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Efficiency and benchmarks of regional public service broadcasters in Spain

Abstract

The current high public deficit situation of the Spanish economy lead us to analyse the management of public service companies, their allocation of resources and how well they are used. Within this article, we shall compare the efficiency of regional public service broadcasters (PSBs) in Spain using Data Envelopment Analysis (DEA) method and benchmarking. That will be done with two goals in mind. One, to evaluate and compare the performance of regional public television networks. And two, to propose policy measures to improve management efficiency. The results from the study indicate that more than a half of public television services in Spain are inefficient. It is recommended that the television services change some of their inputs/outputs to enhance efficiency and ensure future sustainability

Keywords
Efficiency, public service television, data envelopment analysis, benchmarking, input, output

1. Introduction

The Spanish economic crisis in the last few years has been featured by excessive public debt and deficit. Thus, since 2009 the Spanish economy has registered a public deficit that has been reduced from barely 10% to around 5%. In addition, aggregated public debt has been growing and it is almost at 100% of GDP. In this context, the analysis of the allocation and performance of public resources is a matter of great importance so as to improve the management of public services that the State offers to its citizens at local, regional and national levels. Funding of public service television has always been a controversial issue in Spain (Muñoz, 2011), as well as other aspects as internal pluralism (Fernández Alonso and Fernández Viso, 2012a), competition for sports rights (Bonaut, 2010) or the different quality perception of public and private operators by the audience (Artero, Herrero & Sánchez–Tabernero, 2010).

Apart from national public radio and television services of RTVE, there are regional broadcasting networks in 13 out of the 17 territorial regions that make up Spain. RTVE is totally independent from these regional corporations, including their management and content. These

public entities offer programming to their citizens and promote the audio-visual industry within their respective regions (Fernández Alonso & Fernández Viso, 2012b). As a whole, the regional public television broadcasters reached 10.4% of audience share in 2011 (Kantar Media, 2012) with an average cost of 30.60 Euros per citizen, accruing more than 1.5 billion Euros in debt (Accenture, 2012).

Upon analysing and individually comparing different public services of regional television networks, we can see significant differences in production management styles in comparison to the results achieved. Furthermore, many regional networks have an annual audience viewership double or triple than that of other public regional networks with higher public budgets. These differences justify the need for a comparative evaluation or benchmarking among the 13 public entities in order to find out and learn what makes one network more efficient than another as it pertains to production management.

Public regional television in Spain was born under the Third Chanel Act (46/1983-26 December). They were launched as a response to local and regional needs in having access to audio-visual content relating to or dealing with the development and promotion of their culture.

The establishment of public regional television occurred gradually, within two periods. During the first stage, broadcasting companies were set up for the regions of País Vasco (1982), Cataluña (1983), Galicia (1985), Andalucía (1987), Madrid (1989) and Comunidad Valenciana (1989). For the second stage of development, broadcasting services were established in Canarias (1999), Castilla-La Mancha (2001), Asturias (2005), Baleares (2005) Murcia (2006), Extremadura (2006) and Aragón (2006). Therefore, 13 out of the 17 regions that make up the Spanish state offer its citizens at least one public regional television channel.

The production management of these television networks show how important the differences are between public broadcasting systems. Specifically, two different management models are prevalent: the classic model and the outsourcing model (Bustamante, 2009).

The first model, which is followed by public broadcasting corporations created in the first stage, is based on a large-scale production structure similar to that of the national public broadcasting institution, RTVE. This management model generally implies high production costs and considerable debt. Due to this, Madrid and Comunidad Valenciana regional networks have the highest amounts of debt (1.2 billion Euros and 257 million Euros, respectively).

The second model is based on outsourcing a portion of or the entire business activities to external private companies that pitch for public bids. Expense reduction and the productive apparatus are the main objectives of this management strategy. Public broadcasting corporations created in the second phase use this management model. They usually outsource the supply of content, technology, or advertising management.

Furthermore, public television networks in Spain show notable regional differences in other managerial aspects such as in public allocation of funds received to boost the audio-visual industry in the territory where their content is broadcasted.

In 2011, public funds earmarked as direct subsidies for regional governments, reached up to 1.1 billion Euros for all of the 13 public broadcasting corporations. However, these figures are not uniform and vary per broadcasting system. For instance, Cataluña received 241.3 million Euros, Andalucía got 166.8 million Euros and País Vasco earned 140.7 million Euros from public funds. On the other hand, other corporations received less public funding, like Extremadura (31 million Euros), Murcia (30 million Euros) and Asturias (29.4 million Euros) (see Table 1).

