This is an Accepted Manuscript of an article published by Taylor & Francis in The Social Science Journal on 2022, available at: https://doi.org/10.1080/03623319.2022.2125278

Economic analysis of firms in the European film industry through their financial ratios

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Abstract

Within the field of cultural industries the film sector is immersed in a spiral of changes from two different standpoints. On the one hand, new technologies are revolutionising all the stages of the chain of value in the sector, while on the other, consumers are changing their consumption habits. Together with these changes, the huge turnover in the sector, the number of jobs created, and the industry's contribution to the Gross Domestic Product (GDP), make it interesting to explore this sector from the standpoint of the financial situation of the firms involved. Taking these premises into account, this study seeks to examine the film industry, specifically the firms included in code 591 in revision 2 of the Statistical Classification of Economic Activities in the European Community, commonly referred to as NACE (from the French term "Nomenclature statistique des Activités économiques dans la Communauté Européenne"), from the perspective of their financial performance. We analyse the main profitability and structural ratios for firms in the present-day 27-country European Union (EU 27) using multivariate statistical techniques for dimension reduction, establishing the key factors inherent in their financial structure and forming homogeneous groups for the various subsectors grouped under code 591. The results highlight the diverse nature of the sector and the differences between the various subsectors.

1.- Introduction

The film industry has undergone major changes over the last two decades. Globalisation and the development of new technologies have impacted the movie industry, both in terms of production as well as sales processes and even consumption habits (Mikkus & Nedzinskaite-

Mitke, 2016). Film companies, traditionally organised around the three stages of the sector's chain of value –production, distribution, and exhibition– (Eliashberg et al. 2006), have been affected by these changes, which have also been hastened by the COVID-19 health crisis.

The development of new technologies, coupled with the appearance over the last few years of platforms that distribute audiovisual content, such as Netflix, HBO, Amazon Prime, Apple TV or Disney+, has led to numerous innovations, changes in consumer habits, an increase in the amount of content created, new business models and, in sum, has triggered a veritable upheaval in the film sector and in the audiovisual industry as a whole, in line with other cultural and creative industries (Jenster, 2020).

The borders between cinema, video and television are becoming blurred, leading to a convergence in audiovisual content and a coming together between cinema, television and Internet (Heredia, 2017). In addition, audiovisual conglomerates have appeared (large national and international companies) that merge two or three of the activities involved in the chain of value, principally production and distribution (Jenster, 2020). This phenomenon, which already existed –think of the Hollywood *majors*–, is furthered through audiovisual platforms which, although mainly engaged in distribution, have become involved not only in the production of television series and programmes but also of films.

The decisions taken by audiovisual platforms are thus challenging the cinema's business models, which were traditionally based on the classical distribution structure (movie theatres, sales and renting of video, on-demand services, pay-per-view television, open television), by simultaneously premiering on different screens that change viewing times, affect sources of income and even alter consumption possibilities (Heredia, 2017).

In this regard, consumption habits are also changing. Consumers of audiovisual products, including cinema, are increasingly moving away from the restrictions imposed by time and place and are prioritising actual watching as opposed to possession or purchase (DeFilippi &

Wikström, 2014). People today choose to watch films or other audiovisual content at anytime, anywhere and in any format – on any kind of screen – thereby increasing demand for Subscription Video On Demand (SVOD) services and reducing the consumption of video, television or films seen in movie theatres. Despite this, the number of filmgoers rose in 2019 compared to the previous year, with film exhibition continuing to provide a key source of income, such that we will need to see how the sector evolves over the next few years.

In sum, the film sector faces a number of major challenges. The distribution and exhibition of audiovisual content has changed at breakneck speed, and business models based on the use of telecommunications and Internet are consolidating their position. Yet the creation of content – production and postproduction – continues to provide the key raw material.

The four subsectors of the film industry differ enormously from the business standpoint (firm size, turnover, number of employees, etc.), added to which there are regional differences due to contrasting national legislation, each country's public policy as well as investment in the film industry from the various television and audiovisual platforms. In this regard, the European fiction film production's main sources of funding come from direct public funding (26% in 2017) and broadcaster investments (24% in 2017), a percentage that varies when excluding France (36% and 11%, respectively) (European Audiovisual Observatory, 2020a). These public policies of funding and participation of television companies in film production aim to ensure that production companies recoup much of their investment, although the rest depends on commercialising and exporting the product in what is a complex, risky and diverse sector (see Parc & Messerlin, 2020). In sum, in the current scenario of change, uncertainty and ever-increasing competition, it is difficult to gauge a firm's health and chances of survival unless this is compared to the average situation of firms in its particular subsector (Narang et al. 2018).

The aim of this paper is therefore to examine the economic-financial situation of firms in the film industry in the European Union (EU-27) by analysing financial ratios that provide a picture

of the sector and so help to understand the financial performance of the firms involved. Specifically, we study a set of financial ratios of the four subsectors of cinema activity (production, postproduction, distribution, and exhibition) grouped under NACE code 591– Rev. 2, companies corresponding to "motion picture, video and television programme activities". To do this, we perform a two-fold analysis. After conducting a variance analysis designed to test whether the four subsectors of the film industry differ and whether it makes sense to analyse them separately, we then first carry out a factor analysis that enables us to reduce information from the ratios, and secondly, a cluster analysis that allows us to group homogeneous firms and describe them.

This work follows the line of other studies that examine the financial performance of firms in a given sector through their financial ratios, using techniques such as multiple regression analysis, factor analysis, and cluster analysis. This helps to pinpoint firms' strengths and weaknesses. For example, De et al. (2011) apply these techniques for the cement industry in India. Delen et al. (2013) build a predictive model of the financial performance of Turkish public firms. Öcal et al. (2007) focus on the construction industry in Turkey, and analyse a set of financial ratios of firms involved in this sector.

For the case of the cultural and creative industries, mention should be made of the works of Bedate et al. (2017) and Sanz et al. (2018) for the European publishing sector. In the first of these, an analysis is carried out of European firms in the publishing industry in order to classify them in terms of their economic-financial performance, using factor analysis (reduction of information) and cluster analysis (clustering and description of groups of firms). In the second, a synthetic index is created of financial performance based on ratios of profitability and solvency, thereby enabling firms' efficiency to be measured in comparative terms. Finally, one key work is that of Narang et al. (2018) for communication firms in India. Yet, to the best of our knowledge, this is the first study applied to the film sector. In this regard, it may prove to

be very useful since it is built on a wide database of firms and for the year 2019, a key year for making post-COVID comparisons.

