The Migration towards Digital Terrestrial Television (DTT): Challenges for Public Policy and Public Broadcasters

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Abstract

This paper initially identifies the main transformations of the television system that are caused by digitalization. Its development in several broadcasting platforms is analyzed as well as the particular obstacles and requirements that are detected for each of them. Due to its technical characteristics and its historical link to the public service, the terrestrial network requires migration strategies different from those strictly commercial, and public intervention might be needed. The paper focuses on such migration strategies towards DTT and identifies the main issues for public intervention in the areas of the digital scenario: technology, business and market transformation and the reception field. Moreover, it describes and classifies the challenges that public broadcasters should confront due to digitalization. This paper finally concludes that the leadership of the public broadcasters during the migration towards DTT is an interesting tool for public policy. The need to foster the digitalization of the terrestrial platform and to achieve certain social and public goals besides the market interests brings an opportunity for public institutions and public broadcasters to work together. That leading role could also be positive for the public service to face its necessary redefinition and reallocation within the digital context.

1. Digitalizing Television, transforming the media system

When the television signal is digitalized, the coding system of the radioelectrical wave that transports the image and sound information changes. This means that instead of using an analogue coding method – which transforms images and sounds into an electric signal in a proportional way to their natural physical characteristics –, a logical binary code translates those characteristics into discrete values, which are used to build the radioelectrical wave afterwards.[1]

The concept that should be stressed is the change from a proportional to a logical coding system, which generates a flow of data that can be processed by computers. This exclusively technological fact implies such an improvement of the possibilities of the means that all the other facets of television as a social, economic and cultural system are affected too.

However, this improvement does not change television in such a radical way like the birth of a completely new means of communication. It would be more accurate to state that this technical fact is accelerating

[1] For a detailed description of the technological issues concerning digitalization review:
- O'Leary, S. (2000). *Understanding digital terrestrial broadcasting.* Norwood: Artech House.
- Benoit, H. (1998). *Televisión Digital.* Madrid: Paraninfo.
- Fischer, W. (2004). *Digital Television: a practical guide for engineers*. Berlin: Springer.
- Pérez Vega, C. & Zamanillo, J.M. (2003). *Tv: fundamentos de televisión analógica y digital.* Santander: Universidad de Cantabria.

transformation processes of the media system that have already been underway since the 1980s (Brown, 2005).

Digitalization of television has occurred in different phases, initially affecting the field of content production and the transmission and reception activities later. In the first case – production –, the digitalization involved exclusively the professional sphere. The market of equipments and the daily working routines became the arena for discussion. In this field, digitalization brings almost unlimited chances concerning the treatment of the image and the sound and increases the options for content designing. Moreover, when applied to different sources of information (image, audio, text), digitalization turns all of them into the same type of data. It means that they can be mixed and used together, which multiplies the opportunities to create enhanced and interactive services and contents. However, important investments in new equipment and training for professionals are required as well.

At this moment, when digitalization is affecting the transmission and the reception fields, it acquires a major relevance in the areas of business, politics and society. Concerning transmission, the compression of the digital data allows an optimization of the use of the spectrum. An immediate consequence is the increase in the number of channels broadcasted. The first effect of this will be a fragmentation of the audience that will demand to reconsider the current business models based on advertising revenues. Multiplying the number of channels does not mean a proportional increase in the time and budget that the audience will invest in watching television.[2] In addition, the growth of advertising expenditure cannot be certainly predicted, as it depends not only on the availability of advertising slots but also on other economic and social factors that are external to the audiovisual sector. This expending level will certainly determine the viability of the digital multichannel context. Furthermore, it should be considered that more broadcasting time and channels for advertising will imply a decrease of revenue per content unit. In this context, producing more channels becomes a difficult equation where maintaining profit and quality seem to be placed at opposite terms (Brown, 2005).