Regarding funding aimed to promote the audio-visual industry, we can see very different figures while comparing all public entities, which can be calculated as purchases

and supplies procured by regional television networks in the audio-visual market in which their content is broadcasted (Campos, 2012).

In total, regional public television networks spent almost 900 million Euros in procurement and external contracting of services in 2011. Cataluña (197.7 million Euros), Andalucía (123 million Euros) and Comunidad Valenciana (106 million Euros) were the public service broadcasting networks where higher amounts of funds were distributed. On the contrary, expenditures of other regions were much smaller, like in Asturias (30.8 million Euros), Murcia (27.5 million Euros) and Extremadura (19.1 million Euros) (see Table 1).

On the other hand, if one were to calculate the percentage of regional public television viewership within the total TV audience for the year 2011, it reached only 10.4% of the market share (Kantar Media, 2012) and ranked as the fourth most watched television group in Spain. Therefore, only the most watched channel at each regional public service broadcasting system is taken into account. Though audience figures show significant differences among all 13 public entities.

Thus, the regional TV networks of Cataluña (14.1% share), Galicia (12.3%), Andalucía (10.7%) and Aragón (10.7%) had higher figures (10.4 %) than the combined average. However, the networks of Comunidad Valenciana (5.2%), Murcia (4%) and Extremadura (1.7%) held the worst audience viewership statistics (Kantar Media, 2012) (see Table 2).

Yet, the differences between production management and results from the 13 public broadcasting networks can clearly be noticed. These differences are related to varying aspects such as the model used to manage the entity, the expenditure on external purchases, budget financing and viewership. These differences, coupled with a significant combined debt of the networks in addition to the current need to reduce public deficit, justify an efficiency analysis of regional public service television in Spain.

This article is structured as follows. In Section 2, we will study organizational efficiency as understood in management in general and media management in particular. Section 3 contains methodology and variables and Section 4 includes the obtained results. Finally, in Section 5, we shall review the results and implications for management, including future research.

2. Theory: public service broadcasting, performance and efficiency

The static analysis of efficient allocation is a common feature in neoclassical microeconomic research (Ekelund & Hébert, 2002). Diminishing marginal productivity implies that a marginal unit of an input contributes less to a firm's output the greater is the number of units of the input already employed (Wildman, 2006). If the efficiency level of a firm is equal to its unit cost of production and firms learn about their efficiency as they operate more years in a market, efficient firms survive and inefficient ones decline and exit (Jovanovic, 1982). From this perspective, the older a company is, the more likely it is to survive in the market.

Financial performance in broadcasting has a long tradition of studies, such as McFadyen, Hoskins & Gillen (1980) made more than thirty years ago. Other studies got into station trafficking in television and radio (Bates, 1993) and consumer welfare in cable television (Ahn & Litman, 1997; Crawford, 2000). Also the efficiency of state or market provision of television goods as well as their economic impact has constituted a central research line (Minasian, 1964; Samuelson, 1964; Anderson & Coate, 2000). State ownership, control and financing erode market incentives to perform efficiently. But Cherry & Wildman (1999) argue that regulatory incentives and governance requires the sacrifice of some economic efficiency goals.

The notion of economic efficiency is inextricably tied up with objectives, but aims of media organizations tend to vary widely. Public service television has often to comply with

expectations from a wide variety of stakeholders (Berné & Orive, 2013). For companies operating in the public service sector, output quality and other public service objectives (such as content diversity or meeting minority audience needs) are included in their mission (Doyle & Frith, 2006). Many authors have pointed out the importance of extend research on the outcomes of media firms beyond financial performance and organizational efficiency measures to include the quality of media content and social externalities (Mierzjewska & Hollifield, 2006).

Media organizations are more than just economic institutions (Napoli, 2001). In addition, both contents and audiences themselves present unique characteristics as economic goods (Owen & Wildman, 1992). According to Picard (2002), higher levels of market share performance of public service broadcasters are associated with lower levels of governmental funding. Phillips et al. (1991) see efficiency of public service broadcasting as opposed to diversity. They conclude that unless better funding can be found for public broadcasting, the aim of a more plural society may be abandoned in favour of more efficiency in order to attract corporate contributions. That implies that in order to assess their performance as a whole, social and cultural criteria should also be taken into account in the media (especially, public service media). In fact, for Wirth & Bloch (1995) media performance is multidimensional. Hendriks (1995) provided a holistic model for media performance not just taking into account economic indicators.