The article is structured in five sections. After this introduction, which sets out the aim of the study, section 2 looks at the situation of the European audiovisual and cinema industry. Section 3 deals with the research design, and section 4 presents the main results in the two stages of the research. The work closes with section 5, addressing the discussion and conclusions, and with the references.

2.- The cultural and creative sectors in the European Union

The cultural and creative sectors (CCS) are a major economic activity in the EU, at the level of information and communication technologies (ICT) or accommodation and food services (KEA, 2019). In 2017, CCS generated 413,000 million euros in terms of added value (AV), which represents 5.5% of all AV in EU countries, with an annual increase of 5.1% between 2013 and 2017. Those five years thus witnessed a rise from 5.4% to 5.5% of AV in the EU (KEA, 2021). In 2017, CCS as a whole also accounted for 6.2% of all employment in the EU (over nine million workers) and 12.1% of firms (almost three million companies in the sector), thereby contributing to the wealth and progress of the EU (KEA, 2021). The most prominent countries can be consulted in Table 1.

[Table 1 about here]

Within the cultural and creative sectors, the most important is the audiovisual and multimedia sector (AV&M), which includes activities related to cinema, radio, television, music, videogames as well as computer programming activities. This accounts for 2.5% of AV in EU countries and represents almost 48% of the overall AV generated by the CCS; in other words, 185,191 million euros in 2017 (KEA, 2021). This is followed by the publishing sector (books and press), which in the same year generated 1.1% of the EU's AV.

The audiovisual and multimedia sector employed 2.7 million workers in 2017 (1.9% of all EU jobs), with a 6.5% increase in employment between 2013 and 2017. In that year, the sector was composed of 638,000 firms, which was 161,486 more than in 2013 (KEA, 2021).

The audiovisual and multimedia sector is very wide and comprises three major subsectors: i) cinema, video and music; ii) radio and television; iii) videogames. There are also activities related to computer programming, which account for a large part of the activity, employment and firms. In turn, within each of these large subsectors there are a range of different activities (those related to cinema, video and television are in italics). In order of importance in terms of generating AV, these are as follows (KEA, 2021):

- Computer programming activities
- Data processing, hosting and related activities
- TV programming and broadcasting activities
- *Motion picture, video and television programme production activities*
- *Motion picture, video and television programme distribution activities*
- Retail sale of computers, peripheral units and software in specialised stores
- Sound recording and music publishing activities
- *Motion picture, video and television programme post-production activities*
- *Motion picture projection activities*
- Publishing of computer games
- Radio broadcasting
- Reproduction of recorded media
- Manufacture of musical instruments
- Repair of other equipment
- Retail sale of music and video recordings in specialised stores

In this regard, the activities in the audiovisual and multimedia sector that interest us for this work are related to the cinema (cinema, video, and television programmes), some of which carry substantial weight in terms of the AV generated, such as employment and the number of firms. The most important sector in 2017 is "cinema, video and television production", with the rest having less weight (KEA, 2021) (see Table 2).

[Table 2 about here]

These four subsectors or activities within the audiovisual and multimedia sector cover the cinema industry's chain of value6 in a classical sense: production (and postproduction), distribution and exhibition. Nevertheless, the firms involved in these activities not only produce cinema in the traditional sense (films to be screened in movie theatres and subsequently sold to television companies or other means of viewing), but also series, television programmes, documentaries, etc. As a result, from an economic-financial standpoint, they are grouped under NACE code 591 – Rev. 2 highlighted in the introduction, and it is not possible distinguish – except in the case of exhibition – firms devoted exclusively to cinema from firms that produce different kinds of audiovisual content for movie theatres, Internet platforms, open television or pay-per-view television, etc.

Focusing on the cinema sector, we can point to some basic data in the industry in the EU. According to the "Focus 2019" (European Audiovisual Observatory, 2019) report, in 2018 box-office takings in the EU provided revenue of 6,800 million euros, with a total of 955.6 million tickets having been sold. The average ticket price in the whole of the EU was therefore 7.1 euros.

In all, in the EU as a whole 1,142 fiction films were made, in addition to 705 documentaries, giving a total of 1,847 films, 6.3% more than in 2017 and 14.4% more than in 2014. The number of screens in 2018 stood at 33,112, which was 0.26% more than a year earlier. Of these, 94.36% were digital screens (European Audiovisual Observatory, 2019). In 2019, the number of screens

reached 34,181, showing interesting growth compared to the previous year (+2,6%). Of these, 97.4% were digital (European Audiovisual Observatory, 2021).

The number of viewers in 2018, almost 956 million, fell by 2.9% compared to 2017, a trend that has been in evidence since 2015, although there are differences between countries (European Audiovisual Observatory, 2019). In 2019, nevertheless, just before the onset of the COVID-19 crisis, the number rose by 5.3% to reach 1,005 million, after some years in which figures had fallen. This gave the best result in movie theatre projections since 2004 (European Audiovisual Observatory, 2020a).

The countries with the highest film production[1], and which therefore had the strongest film industry, are France (which was involved in the production of 300 films in 2018, including 100% national fiction films, majority co-production fiction films, minority co-production fiction films and feature documentaries), followed by Italy (273), Spain (257), and Germany (247). Some way behind were countries such as the Netherlands (86 films), Belgium (75) or Denmark (57). The countries that saw the lowest figures of cinema production included Hungary (18 films), Luxembourg (12), Malta (4) or Cyprus (3) (European Audiovisual Observatory, 2019).

The trend towards a decline in the number of movie theatre tickets sold in EU countries has run parallel to the rise in the consumption of cinema and other audiovisual content through Video on Demand (VOD) systems. The appearance, expansion and growth of audiovisual content platforms such as Netflix, HBO, Amazon Prime, Apple TV and pay-per-view television are changing cinema consumption habits and revolutionising the sector, in which purchasing (films and video) is losing ground to subscriptions (seeing content at anytime, anywhere, and on any device) (DeFilippi & Wikström, 2014).

[1] The production data for films provided by the European Audiovisual Observatory and their distribution by country should be approached with caution, as there is enormous difficulty assigning nationality in the case of co-productions, since assessment is not univocal (European Audiovisual Observatory, 2018).