Digitalization also improves the encrypting and the conditional access systems. First, it results in a better protection of copyright. Secondly, it allows more flexibility and business opportunities for pay-tv offers, which can be better adapted to the needs and consumption patterns of the audience. Paradoxically, being digital also means being more exposed to piracy, with all the negative consequences that derive from it (Marsden & Ariño, 2005). Still in the field of transmission, the digitalization of the broadcasting signal makes the implementation of correction procedures feasible to avoid errors and interferences that are common in the analogue transmission. The improvement of the quality will probably be highly valued by the viewers, becoming a key element to motivate the conversion to digital. However, a major investment in

[2] As Picard (2001) reports: In the European Union the number of channels grew 44% between 1990 and 2000. Contrary, the daily viewing time rose only 13.7%, about 22 minutes per person during the decade, a bit more than 2 minutes per year.

the broadcasting infrastructures is also needed. The digital signal does not allow the same error margins than the analogue one, so more masts are needed to cover signal gaps in certain areas.[3]

In the field of reception, digitalization transforms television as an element of the social communication system.[4] The mass nature that it used to have is evolving towards the creation of segmented offers, which are more personalized and addressed to specific and better identified audiences. In a similar way, the citizens' viewing habits and attitudes in front of the set are changing and becoming more individual and focused on concrete contents and services.[5] As a result of this, the concepts of channel and flow programming begin to dissolve.[6] "Menu" or "on demand" dynamics appear as new relation strategies between television and the audience, which is made up of citizens now turned into customers or users as well.[7]

Concerning the structure and relational model of the television sector, it has been broadly announced that the reduction of operating and producing costs that digitalization might lead to will open the access to the market for new players. It would be an opportunity to increase the pluralism within the audiovisual sector and to foster the national production industries. However, despite the fact that new companies are usually emerging in the field of technological services, things are not easy for new starters. In addition to high entry costs to the market, the firms already operating are reconsidering the scope of their activities and their strategic position. Concentration movements are carried out by the main incumbent players. It responds to a triple objective: First of all, the market agents want to minimize the risks and investment efforts that this technological leap initially requires. Secondly, they want to protect their current interests and to achieve a solid position within the market in order to face a context of increased competition. Finally, they want to maximize the benefits that aggregating contents and economic power might produce in a globalized and multiplatform scenario where scale economies are predominant.

Nevertheless, the consequences of digitalizing television should not be overestimated. There is an important segment of society that is not well informed about this new way of broadcasting and therefore cannot access it properly. Moreover, the existence of a group of reluctant people – unwilling to change their receiver or to purchase a set top box, or not interested in the new features and services offered –

[3] Using the analogue signal, it is still possible to receive and to watch television in places with poor signal coverage, although some image and audio noise will appear. Using the digital signal, once the maximum amount of error allowed by the processor of the digital receiver has been overcome, it is not possible to display any image or sound. This fact is called the "digital cliff". As it has been indicated, more masts are needed in order to guarantee a proper coverage, especially in areas with a complicated orography.

[4] Gifreu (1996) suggests that the four classic functions that Lasswell and Wight assigned to the social means of social communication (to inform, to educate, to entertain and to persuade) are not the only ones that can be carried out by the media. Digitalization opens new ways for interpersonal and group communication and it would also be an opportunity to implement new communication channels between the citizens and the public institutions.

[5] For a deep analysis of the processes of social appropriation of television and a systematization of the different habits and patterns of consumption depending on the cultural and socioeconomic characteristics of the audience, review Callejo (1995).

[6] Arthur Andersen (2002). The idea suggested by E. Bustamante (1999) is also very interesting: Digitalization and pay-TV open the way to the transition from the current model of flow programming to a model of "cultural edition and video-services". This idea is also supported by Llorens-Maluquer (2001).

[7] The new content and services offered by television affect the attitudes and roles of the audience in front of the set. A single viewer can shift from viewing television as a citizen (news program) to become a consumer (shopping program-advertising) or a user (interactive application). Analysing the particularities of each role or their links to certain types of content might be an interesting research line that would produce valuable results to understand some aspects of the current reconfiguration of the media system.

should be strongly taken into consideration too. Social acceptance and appropriation is one of the main obstacles within the migration process from analogical to digital broadcasting.[8]

Furthermore, the costs that digitalization implies for the viewers cannot be left out. The case of the terrestrial broadcasting might become especially conflictive. The reception aerials and the distribution facilities will have to be adapted or fully replaced in many cases. A set top box or a new digital television set should be bought. Taking into account that this platform has historically offered free to air services, these costs become an important obstacle. They will be not only an unattractive factor that might determine the attitude of the citizens in front of digital terrestrial television (DTT), but a real budget problem for those with less economic resources.