Chan-Olmsted & Li (2002) used secondary data and statistical methods like cluster analysis and analysis of variance so as to study how different strategies of pay television channels related to performance. Relevant variables included organizational size, product-pricing practices and operating efficiency. Performance can be studied both from the firm and the market perspective. Market performance includes the concept of efficiency for incumbent firms and for the public. Albarran (2003) summarizes market performance around three aspects: technical and allocation efficiency, equity, and progress.

In sum, in the last decades several varied contributions have been made from the literature in order to assess media performance. They can be organized into two wide streams. On the one hand, as seen before, those studies regarding economic efficiency have pointed out the importance of resource's optimization so as to reach a given output level. On the other hand, other pieces of research have highlighted that media performance cannot be fully assessed with just economic measures. In that sense, socio-cultural criteria should also be included. The problem here is that while economic indicators are widely accepted, socio-cultural indicators are subject to intense academic debate. In particular, how public service media fulfil their public service mission and how that extent should be measured is a matter of deep controversy (Artero, 2007). Consequently, this piece of research will use basically quantitative, economic measures. But that does not imply rejecting the importance of other qualitative or socio-cultural aspects, which are essential to fully assess media performance. In other words, this article is just focused on efficiency, not in media performance as a whole, which goes well beyond the limitations of this piece of research.

In fact, in the last few years, an increasing number of pieces of research have analysed efficiency of several companies within the same industry that are considered homogeneous production units (Kneip & Simar, 1996; Simar & Wilson, 1998; Tongzon, 2001; Cooper, 2013). The aim of those articles is assessing if production units are using efficiently available resources.

A company or production unit is efficient, from a technical viewpoint, if it is situated within its production frontier. This is to say, if no inputs combinations exist that generates more output or if the same output cannot be obtained with a lesser level of inputs. Both parametric and non-parametric methods can be applied so as to estimate production frontiers and to measure technical efficiency. But generally non-parametric methods based

on linear programming techniques have been preferred to build the smallest production frontier with the data and axioms of economic theory (Jondrow et al., 1982). Among these measuring techniques, Data Envelopment Analysis (DEA) highlights, which will be explained in detail at the methodology section.

In the public sector, DEA applications can be found on several services, such as health care (Sherman, 1981), judicial courts (Lewin & al., 1982), public schools (Bessent & Bessent, 1980), universities (Tonkins & Green, 1988) and airports (Gillen & Lall, 1997), among others. Comparisons among different efficiency levels of production units can be used to propose changes and improvements in the management of publicly funded services.

3. Methodology: DEA, benchmarking, variables and model

Data Envelopment Analysis is a technique for measuring efficiency and has been commonly used throughout the past few decades (Liu & al., 2013). This technique was developed by Charnes, Cooper & Rhodes (1981) (CCR) and is defined as a nonparametric procedure for evaluating the relative efficiency of a set of homogeneous production units.

It is necessary to know the quantities of inputs and outputs used and produced by each production unit in order to perform this evaluation method. Once these amounts are known, the efficient production frontier is built through linear programming techniques to which the efficiency of each unit is evaluated (Roll & al., 1991). Therefore, the method allows estimating DEA technical efficiency of different production units and comparisons between the units (Latorre, 2013).

This technique has been widely used to analyse efficiency in production resource management of public services in different sectors such as health services (Hollingsworth, 2008) and educational services (Johnes, 2006). However, in the television services field, empirical studies that have addressed the technical efficiency using the DEA method are scarce (Asai, 2011; Liu & al., 2013).

Therefore, Asai (2005) measures efficiency and productivity of 30 public and private television stations in Japan within the period 1997-2002. This study considers as inputs the number of employees, capital employed and production costs. Output is understood as income divided by price index. Results show that on average smaller, publicly owned broadcasters have not operated efficiently.

Later on, Asai (2011) analysed efficiency of seven local television channels in Japan (2002-2006) by differentiating two activities: production and broadcasting of programming. Inputs and outputs are different for each activity. For production, inputs are labour, materials and capital of that division, while outputs are programs for sale and programs produced for transmission. For transmission, inputs are also labour, materials and capital employed on the division, but output is revenues. Results shows greater variation in the efficiency scores for labour-intensive program production division than for technically standardized transmission work.