Although there are no official EU statistics, the KEA (2021) report (see also European Audiovisual Observatory, 2020b) calculates that in 2019 the number of subscribers to SVOD services exceeded 100 million in the EU and accounted for over 80% of revenue for VOD services (European Audiovisual Observatory, 2021), with further growth expected in the coming years. This has been bolstered and hastened by the current Covid-19 pandemic (Deloitte, 2020).

3.- Research design

For this research, we used the Orbis database, published by Bureau Van Dijk Electronic Publishing, which provides financial information in a standardised format on over 144 million firms worldwide. For the study, we selected European Union firms (EU-27) with NACE code 591– Rev. 2 corresponding to motion picture, video and television programme activities and that had operating revenues of over one million euros in the last available year so as to ensure they had at least some activity and a minimum economic structure.

The variables taken from the database are associated to financial ratios and variables for 2019 related to profitability (code R), financial structure (code S) and size (the remaining variables) (see Table 3): Return on Equity (ROE) using P/L before tax (%), Return on Assets (ROA) using P/L before tax (%), Return on Equity (ROE) using Net income (%), Return on Assets (ROA) using Net income (%), Profit margin (%), Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) margin (%), Earnings Before Interest and Taxes (EBIT) margin (%), Cash flow / Operating revenue (%), Current ratio, Liquidity ratio, Solvency ratio (Asset based) (%), Gearing (%), Operating revenue (Turnover) million euros, Total assets million euros, and Number of employees. The latter three variables are used to describe the groups of firms in the second part of the analysis.

[Table 3 about here]

This search gave a list of 2,260 firms that had data in all the variables used in the study. We then removed any firms that might be outliers. The criterion used to pinpoint such firms was to consider as an outlier any firms at a distance from the mean of over ±4 times the standard deviation. The final number of firms that make up the study sample is 2,154.

Code 591 is in turn subdivided into the following subsectors:

- 5911 corresponding to "Motion picture, video and television programme production activities", with 1,362 firms.
- 5912 corresponding to "Motion picture, video and television programme post-production activities", with 197 firms
- 5913 corresponding to "Motion picture, video and television programme distribution activities", with 205 firms and
- 5914 corresponding to "Motion picture projection activities", with 390 firms.

Having obtained the data, in the following section, which deals with the results, we first offer a description of the distribution of the firms chosen by country and activity subsector. We then conduct a factor analysis for each of the subsectors considered in order to sum up in new factors the information provided by the variables used in the study. The study concludes by clustering the firms from the different subsectors into homogeneous groups using cluster analysis and then describing the features that distinguish certain groups from others.

4.- Results

4.1.- Firms by country and subsector of activity

Of the 2,154 firms selected and analysed, 28.32% are firms from France, 24% from Italy, 19.08% from Spain, 5.11% from Poland, 4.74% from Sweden, and 3.30% from Portugal. The remaining 15.45% belong to other countries in the EU-27 (see Table 4). Countries such as Germany, which has a strong film industry, are under-represented in the Orbis database.

[Table 4 near here]

By subsectors, we find that 63.23% of firms are production companies, 18.11% are involved in exhibition, 9.52% in distribution, and that the remaining 9.15% are postproduction firms. Over all the subsectors, the country with the most firms is France, followed by Italy and Spain, except in the case of postproduction, where Spain has more firms than Italy, and thus switches places in the order of importance (see Table 4). Broadly speaking, the values in the sample concur with the data from the sector seen in section 2.

4.2.- Description of the characterising variables

The mean operating revenue (OR) of the firms analysed for the film industry as a whole comes to 12.81 million euros, although there is enormous variability. In turn, there are differences by subsectors. The distribution sector (5913) - with 33.47 million - evidences the highest mean revenue, with the postproduction sector (5912) displaying the lowest mean revenue (7.74 million euros) (see Table 5).

The mean total assets (TA) of firms in the film industry amount to 14.56 million euros. The highest mean corresponds to the distribution subsector (33.70 million euros), since this logically includes the exploitation rights of audiovisual products, whereas firms dedicated to the other subsectors have assets that are notably below the mean value (see Table 5).

From the standpoint of employment (NE), the situation differs somewhat. Firms in the cinematographic industry employ an average of 45.63 workers, albeit with certain differences. Exhibition firms generate most jobs (57.75 workers on average), while distribution firms have the fewest employees, with an average of 39.12 (see Table 5). These results are in agreement with the data provided by the KEA (2021) study.

One feature common to these three variables is that the degree of dispersion is very high. The exhibition subsector displays the mean values with greatest dispersion, with the post-production sector presenting the least disperse, although they are still very high (see Table 5).

4.3.- Factor analysis

We first carried out a factor analysis with the 12 financial ratios in order to reduce them to a smaller number factors that can capture the same amount of desired information as the original larger set of ratios. The analysis showed that the variable Cash flow/Operating revenue (%) (R8) evidenced a very low value in the anti-image matrix, thus advocating its removal. Factor analysis was repeated without this variable, using varimax rotation, and a reliability study was carried out of the new factors using Cronbach's alpha. The study showed that the variables of Solvency ratio (%) (S3) and Gearing (%) (S4) had a negative value for Cronbach's alpha, such that we decided to remove them. This meant that of the 12 variables initially used only nine now remained.

Table 6 shows the mean values and standard deviations of the variables in the study. One prominent feature in all of the variables and subsectors is the high data dispersion, with the EBITDA Margin (%) variable displaying the least dispersion in all the subsectors. Table 6 also provides the value of the difference of means statistic between the subsectors for each variable, as well as for the p-value corresponding to each of the hypothesis tests. Before comparing the means, a variance equality test was carried out using the Levene statistic. When variances were equal, the difference of means was tested using variance analysis, whereas when variance equality was rejected, the test was carried out using the Kruskal-Wallis statistic. The variables in which differences between the means of the subsectors were evident are: ROE using P/L before tax (%), ROA using Net income (%), Profit margin (%), EBITDA margin (%), and EBIT margin (%).

