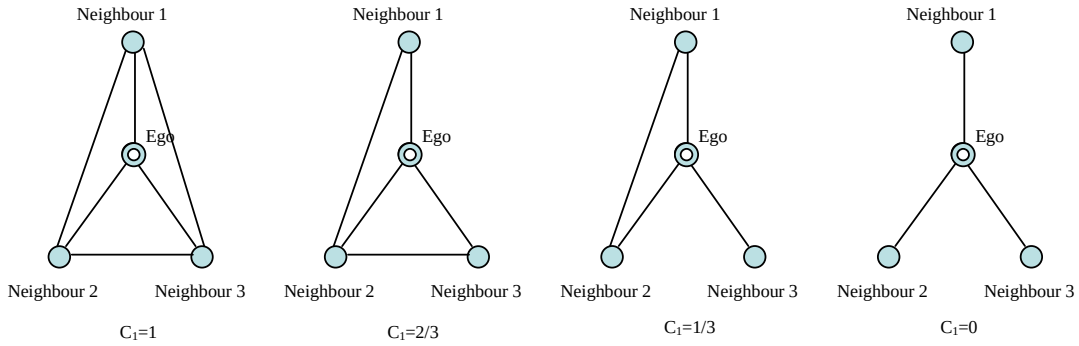

Table 1. Overview of Hypothesis and Variables.

Category	*Sub-category*	*Hypothesis*	*Variable*
Product-inherent categories			
Creative Sphere	Team Structure	H1: A high number of experienced team members positively influences a film's admissions.	*STEAM*
	Star Power	H2a: The participation of male stars positively influences a film's admissions.	*ACTOR*
		H2b: The participation of female stars positively influences a film's admissions. The female star effect on admissions is stronger than male star power.	*ACTRESS*
Financial Resources	Budget	H3: A high budget positively influences a film's admissions.	*BUDGET*
	TV-Funding	H4: A high amount of TV-funding positively impacts a film's admissions.	*TVFUND*
Product-induced categories			
Marketing Support	Critics' Reviews	H5: Being awarded a FBW-"highly recommended" – certificate positively influences a film's admissions.	*FBWHR*
	Movie Awards	H6: Movie awards positively influence a film's admissions.	*AWARDS*
Competition		H7a: There is a negative impact of the number of blockbusters per year on a film's admissions.	*BLOCKB*
		H7b: There is a positive impact of the number of blockbusters per year on a film's admissions.	
Network Structure			
Vertex Degree		H8: A high degree positively influences a film's admissions.	*NDEGREE*
Structural Holes		H9: A high number of structural holes positively influences a film's admissions.	*EGODENS*

Controls	
Category	*Variable*
Competition from Film Imports	*IMPORT*
Competition from Piracy	*PIRACY*
Distribution Revenues	*LDISTREV*
Genre	*DOCU*
	ENTERTAIN
Symbolicity	*KNOWNIDEA*

Table 2. Pearson Correlations and Descriptive Statistics.