Finally, the study made by Campos & Velasco (2013) analyses the efficiency of 12 regional PSBs in Spain by using DEA. It considers as inputs, fixed assets investment, long-term external liabilities and personnel spending. The basic output is the total revenue received from public funds. It is a strictly an economic efficiency perspective, taking into account four types: global, technical, scale and super-efficiency. Conclusions indicate that only three regional PSBs (those in Cataluña, País Vasco and Castilla-La Mancha) are globally efficient. Used variables in those studies are summarized in table 1 below.

Table 1. Research on efficiency in television using the DEA method

Author & Date	Study Site	Number of Networks	Inputs	Outputs	Results
Asai (2005)	Japan	30 public and private television networks	Number of employees	Revenue/ Price ranges	The smaller public television networks are not managed efficiently.
			Capital		
			Production Costs		
Asai (2011)	Japan	7 local television networks	Labour	Programs produced for sale	Differences in the efficiency of production management among networks
			Materials	Programs produced for local broadcast	
			Capital	Revenue	
Campos & Velasco (2013)	Spain	12 regional TV networks	Fixed asset investments	Public funds received	Only networks from the Cataluña, Basque and Castilla-La Mancha regions produced efficiency in production management
			External financing		
			Personnel expenses		

Source: cited publications.

With respect to output measurement, different variables are used in the literature: revenue between price ranges (Asai, 2005), programs produced to sell, programs produced for self-broadcasting, sales revenue (Asai, 2011) and public funds received (Campos & Velasco, 2013).

However, it appears as clear that DEA is a way to measure efficiency in production resource management which seems to be very useful in analysing the overall performances of companies. Nevertheless, in the television sector, there is no extensive body of work on efficiency DEA. Furthermore, there is no clear consensus on the used production factors and the examined outputs to analyse technical efficiency.

On the other hand, benchmarking is a management tool widely used in the private business sector. It originated in the USA in the seventies when Xerox self-assessed its own management of the company. They put strategies into action in order to improve management practices in relation to what their competitors were doing at the time. Spendolini (1994: 10-11) defines benchmarking as "a continuous and systematic evaluation process among institutions, processes, products and services that are carried out in order to implement improvements in an organisation". Consequently, using benchmarking allows us to understand why some organisations within the same industry are more efficient than others (Codling, 1995). Furthermore, this technique is considered fast, inexpensive and easy to apply to any organisation (Cohen et al., 2008).

This tool has been applied less often in the public sector. It has been used in different forms within the university educational system (Ruiz et al., 2014), health services (Plaza et al., 2005) and libraries (Stroobants & Bouckaert, 2014). However, in the television sector no empirical study using benchmarking to analyse the production management of the public television system resources has been applied. There are different theoretical methods (Spendolini, 1994; Bruder & Grey, 1994) and empirical methods (Adler & al., 2014; Ruiz & al., 2014) available to proceed with the implementation of the benchmarking process. Among these, DEA is also included.

Consequently, DEA technique will be used to analyse the efficiency of the 13 regional television public services in Spain. This analysis will be put in place in order to extract more information about the efficiency of the production management of various institutions. There are two main DEA models: the CCR developed by Charnes, Cooper & Rhodes (1978); and the BCC developed by Banker, Charnes & Cooper (1984).

The BCC model of the DEA method has been selected for this work (Banker, Charnes & Cooper, 1984), i.e., with variable returns to scale. This choice is used to obtain the pure technical efficiency (which includes only efficiency due to the use of resources), eliminating the effects of scale efficiency and relaxing the assumption of constant returns to scale. BBC model also permits comparison among different companies despite not only their size differences, but also in terms of market size and particular features.

The next step is to select the model orientation. An input orientation has been selected to analyse the necessary reduction of input to achieve a given amount of output. That is to say, we will try to see if resource allocations are right for each television network. Thus, each Decision Making Unit (DMU) will receive efficiency between the ratios of 0 and 1. Hence, a value of 1 indicates an overall efficiency of the television station, while if it is less than 1, an excessive use of resources will stand out.