Significant differences in means were found in two ratios of profitability and the three ratios of profit, whereas there are no differences by subsectors in the liquidity variables. Profits ratios is where the level of significance is highest: in the ratios of Profit margin (%) and EBIT margin (%) the firms in the exhibition subsector is where the means reach the highest values, and in

production the lowest values, whereas for the EBITDA margin (%) the highest values for the mean are in the distribution subsector and the lowest in postproduction. For the profitability ratios, the significant differences are found in the ROE using P/L before tax (%) and in the ROA using Net income (%). In both cases, the highest mean values are obtained in the production subsector; for the ROE using P/L before tax (%) the exhibition subsector is where the mean is the lowest, and for ROA using Net income (%) the lowest value is obtained in distribution.

[Table 6 near here]

Table 7 sums up the factor analysis by subsector. The Kaiser-Meyer-Olkin (KMO) statistic is significant with values above 0.600, except in subsector 5913, which is 0.575. For all of the subsectors in the Bartlett sphericity test, the null hypothesis is rejected; in other words, the correlation matrix is different to the identity matrix. The percentages of total variance explained range between 77.890% for sector 5912 and 89.065% for sector 5914.

[Table 7 near here]

The initial variables are grouped into three factors for subsectors 5911, 5913 and 5914 and in two factors for subsector 5912. Table 8 shows the factor loadings and percentage of variance explained by each factor and subsector. Reliability was measured through Cronbach's alpha and ranges between 0.996 and 0.694, thereby evidencing acceptable values for the internal consistency of each factor.

[Table 8 near here]

The interpretation of the factors extracted is quite similar in the four subsectors analysed. In the case of Production (5911), Distribution (5913) and Exhibition (5914) there are three factors displaying a clear significance of Profitability (ratios R1, R2, R3 and R4), Profits (ratios R5, R6 and R7) and Liquidity (ratios S1 and S2) of the firms in the group, even though said factors do not always appear in the same order in terms of percentage of variance explained. Factor

analysis in the Postproduction sector (5912) only extracts two factors, the first of which merges Profitability and Profits, while Liquidity remains in the second factor.

4.4.- Cluster analysis

With the resulting factor scores, we performed a k-means cluster analysis, after conducting a preliminary hierarchical analysis that helped to determine five clusters in all the subsectors, except in 5912, for which there were four. This part of the study aimed to group firms that were similar vis-à-vis their economic-financial ratios. [Table 9 near here]

Table 9 shows for each subsector the number of firms that make up each of the clusters. In each subsector, the cluster with the greatest number of firms is: C4 for production, C1 for postproduction, C5 for distribution and C3 for exhibition.

[Table 9 near here]

Taking into account that the mean value of the factors is zero for each subsector, we need to compare the value of the centroids of each cluster with zero (means) if we are to correctly interpret the graphs in [Figure 1 near here] with those that sum up all of the information. In the four subsectors, there is a majority cluster formed by firms situated slightly below the mean in all the factors. This cluster groups together firms that evidence less dispersion in their factor scores.

[Figure 1 near here]

We now provide a description of the clusters taking into account the values shown by the firms of which they are made up, in terms of factor scores obtained in the factors extracted and which are shown in [Figure 1 near here]. This description is completed using size variables whose values for the different clusters appear in Figure 2. Annex 1 shows in greater detail how the different clusters of firms for each subsector are distributed in the factors obtained.

5911. Production: The largest cluster is C4 and accounts for 46.84% of the production firms analysed and is characterised by profitability and profits that are below the mean for the

subsector, with liquidity being almost at the mean. C1 presents good results in the three factors (8.00% of firms), primarily in terms of profits. These are therefore the most profitable firms. They are not the largest in terms of operating revenues, total assets and employees, but they do evidence important values in these variables, particularly notable amongst which is the volume of total assets (see Figure 2). C2 (23.94% of firms) stands out thanks to its high profitability, which appeals to investors, with negative values, in other words, values below the mean for firms, in liquidity and profits, although these are more moderate than those of the other clusters; the firms here have fewest total assets, with an average of 6.42 million. C3 has high profits but is below the mean in the two other factors, reaching the minimum value of all the clusters. These are the firms in the subsector that have the highest operating revenue, total assets and employees; in other words, they are the largest (18.50% of the sample). Worthy of note is cluster 5 due to its high liquidity. It has the lowest operating revenue and number of employees of all the clusters (5.56 million euros and 27.10 workers, respectively) and is also not a very representative group within the production subsector as it is made up of only 2.72% of firms.

5912. Postproduction: The postproduction sector is the most homogeneous in terms of its economic-financial information, with a cluster (C1) composed of 71.07% of the firms in the group, with a mean value in the profitability and profits factor that is below the mean, although very close to it and with the lowest mean ratio in the liquidity factor. Once again, this group is located in the mean values in terms of operating revenues, total assets and employees (see Figure 2). Cluster 4, which consists of 17.26% of the firms, displays good values in both factors, particularly in profitability and profits and with high values in revenue and total assets: 7.77 and 11.78 million euros, respectively. These are the firms that function best. Nevertheless, they are not very large in terms of employment. Cluster 2 presents poor results as regards profitability and profits, although its firms have the highest operating revenue and number of employees, in other words, they are the largest, employing an average of 116.69 workers

compared to the subsector mean, which is 53.41. Cluster 3 stands out due to its high liquidity and negative values in the first factor, in other words below the mean. It also has the lowest values in operating revenue, total assets and employees, although it accounts for only 2.03% of the sample.

5913. Distribution: In the distribution sector, 42.93% of firms are located in cluster 5, which is characterised by having low profits with a profitability and liquidity similar to the mean for the group. Yet they do have the highest values for operating revenue, total assets and employees. These are therefore large firms, with 48.71 million euros operating revenue, 38.91 million euros total assets and 58.37 employees, expressed in mean figures. Cluster 3 contains the most profitable distribution firms, although the profits obtained are low. They employ few workers and account for 13.17% of the sample. Cluster 1 (17.07% of firms) has the best ratios, scoring high values in the three factors, particularly in profits. They are small firms in terms of the number of employees. Almost a quarter of the firms belong to cluster 4, in which profitability and liquidity are well below the mean values and where profits are located around the mean. Once again, there is a very small cluster, cluster 2, made up of firms with very high liquidity, but with low values in terms of profitability and profits, and which also displays the lowest values for operating revenue and total assets (16.63 and 21.92 million euros, respectively).