In order to foster the migration towards digital television, an important effort in public communication is needed. The features and the added values of the new broadcasting system should be clearly transmitted. Without information and without real benefits, the viewers will remain analogue as a reaction to uncertainty.

These are some the most relevant transformation processes that arise during the digitalization of television.[9] Due to the centrality of broadcasting within the audiovisual sector, those changes affect the entire media system. However, as it has been stated, these processes are not completely new. Contrary, most of them were already running when the digitalization of television started. It is also necessary to emphasize that their development is not homogeneous in the different technological platforms of television. Each platform – terrestrial, satellite, cable or IP – presents particular technical, business and reception characteristics. This implies different migration paths towards digital television for each of them.

2. The migration towards digital television: a non homogeneous process among platforms

Digitalization of television started earlier at cable and satellite networks. The private companies operating them had huge expectations about the possibility of finding additional revenue sources within the pay-tv market and from the new interactive services (Brown, 2005). In addition, national governments not only didn't have legal instruments to control this development – like the licensing process and the spectrum management used in the terrestrial platform –, but were also interested in having national companies

[8] In order to improve the implementation of digital television, some research projects about the attitudes of the citizens in front of the migration process have been carried out in the United Kingdom. They are available at: http://www.digitaltelevision.gov.uk [February 2007]. Some of them are:

a) The Generics Group (2004). *Attitudes to digital television – Preliminary findings on consumer adoption of Digital Television*.

b) Consumers' Association (UK) (2001). *Turn on, tune in, switched off – Consumers attitudes to digital television.*

The Office of Communications (OFCOM) is also assessing this topic. Check the Switchover Progress Report Q4 2006 < http://www.ofcom.org.uk/research/tv/reports/dtv/ > [February 2007].

In Sweden, the Media Management and Transformation Center at the Jönköping International Business School and the Department of Media and Communication of the School of Education and Communication at Jönköping University are carrying a research project about the reaction of the citizenship during the switch-off process in the region of Gotland.

[9] Digitalization involves a wide range of transformation processes. Not all of them have been included in this paper, but those that might affect the terrestrial platform and the public broadcasting.

developing this technology as well as achieving international prestige and dominant and strategic positions within the market (Näränen, 2005).

The satellite sector was fast and efficiently digitalized following commercial strategies, which needed very important capital investments. Usually the operators took up the costs of replacing the analogue set top boxes of their customers. They also did great efforts in order to acquire rights of premium content to keep their subscribers and to appeal to new ones. In addition, establishing their own technology as a *de facto* standard, especially in the case of conditional access systems, was among their objectives. This would allow them to control the market better instead of facing more competition as a result of the implementation of open and common standards, which have been promoted at a European level (Näränen, 2005).[10]

On the other hand, the cable sector is having some difficulties to profit from digitalization.[11] This platform already offers a big amount of channels and a very good image and sound quality in its analogue version. Therefore, cable users do not find the basic benefits of digitalization so interesting and purchasing a new digital receiver is frequently seen as an unnecessary expense. In this context, the strategy used by the cable companies in order to keep their customers, to convert them to digital and to gain new ones has been the aggregation of services. It is known as *"triple play"*, including television, internet and telephone in one bill. Nevertheless, the migration of cable systems to digital is still slower than in the satellite sector (Brown, 2005).