The fractional form of the DEA-BCC model in its input-oriented version can be expressed as:

$$Max_{U,V} \quad \sum_{r=1}^{s} U_r \cdot Y_{ro} + u_o$$

$$S.A$$

$$\sum_{i=1}^{m} V_i \cdot X_{io} = 1, \forall i$$

$$\sum_{i=1}^{m} V_i \cdot X_{ij} - \sum_{r=1}^{s} U_r \cdot Y_{rj} - u_o \geq 0, \forall j : 1...n$$

$$U_r, V_i \geq \varepsilon$$

$$u_o \quad libre.$$

Where yrj is the value of the output variable r in the DMU j-th for r=1,...s; xij is the value of the input variable I in the DMI j-th for i=1...m; ur is the weight of the output variable r-th; vi is the weight of the input variable i-th and n is the number of decision units. Furthermore, by using the BCC model, we can perform benchmarking or comparative analysis. Thereby, for each inefficient television network, the BCC model can assign a reference group or set of benchmarks. The inefficient group looks at the group made up of efficient institutions as a benchmark model. With this, we can follow the efficiency and therefore facilitate the management of resources.

To measure the efficiency of the production units we must look at the comparisons laid out in the obtained results by using the benchmarking technique. It is therefore, important that the units studied are comparable. In fact, the homogeneity of the sample must be guaranteed to achieve a valid measure of efficiency.

Golany & Roll (1989) consider a sample to have a significant level of similarity when the productive component units have the following characteristics: a) the same objectives; b) work within the same market conditions; and c) offer similar services. These considerations are a prerequisite for selecting comparable samples. In this study, the 13 regional public broadcasting companies in Spain meet all three requirements put forth by Golany & Roll (1989), and therefore are assumed to be homogeneous and comparable.

In order to measure the efficiency of the production management of regional television in Spain using benchmarking and the DEA method, we need to take into consideration some variables of analysis in order to quantify the obtained performance for each public institution. To calculate the number of analysis variables in analysing efficiency, Drake & Howcroft (1994) show that the number of DMU units (in this case TV networks) must be at least twice times the sum of inputs and outputs. Since in this study there are 13 DMUs, the number of variables that can be taken into consideration is four.

As shown, there is no clear consensus in scholarly research on the selection of inputs and outputs to analyse technical efficiency in public service television. Therefore, variables selected for analysis are the following ones: market experience; external purchases; and received public subsidies. Audience share will be considered as the output. The proposed model is referred to as Efficiency Model for Public Service Television (EMPSTV) (see Figure 1), taking into account that private firms conduct themselves with no public funding and profitability measures are critical for them, while they do not apply for public service media. In Table 2, there are 13 companies listed for this study and the input and output data related to 2011.