5914. Exhibition: This subsector contains a large cluster (C3) comprising almost half the firms dedicated to exhibition and whose economic-financial results display values below the mean in the three factors. These firms do not stand out particularly. Cluster 1, the second most numerous (24.10%), is noticeable for its profits with low liquidity, with its firms being the ones that present the highest values in operating revenue, total assets and employees: 15.44 million euros, 30.56 million euros and 86.71 workers, respectively. Put differently, they are the largest firms. Cluster 5, which is made up of 17.69% of firms, is interesting because of its high profitability with liquidity around the mean and profits ratios that are slightly below the mean. When

compared to the other clusters, these are relatively small firms in terms of operating revenues, total assets and employees. The two remaining clusters are minority clusters: cluster 4 characterized by high values of liquidity and profits with a profitability that is close to the mean, and the lowest values in operating revenue and employees, and cluster 2 that is composed of firms with very bad results in all of its ratios and the lowest values in total assets (5.67 million euros).

[Figure 2 near here]

5.- Conclusions

The film industry is undergoing changes as a result of globalisation, the development of new technologies, the appearance of new content platforms or changes in spectators' consumption habits, all of which has been hastened by the COVID-19 pandemic, and which has led to a veritable upheaval in the sector, in line with other cultural and creative industries. All of this is obviously having an effect on firms in the audiovisual and film sector, including their business models, sources of income or their financial performance.

The present work seeks to examine the economic-financial situation of firms involved in the cinematographic industry in the European Union (EU-27), a key sector in the "Audiovisual and Multimedia" industry, and which is the leading sector in the CCS. The cinema sector is, in turn, divided into four subsectors that reflect all of the stages of the chain of value: production, postproduction, distribution, and exhibition in movie theatres, with the production subsector - in other words, content creation - being the most important in terms of firms, employment, and creation of added value.

To carry out the study, we used a set of financial ratios that reflect variables relating to profitability, operating structure and size. Financial ratio analysis allows a firm's performance and financial state to be understood and analysed such that, from an overall perspective, financial ratio analysis is a means to overview the financial state of an industry, which can help

to identify the strengths and weaknesses of the sector. More specifically, we adopt a two-fold methodological approach: factor analysis, which reduces the most relevant information, and cluster analysis, which enables us to merge firms into homogeneous groups and to describe them in terms of size, using variables such as operating revenue, total assets and employees.

As regards the study sample, the most important sector in terms of the number of firms is production, which reflects the reality of the sector. Nevertheless, these are not the largest firms, since it is the distribution sector that has the largest companies in terms of revenue and assets, although they also have the fewest employees. In contrast, the smallest firms from the standpoint of operating revenues and total assets are those involved in postproduction, although they rank second in the number of employees, behind firms involved in exhibition, which have most employees. The sectors which display the greatest variability, in general, are production - which encompasses firms linked to a single cinematographic project with firms that have a long-running tradition - and exhibition, which range from independent cinemas to large European cinema chains. In contrast, the sector with least dispersion is post-production. In terms of financial ratios, the sample also displays enormous variability, and the significant differences between subsectors in many of them justifies their being examined separately.

Factor analysis allows us to summarise the information concerning the chosen financial ratios. Broadly speaking, the ratios are grouped in three factors linked to profitability, profit and liquidity, although there is a different sector, post-production, where only two factors appear (one of profitability, profit and the other of liquidity).

Analysis of the percentages of variance explained in the four subsectors shows that the factor with the greatest explanatory power in all the subsectors is profitability, whereas liquidity, or the capacity to meet short-term payments is the factor with the lowest explanatory power, except in the production subsector.

Cluster analysis groups firms that are homogeneous from the viewpoint of the factors obtained; in other words, from the economic-financial standpoint. In this regard, in all the subsectors, there seems to be a group of firms clustered around the mean in all of the ratios, although at times, such as in exhibition, they fall somewhat below the mean. In each subsector, this group is large and determines the subsector's structure: C4 in production, C1 in post-production, C5 in distribution and C3 in exhibition. The subsector in which this majority group has the greatest weight (71.1% of firms) is post-production, once again indicating that it is the subsector with the fewest differences amongst its firms in terms of financial performance.

In each subsector of the film industry there is normally what we might term a 'success group' which concentrates those firms that are in the best positions; in other words, which are the healthiest or which display the greatest profitability or profits: C1 in the production sector, C4 in the case of postproduction, C1 in the distribution subsector, and C4 in exhibition. These account for 8.00%, 17.25%, 17.07%, and 7.94%, respectively, of firms. Postproduction and distribution are therefore where the percentage of firms that are best positioned is seen to be the highest. Although the characteristics of the firms in each group differ, one aspect they do have in common is a high level of assets.

In some subsectors, there are firms that evidence a delicate economic-financial situation, and which are badly positioned vis-à-vis their competitors, such as C2 (9.46% of firms) in postproduction or C2 (4.10%) in exhibition.

In all the subsectors, there is a cluster that contains just a few firms characterised by having a liquidity factor that is much higher than the mean and which tend to present values that are significantly lower, both in other factors as well as in the characterising variables.

In three subsectors we have clusters that display a high profitability -above the mean-, which makes them attractive to investors, although they do exhibit low liquidity; in other words, they have greater difficulty meeting short-term payments. These are C2 in production (not very large

firms - 23.94% of the sample), C3 in distribution (13.17% of firms), and C5 in exhibition (rather small firms, 17.69%). Production offers the most opportunities for investors, although it is a high-risk sector. Finally, we have groups with large profits, but which display lower profitability and liquidity. These are C3 in production and C1 in exhibition, and in each case they are the largest firms in all the variables of size.

In sum, some of the conclusions that may be drawn are the importance of the content creation sector (production) in the film industry; variability in production and exhibition firms, with very different types of firms compared to the lower dispersion found amongst post-production firms; the high dispersion in firms' financial characteristics; the existence of a group of majority firms who reflect the mean structure in the sector; the presence of more successful firms - financially speaking - in distribution and post-production; the existence of firms who facing difficulties and who evidence questionable financial viability, with post-production at the head, although this accounts for less than 10% of firms.

The results to emerge from this study are consistent with those obtained in another cultural sector; specifically in the publishing industry (Sanz et al. 2018), in which financial ratios are also grouped into factors that have a similar significance to those found in this work, thereby indicating the validity of the present study.