	Mean	S. D.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. ADMISS	1293306.49	964629.11	1.000															
2. STEAM	3.28	2.00	0.252***	1.000														
3. ACTOR	0.45	0.50	0.088	0.465***	1..000													
4. ACTRESS	0.25	0,44	0.078	0.336***	-0.026	1.000												
5. BUDGET	64.58	33.00	0.246***	0.058	-0.037	0.196**	1.000											
6. TVFUND (in €)	148312.22	410713.48	0.230**	0.158*	0.029	0.106	-0.088	1.000										
7. FBWHR	0.34	0.48	0.234**	0.061	0.034	0.149	0.252***	-0.057	1.000									
8. AWARDS	0.58	0.89	0.307***	0.077	0.044	-0.027	0.125	0.113	0.259***	1.000								
9. BLOCKB	39.12	5.27	0.195**	0.049	0.052	0.003	-0.263***	0.068	0.074	0.185*	1.000							
10. NDEGREE	0.07	0.07	0.282***	0.608***	0.166*	0.182*	0.102	0.030	0.094	-0.005	-0.037	1.000						
11. EGODENS	0.48	0.36	0.108	0.193**	0.095	0.016	-0.025	-0.010	-0.063	-0.049	0.102	0.297***	1.000					
12. PIRACY	994.50	749.79	0.067	0.137	0.063	0.008	-0.444***	0.233**	-0.015	0.264***	0.446***	-0.099	0.056	1.000				
13. IMPORT	840.71	234.95	-0.064	0.033	-0.089	0.063	0.087	0.055	0.023	0.030	-0.286***	0.052	-0.039	0.000	1.000			
14. LDISTREV	3.25	0.43	0.358***	0.060	0.016	-0.142	0.116	-0.009	0.044	0.059	0.185*	0.138	0.025	0.116	0.006	1.000		
15. ENTERTAIN	-0.03	.01	0.132	0.001	0.173*	-0.077	-0.004	-0.097	-0.216**	-0.244***	-0.042	0.044	0.113	-0.262***	-0.106	0.052	1.000	
16. DOCU	-0.03	0.95	-0.067	-0.168*	-0.042	-0.100	-0.229***	-0.034	-0.032	-0.019	-0.010	-0.136	-0.233**	0.057	-0.105	0.006	0.016	1.00
17. KNOWNIDEA	0.12	0.32	0.420***	0.132	0.064	-0.083	-0.055	0.110	-0.145	0.016	0.003	0.147	0.088	0.141	0.009	0.192**	0.008	-0.087

N = 111; Significance Levels: *** p < 1%; ** p < 5%; * p < 10%.

Table 3. OLS-Regression Results for Models 1-3. The dependent variable for all regressions was the number of box-office admissions.

	Model 1 Coefficient Std. Coeff. (Std. Error)	Model 2 Coefficient Std. Coeff. (Std. Error)	Model 3 Coefficient Std. Coeff. (Std. Error)
C	-694083.316 (735332.379)	-2079593.343** (831350.562)	-2023355.574** (793481.996)
STEAM		71955.684** 0.150** (34772.000)	
ACTOR		-142514.464 -0.074 (169666.800)	-58248.298 -0.030 (151810.411)
ACTRESS		61635.324 0.028 (138567.181)	106813.148 0.048 (149996.396)
BUDGET		5705.221* 0.192* (2999.427)	6058.293** 0.204** (3011.805)
TVFUND		0.463** 0.194** (0.221)	0.484** 0.203** (0.212)
FBWHR		442630.467*** 0.217*** (161751.790)	418296.918** 0.205** (161165.007
AWARDS		244247.114*** 0.289*** (90848.688)	248432.362*** 0.294*** (93762.108)
BLOCKB		28070.997** 0.154** (11321.544)	27381.925** 0.151** (11385.963)
NDEGREE			2121958.927* 0.146* (1243771.842)
EGODENS			79360.622 0.030 (182913.792)
PIRACY	19.987 0.016 (97.179)	-66.201 -0.053 (112.514)	-21.979 -0.018 (106.222)
IMPORT	-253.765 -0.063 (363.319)	-192.827 -0.048 (365.149)	-198.337 -0.049 (350.812)
LDISTREV	631957.620*** 0.279*** (171112.995)	447202.701*** 0.198*** (143197.919)	420920.875*** 0.186*** (143372.693)
ENTERTAIN	108056.634 0.114 (92364.257)	232613.062*** 0.246*** (66535.441)	225901.411*** 0.239*** (66243.426)
DOCU	-47791.947 -0,052 (51077.574)	49615.519 0.054 (35415.780)	55045.727 0.060 (41664.970)
KNOWNIDEA	1071545.130** 0.349** (440717.177)	1180540.461*** 0.385*** (353892.606)	1152313.943*** 0.376*** (331059.313)
N	111	111	111
R^2	27.43%	54.23%	54.94%
Adj. R^2	23.24%	47.55%	47.82%
F-Statistic	6.550***	8.123***	7.722***
F-Value	0.000	0.000	0.000
Durbin Watson	1.932	2.080	2.100

Significance Levels: *** p < 1% ** p < 5%; * p < 10%.