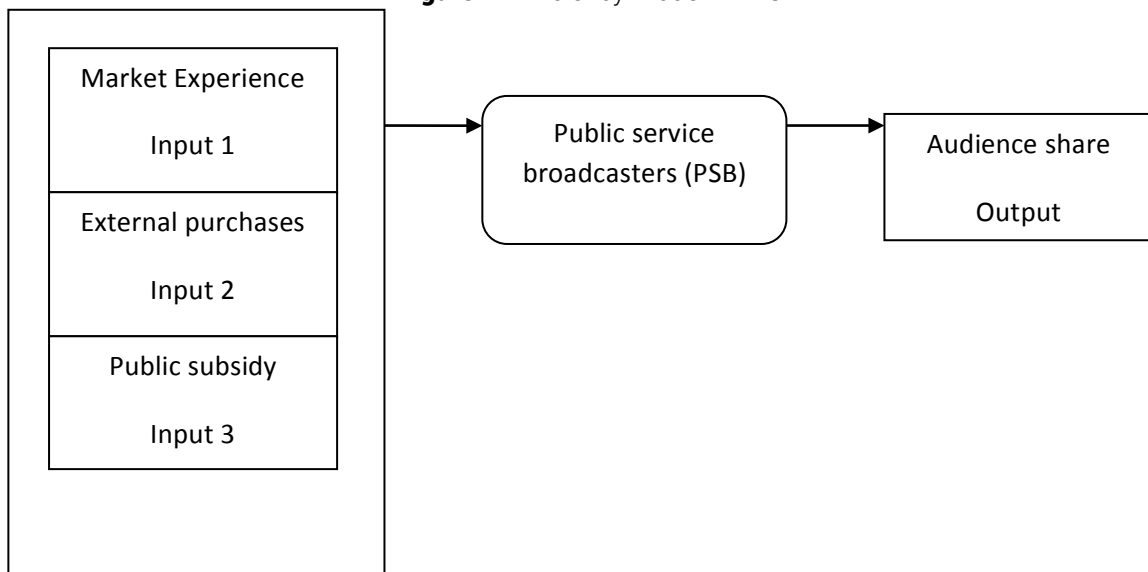**Figure 1.** Efficiency model EMPSTV

Table 2. Input and output data

DMU nº	DMU name	Input 1	Input 2	Input 3	Output
1	Andalucía	25	123,002,000	166,887,000	10.70
2	Cataluña	31	197,709,000	241,390,000	14.10
3	Madrid	25	76,619,000	105,364,000	6.40
4	Comunidad Valenciana	26	106,099,000	124,110,000	5.20
5	Galicia	30	57,826,000	101,147,000	12.30
6	País Vasco	32	98,963,000	140,762,000	8.20
7	Canarias	15	32,133,000	37,720,000	7.90
8	Castilla-La Mancha	14	36,950,000	50,000,000	6.40
9	Murcia	10	27,572,000	30,109,000	4.00
10	Aragón	9	50,586,000	54,344,000	10.70
11	Baleares	10	40,452,000	42,952,000	5.20
12	Extremadura	8	19,190,000	31,056,000	1.70
13	Asturias	11	30,884,000	29,450,931	7.70

Source: annual reports of regional PSBs. External purchases and public subsidy figures in Euros.

The variable market experience (input 1) is measured as the numbers of years that the PSB has been on air. Organisations learn about their efficiency as they operate in a market and thus, the more years they have been on air, the greater their experience. The variable external purchases (input 2) is measured as suppliers and external services sourced by PSBs from other companies within the sector. The variable public subsidies (input 3) is measured from direct public subsidies provided by the respective regional governments. The output is measured using the variable audience share (percentage of viewers watching the main channel of the PSB on a 24-hour basis). Finally, this research does not consider other variables, such as number of employees, gross rating points or advertising revenues. This is justified on the basis of the significant differences in the numbers of employees hired by classic model PSBs and outsourced PSBs. For advertising, the aggregate advertising revenues of all regional PSBs were less than five times the taxpayers' money they received (Infoadex, 2012).

4. Results: efficiency scores and benchmarks

The main results obtained from the research are included below. To achieve these results, we analysed the efficiency of the 13 public regional television services using the DEA method's software program. Subsequently, benchmarking or comparative evaluation is carried out using the DEA Konsi software. Finally, the benchmark or reference groups for each television channel are calculated.

Table 3 shows the efficiency values obtained by the regional public television services in Spain after applying the DEA model. As shown, 7 of the 13 television networks are efficient (53.8% of the total) in the production management of their business. The regions of Cataluña, Galicia, Aragón, Extremadura and Asturias are represented in these results. This group also incorporates the television networks of Murcia and Canarias, whose efficiency is 99.6% and 99.7% respectively.

However, six television networks (Andalucía, Madrid, Comunidad Valenciana, País Vasco, Castilla–La Mancha and Baleares) are inefficient (46.2% of the total). In this group, the

efficiency of regional public television in Andalucía, Madrid and Comunidad Valenciana are below 50%.

Table 3. Efficiency of regional public television services in Spain (2011)

DMU nº	DMU name	Efficiency
1	Andalucía	0.40976
2	Cataluña	1.00000
3	Madrid	0.39481
4	Comunidad Valenciana	0.32287
5	Galicia	1.00000
6	País Vasco	0.77622
7	Canarias	0.99758
8	Castilla–La Mancha	0.76726
9	Murcia	0.99653
10	Aragón	1.00000
11	Baleares	0.87395
12	Extremadura	1.00000
13	Asturias	1.00000

We will use the benchmarking method to suggest performance improvements for the 6 inefficient television networks outlined in the previous section. To do this, the loose variables (the difference between the current value and the target value of each input and output) for the inefficient television networks are calculated. An estimate of the percentage change between inputs and output is conducted for every regional public television service and must be performed in order to achieve the most efficient position possible (see Table 4).

As it can be seen, in order to become efficient, Andalucía should reduce their inputs (years of experience, external purchases and public subsidies) by about 42%, 53% and 60% respectively, while simultaneously increasing the output variable (audience share) by 23%, i.e., its audience viewership share has to grow from the current 10.7% to 13.4%. Due to the obvious inability to control the market experience variable, this television network should have reached that output level at 42% of the years earlier.

The public institution of Comunidad Valenciana (now closed down by its regional government) should have had all their inputs decreased by more than 45%, especially public subsidy contributions (61.3%). Also, to be considered efficient, its share would have had to be 12.5% higher and move from an audience viewership share of 5.2 to 5.8.