This work provides an initial step, which is essentially descriptive, towards understanding the European cinematographic sector and offers a picture of the financial health of the firms involved whilst also pointing to certain differences between subsectors. The wide database, coupled with the possibility of carrying out subsequent studies over time, are further strengths of the research undertaken.

Nevertheless, further detailed analysis needs to be carried out on firms, subsectors and countries in order to gain deeper insights. In this regard, the study's limitations include the following: i) there are firms that are not in the database, since they provide no financial information; ii) there

are firms which are small and unstable, have no minimum activity, and which have not therefore been considered: iii) there are countries which are under-represented such as Germany who, despite being the fourth largest producer (or one of the most important film producers), contributes a mere 1.44% of the firms considered. Finally, there are certain limitations related to general film industry data, and which need to be improved, both for the benefit of scholars and film industry as a whole.

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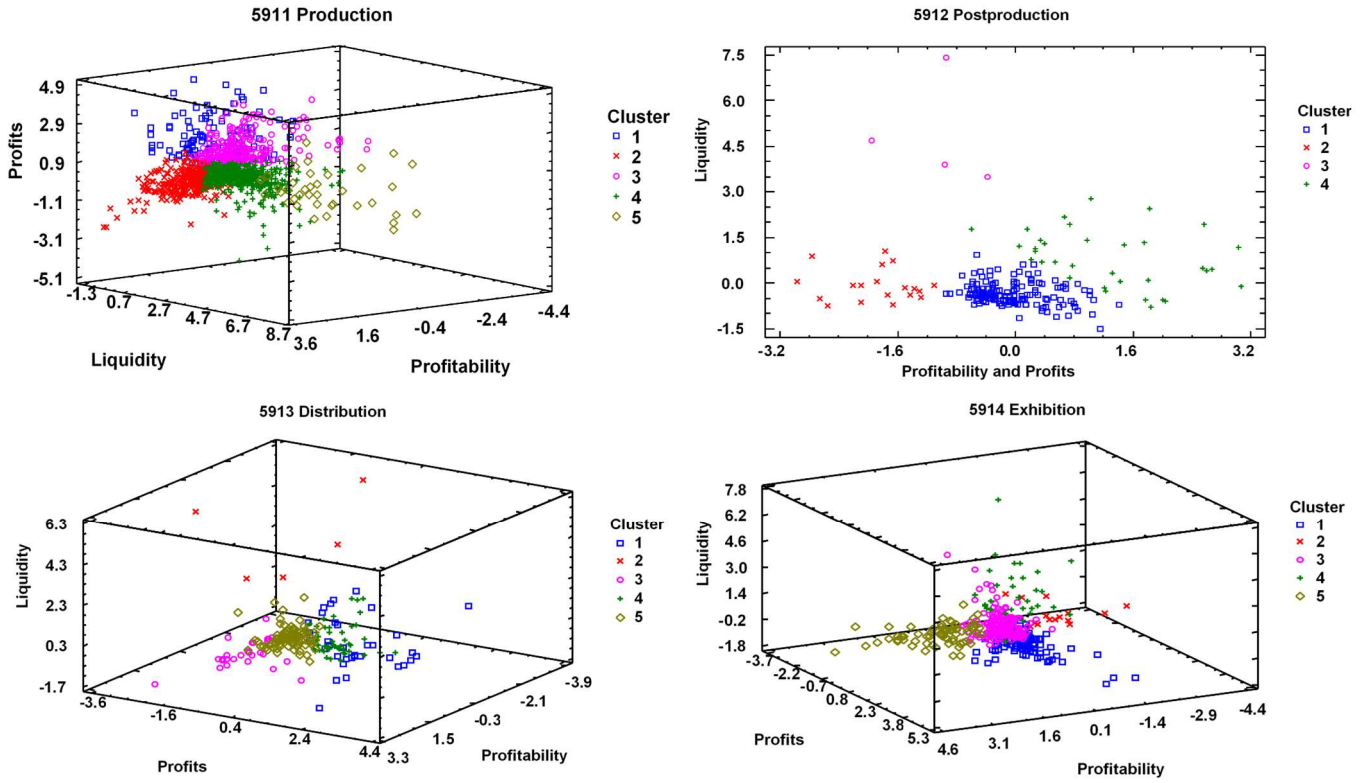
Annex 1. Spatial representation of firms clusters in terms of the scores in the factors extracted



Tables

Table 1. Top five countries in % of added value, employment, and firms involved in CCS in the EU

AV		Employment		Firms	
CY	10.22%	NL	9.1%	NL	23.0%
UK	7.99%	IE	8.9%	HU	15.5%
FI	7.44%	LV	7.9%	SI	14.7%
LV	7.32%	FI	7.6%	AT	14.2%
MT	6.71%	DK	7.4%	SE	13.6%
EU Average	5.54%	EU Average	6.2%	EU Average	12.1%

Source: KEA (2021)

Table 2. Weight of cinema subsectors in the audiovisual sector in 2017 (%)

	AV	Employment	Firms
Cinema, video and TV production	Almost 10%	7.5%	15.6%
Cinema, video and TV post-production	n.a.	1.3%	2.9%
Cinema, video and TV distribution	3.1	0.5%	0.6%
Cinema projection	n.a.	2.5%	0.7%

n.a. = not available
Source: KEA (2021)

Table 3.- Variables: codes and description

Code	Variables	Description
R1	ROE using P/L before tax (%)	(Profit before tax / Shareholders funds) * 100
R2	ROA using P/L before tax (%)	(Profit before tax / Total assets) * 100
R3	ROE using Net income (%)	(Net income / Shareholder funds) * 100
R4	ROA using Net income (%)	(Net income / Total Assets) * 100
R5	Profit margin (%)	(Profit before tax / Operating revenue) * 100
R6	EBITDA margin (%)	(EBITDA / Operating revenue) * 100
R7	EBIT margin (%)	(EBIT / Operating revenue) * 100
R8	Cash flow / Operating revenue (%)	(Cash flow / Operating revenue) * 100
S1	Current ratio	Current assets / Current liabilities
S2	Liquidity ratio	(Current assets - Stocks) / Current liabilities
S3	Solvency ratio (Asset based) (%)	(Shareholders' funds / Total assets) * 100
S4	Gearing (%)	((Non-current liabilities + Loans) / Shareholders funds) * 100
OR	Operating revenue (Turnover) mill EUR	Total operating revenues (Net sales + Other operating revenues+ Stock variations). Figures do not include VAT
TA	Total assets mill EUR	Total assets (Fixed assets + Current assets)
NE	Number of employees	Total number of employees

Source: Orbis (2021)

Table 4.- Geographical distribution of firms in number and percentage according to country and NACE code subsector – Rev. 2

Country	5911 Production	5912 Postproduction	5913 Distribution	5914 Exhibition	Total
France	351 (16.30%)	73 (3.39%)	48 (2.23%)	138 (6.41%)	610 (28.32%)
Italy	330 (15.32%)	36 (1.67%)	43 (2.00%)	108 (5.01%)	517 (24.00%)
Spain	255 (11.84%)	43 (2.00%)	36 (1.67%)	77 (3.57%)	411 (19.08%)
Poland	71 (3.30%)	11 (0.51%)	20 (0.93%)	8 (0.37%)	110 (5.11%)
Sweden	77 (3.57%)	8 (0.37%)	10 (0.46%)	7 (0.32%)	102 (4.74%)
Portugal	54 (2.51%)	4 (0.19%)	7 (0.32%)	6 (0.28%)	71 (3.30%)
Others	224 (10.40%)	22 (1.02%)	41 (1.91%)	46 (2.13%)	333 (15.45%)
Total	1362 (63.23%)	197 (9.15%)	205 (9.52%)	390 (18.11%)	2154 (100%)

Source: Own

Table 5. Characterising variables: mean and coefficient of variation

Variable	5911 Production		5912 Postproduction		5913 Distribution		5914 Exhibition		Total	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
Operating Revenue	11.018	3.897	7.735	2.025	33.473	2.508	10.776	3.431	12.811	3.621
Total Assets	11.793	3.997	7.680	2.707	33.697	2.296	17.636	4.536	14.559	3.897
Employees	41.898	2.442	53.412	1.737	39.124	3.370	57.745	3.384	45.634	2.800

Source: Own

Table 6.- Descriptive statistics of the financial ratios in the study according to subsector and difference of means test

		5911 Production (n = 1362)		5912 Postproduction (n = 197)		5913 Distribution (n = 205)		5914 Exhibition (n = 390)		Difference of means	
Cod	Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Statistic	p-value
R1	ROE using P/L before tax (%)	25.607	50.315	22.469	51.041	24.219	41.468	21.939	38.455	8.684[+]	0.034[b]
R2	ROA using P/L before tax (%)	8.580	14.360	8.553	15.528	6.769	10.497	7.752	10.821	2.280[+]	0.516
R3	ROE using Net income (%)	21.564	41.101	21.196	34.642	18.894	34.820	17.907	30.171	5.666[+]	0.129
R4	ROA using Net income (%)	7.490	11.858	7.309	11.845	5.373	8.770	6.899	8.717	6.343[+]	0.096[a]
R5	Profit margin (%)	4.746	10.693	5.809	11.988	6.531	10.954	7.553	10.902	7.470	0.000[c]
R6	EBITDA margin (%)	15.638	18.694	10.633	14.437	19.535	20.081	14.791	10.686	31.815[+]	0.000[c]
R7	EBIT margin (%)	5.008	10.732	6.225	12.453	6.477	10.289	7.821	10.368	7.360	0.000[c]
S1	Current ratio	1.922	1.942	2.180	2.094	1.952	2.146	1.821	1.922	1.470	0.221
S2	Liquidity ratio	1.810	1.836	2.078	2.049	1.834	2.081	1.755	1.850	1.390	0.243

[+] Using the Kruskal-Wallis statistic; [a] Significant at 10%; [b] Significant at 5%; [c] Significant at 1%

Source: Own.

Table 7.- Statistics of factor analysis by subsector

Sector		5911	5912	5913	5914
Sample size		1362	197	205	390
Kaiser-Meyer-Olkin sampling adequacy measure		0.612	0.630	0.575	0.667
Bartlett sphericity test	Approx. Chi-squared	13745.161	2654.701	2446.669	4323.477
	df	36	36	36	36
	Sig.	0.000	0.000	0.000	0.000
Percentage of total variance explained		83.418	77.890	85.680	89.065

Source: Own

Table 8.- Matrices of rotated components, % of variance explained and Cronbach's alpha of each factor by subsector

	5911			5912		5913			5914		
	F1	F2	F3	F1	F2	F1	F2	F3	F1	F2	F3
R1	0.877			0.743		0.906			0.888		
R2	0.857			0.921		0.765			0.825		
R3	0.867			0.638		0.919			0.913		
R4	0.842			0.859		0.780			0.832		
R5			0.641	0.926			0.777			0.873	
R6			0.856	0.804			0.836			0.935	
R7			0.679	0.904			0.821			0.920	
S1		0.980			0.975			0.979			0.982
S2		0.980			0.973			0.975			0.984
% var	41.420	23.039	18.959	54.138	23.751	36.174	24.781	24.725	35.757	30.724	22.584
alpha	0.789	0.977	0.694	0.807	0.996	0.792	0.734	0.992	0.807	0.944	0.983

Note(s) Extraction method: principal component, Rotation method: Varimax with Kaiser normalization.
Source: Own

Table 9.- Number of cases in each cluster

Sector	5911	5912	5913	5914
C1	109	140	35	94
C2	326	19	5	16
C3	252	4	27	180
C4	638	34	50	31
C5	37		88	69
Valid	1362	197	205	390