The Madrid television network would have to reduce all inputs by more than 60%, but it does not need to adjust its audience output. In order to achieve efficiency, the television network of País Vasco should decrease all inputs by at least 15% and increase output by at least 26%.

Finally, the networks from Castilla–La Mancha and Baleares have to reduce all inputs and should further reduce the public subsidy contributions and external purchases respectively. However, to be efficient they do not need to increase their audience share.

Table 4. Inputs/outputs variations

DMU nº	DMU Name	Input 1 Variation (%)	Input 2 Variation (%)	Input 3 Variation (%)	Output Variation (%)
1	Andalucía	-60.35	-42.14	-53.11	22.75
3	Madrid	-68.37	-60.52	-60.52	0
4	Comunidad Valenciana	-61.36	-49.27	-50.31	12.46
6	País Vasco	-22.38	-15.48	-22.38	26.12
8	Castilla-La Mancha	-40.4	-26.07	-23.27	0
11	Baleares	-12.6	-12.6	-25.81	0

In addition, the television networks that may serve as a reference to the six inefficient television networks can be revealed herein. More specifically, the DMU that identifies the inefficient institutions can match up with one or more of the efficient units and can also be considered their benchmark or reference group.

Thus, from each inefficient television network a fictitious point is gathered which is the linear combination of some of the efficient points. Efficient television network λ different from zero, are those that form the reference group and therefore become efficient group role centres evaluated by the unit and are benchmarks.

To obtain this fictitious point, each efficient unit gathers a λ: this value determines the degree of homogeneity with the unit that is being evaluated. The efficient television networks with λ, a non–zero value, make up the reference group; therefore, they become markers of efficiency to be followed by the evaluated unit hence creating the benchmarks.

When the λ value is close to 1, the similarity between the networks becomes more important and can be used as a model for defining the strategies to achieve improved efficiency in the inefficient television network. In other words, the higher the value accompanying them, the greater importance is placed on the institution's inefficiency thus having greater weight within the process of going from inefficient to efficient for each unit studied. Table 5 depicts benchmarks or reference groups for each television network.

Table 5. Benchmarks or reference groups

DMU nº	DMU Name	Efficiency	Benchmark (λi)	Scale Efficiency
1	Andalucía	0.40976	λ5=0.056 λ10=0.914 λ13=0.030	0.97881687
2	Cataluña	1.00000	λ2=1.000	0.38257
3	Madrid	0.39481	λ10=0.137 λ12=0.285 λ13=0.578	0.87072263
4	Comunidad Valenciana	0.32287	λ10=0.387 λ12=0.610 λ13=0.002	0.67237588
5	Galicia	1.00000	λ5=1.000	0.85315

6	País Vasco	0.77622	$\lambda 5=0.017$ $\lambda 10=0.141$ $\lambda 13=0.842$	0.9917902
7	Canarias	0.99758	$\lambda 5=0.043$ $\lambda 13=0.957$	0.98848213
8	Castilla-La Mancha	0.76726	$\lambda 12=0.217$ $\lambda 13=0.783$	0.90545578
9	Murcia	0.99653	$\lambda 12=0.345$ $\lambda 13=0.655$	0.58390615
10	Aragón	1.00000	$\lambda 10=1.000$	1
11	Baleares	0.87395	$\lambda 10=0.289$ $\lambda 12=0.561$ $\lambda 13=0.150$	0.65022026
12	Extremadura	1.00000	$\lambda 12=1.000$	0.35532
13	Asturias	1.00000	$\lambda 13=1.000$	1

As may be seen, the networks of Aragón, Asturias and Galicia are the reference groups for the public institution of Andalucía. Aragón, holding a weight of 0.91, is the most important benchmark. For the television network of Madrid, the reference groups are Asturias (0.57), Extremadura (0.28) and Aragón (0.13). The public institutions of Comunidad Valenciana would have as reference group Extremadura (0.61) and Aragón (0.38), while the television network of País Vasco has Asturias (0.842) and Aragón (0.141) as benchmarks.

In order to achieve efficiency, the television network of Castilla-La Mancha has to look towards performance of the regional network from Asturias (0.78). However, for the public institutions of the Baleares, the most important benchmark is Extremadura (0.56), followed by Aragón (0.28) and Asturias (0.15).