Source: Own

Figures

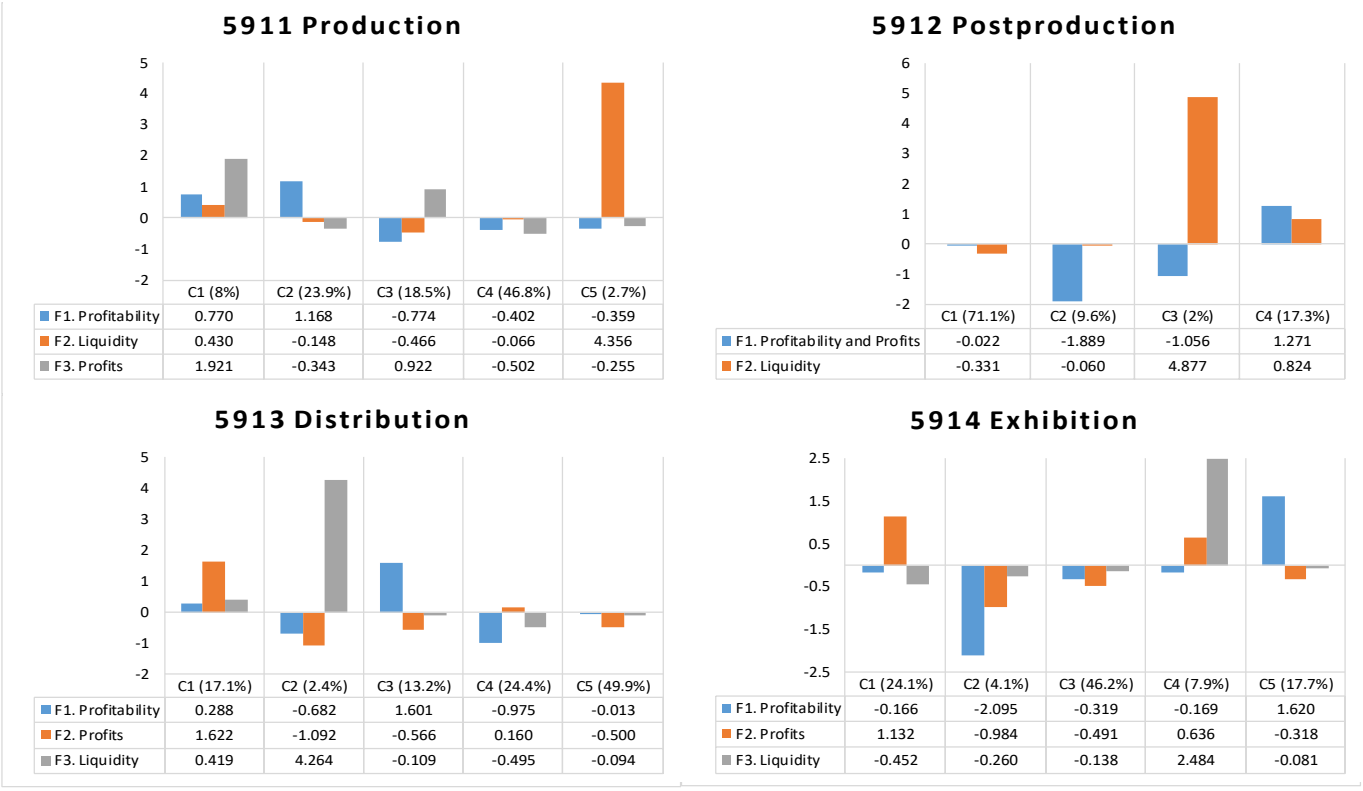


Figure 1.- Factors: centroids of the clusters for each subsector

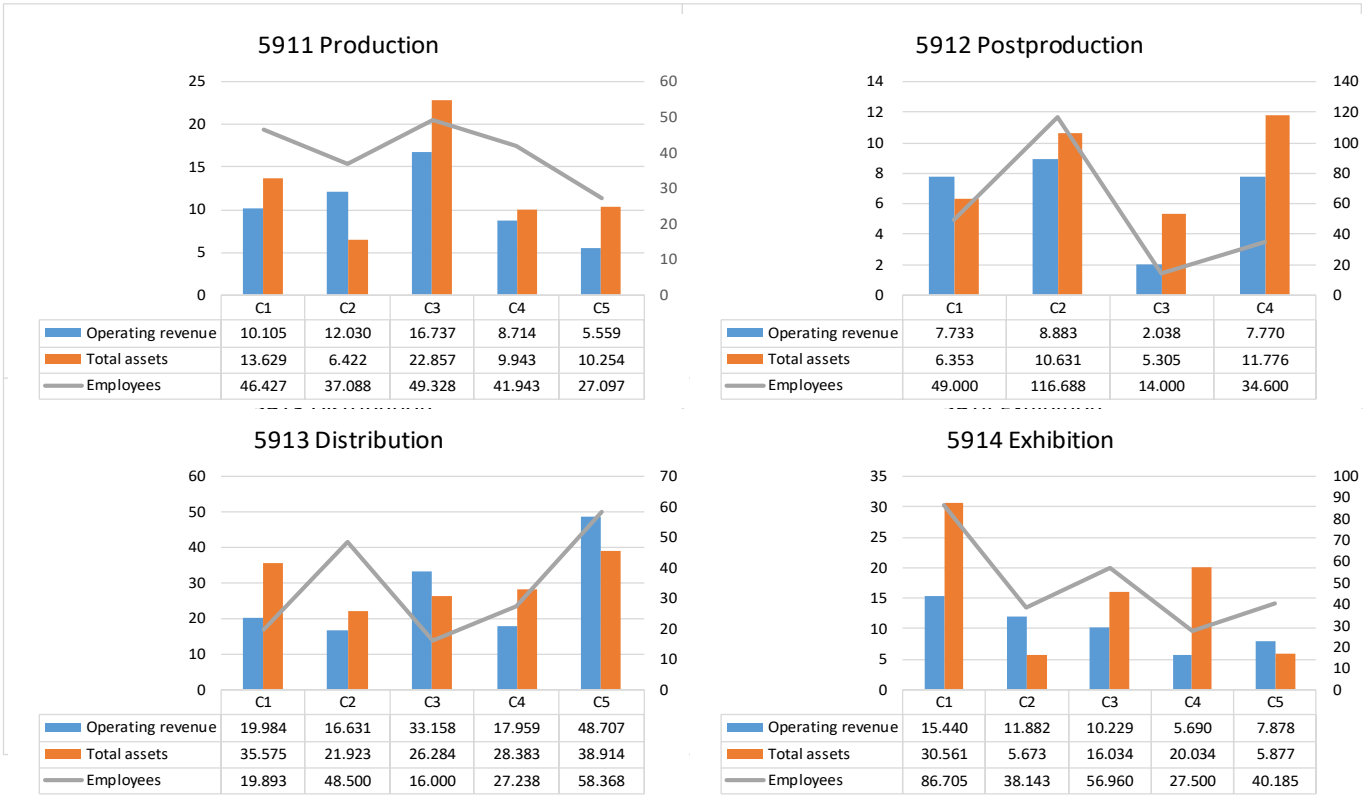


Figure 2.- Characterising variables: mean values of the clusters for each subsector