5. Conclusions, management implications, limitations and future research

Basically, we can conclude from this piece of research that taking into account the 13 Spanish regional television services, seven manage themselves efficiently, while the other six are inefficient. If we analyse the management styles adopted by each institution discussed herein, the classic model stands out as being efficient in only two cases (Cataluña and Galicia), while the outsourced model is efficient in five cases (Aragón, Asturias, Extremadura, Canarias and Murcia). On the contrary, there are four inefficient television networks managed using the traditional organisational structure (Andalucía, Madrid, Comunidad Valenciana and País Vasco), whereas two adopt the outsourced management model (Castilla-La Mancha and Baleares). Therefore, the classic management model is efficient in only 33% of cases, while outsourcing is efficient in 71% of the institutions that use them. Consequently, the outsourced model maintains better overall efficiency when compared to the classic one.

These considerations lead us to some observations for managers and policy makers of inefficient regional television institutions. Informally speaking, this article does not give solutions to general management or performance problems, but at least it partially points out, "the ones that have to change and whom they should be paying attention to" so as to these institutions can be considered efficient as it pertains to the management of public resources. The recommendations fall into three different tiers.

First, the television networks that require larger improvements are Andalucía and Comunidad Valenciana. The former should reduce their purchases by 53% and its public subsidy by 60% while increasing its audience viewership by 23%; its benchmark reference

would be Aragón. Comunidad Valenciana should reduce its purchases by more than 45%, and public funding should be reduced by 60%, in addition to slightly increasing their audience share. This region's best model would be Extremadura.

At the second tier, Madrid and País Vasco need moderate reforms. Madrid should reduce its two controllable inputs by 60% without modifying its audience viewership. País Vasco should reduce its inputs by at least 15% and increase its audience by 26%. Both have Asturias as the primary benchmark.

Third, other television networks require limited reforms. Castilla-La Mancha and Baleares should reduce their two controllable inputs, but also have to increase audience. Their references would be Asturias and Extremadura, respectively. Finally, Canarias just should reduce the level of public subsidy contribution and also follow Asturias' lead.

In fact, effective policy decisions are far from being easy to tackle. Since 2011, none of the regional television networks have taken significant steps to put into effect such measures, except for the autonomous region of Comunidad Valenciana when they decided to eliminate their public television service all together. However, the managers of these institutions could try to improve their performance without increasing the government subsidies they receive by taking at least three possible actions: allocate fewer resources to their own corporate structure and increase external purchases (which also energizes the regional audio-visual industry); implement measures to increase audience with a more attractive content mix; and increase advertising revenue with better business management.

If these solutions were not enough, the regional governments could also count on three other possible basic actions before having to cancel the service completely: appoint other managers if they fail to achieve performance goals; adjust public subsidies to the performance realised; and legally modify the management model adopted. Among performance results, we could also include other issues such as necessity of public service programming and the effective promotion of the regional audio-visual industry, which subsequently occurs more in the outsourced model.

These management measures, at both the political and managerial level, could therefore be implemented directly or indirectly before cancelling the provision of the public service television network. Although it should be noted that 5 out of 17 Spanish autonomously governed regions do not offer their citizens this service and therefore can allocate those resources and funds saved to other public services.

There are two aspects of this study that could be possibly limiting its results: data and variables. On the one hand, empirical evidence used in this study derives from 2011, which was also the year of regional elections. For this reason and the subsequent tightening of the economic crisis and the reduction of public spending, the results could shed some variation, if applied to previous years.

On the other hand, the variables chosen form a model that takes into account market experience, external costs and public subsidies. They are all inputs that could contribute to an output understood as the audience share of the main network. But in fact, the budgets of these institutions also include allocations of other complementary television channels, radio broadcasting companies and website management services which are rarely disintegrated in their annual public reports. In addition, there are other variables whose influence could be seen using other methodologies, such as genre content mix, advertising revenues, fixed assets, equity, debt, staffing or qualitative consumer satisfaction. As pointed out, this piece of research does not intend to give a whole assessment of public service media performance, but just a limited evaluation of the efficient use of public resources.

Future research focus should refer to building efficiency models that can be applied to a larger number of cases and therefore more variables considered in both public and private sectors. It would also be desirable to conduct empirical research applying time series above one year, giving them a more longitudinal nature. Therefore, studying efficiency from DEA,

benchmarking or cost-benefit analysis in general should receive more attention in other sectors beyond public service television, validating new efficiency theoretical models in the media and other industries and services, including the public administration and other not-for-profit environments.

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