In the case of the terrestrial network, the situation is even more difficult. First of all, it is necessary to understand that despite the existence of private broadcasters the terrestrial platform has been historically linked to the public broadcasting service (PBS) (Hujanen, 2005). This fact grants some social values to this platform, which conditions the mechanisms and strategies to be used when confronting its digitalization process. Migrating to digital implies the switch-off of the analogue signal in a certain moment.[12] Then, those who will not have adapted their receivers will not be able to watch television anymore. Therefore,

[10] Besides defining the standards for transmission, the Digital Video Broadcasting consortium (DVB) has developed a standard for conditional access as well as open middleware for interactive applications (MHP). The main objective of these standards is to create a horizontal and interoperable market that will foster the competition between players and will also allow the citizens to use their reception equipment with any offer. This has been one of the most conflictive topics concerning digitalization. The incumbent operators want to make the most profit from their early investment in their own technologies. Therefore, they try to keep their customers tied through the receiver sets. Interoperability means freedom for the user to shift from one offer to another. Obviously, it endangers the revenues from subscriptions. The DVB consortium has been clearly supported by the European institutions. After the failure of the European policies for high definition television, the EU's institutions preferred to use a "light touch" intervention within the audiovisual sector. Mainly made up of the market players but including many public institutions as well, the DVB has become one of the most relevant forums for technical matters related to digital television; first at an European level and then worldwide.

[11] As Brown (2005) refers, by the end of 2002 most of satellite operators had completed the digital switch-over. Around 80% of cable networks had also turn digital. The process started in the mid-90.

[12] A clarification about the terms used should be done: Analogue switch-off means the cessation of the analogue broadcasting. Digital switch-on is used to refer to the beginning of digital broadcasting. Both phases usually overlapped. The digital switch-on is done before the analogue switch-off. That period is called simultcast. Switch-over is used to name the moment where the migration to digital has been completed and there is no more analogue broadcasting. In that moment, thanks to the optimization of the spectrum that digitalization allows, the 'digital dividend' appears: radioelectrical frequencies are released and can be used for additional broadcasting or other services.

considering that receiving the terrestrial broadcasting has become some kind of right of the citizens in many countries, the switch-off might be a conflictive issue from the point of view of public policy.

Secondly, the costs of adapting the receiving facilities and purchasing a digital television set or a decoder are important social obstacles.[13] Despite the fact that in most European countries a public fee for those owning a receiver exists[14] – which is set aside for funding the public broadcasters –, this service has been broadly considered as free of charge. Private channels have also been offered free to air in the terrestrial platform, using advertising revenues as funding sources. Although the terrestrial offer will continue being mainly accessed for free, it is necessary to set a rationale – the reasons and the benefits – that legitimizes this substitutive technological evolution and justifies the personal and economic efforts that the citizens will be forced to make if they want to become digital, if they want to continue watching television.

Moreover, it should also be taken into account that, due to its technical characteristics, the terrestrial platform offers lower possibilities than satellite or cable concerning the increase in the number of channels and the implementation of interactive services. From the perspective of the viewers, this fact initially places DTT in a less competitive position in comparison with the other technical platforms. It could result in a transfer of terrestrial viewers towards other platforms with a higher number of channels or attractive services. That is why a good selling proposition and strategy is necessary for the digital terrestrial television.[15]

From the point of view of the broadcasters, the digitalization of the terrestrial platform is a conflictive issue. First of all, it means an increase of their operating costs, due to the simultcast and the requirement of producing or buying more contents. It also brings more competition into the market. Altogether, these facts create risks for the stability of their business models, which in the case of private operators are relatively young and still should be paid off. Expected benefits like new revenues from advertising or interactivity and new business opportunities are still seen far away. As a consequence, their attitude towards digitalization is a bit reluctant. They do not face it with determination, but try to delay it while strengthening their position in the (analogue) market.

As it has been stated, digitalization raises several conflicts, obstacles and transformation processes that, due to their heterogeneity and the social relevance of television, might make the intervention of the public administration necessary. This fact is more marked in the case of the terrestrial broadcasting system.

[13] Although the price of the receiving equipment is decreasing constantly, it will still be an important expense for certain social groups.
[14] According to Hujanen (2005), only Luxembourg, Portugal and Spain do not have that kind of fee.
[15] The fact that the viewers could migrate to other platforms cannot be qualified as good or bad. However, while the terrestrial platform is a free access public good, the satellite and cable networks belong to private companies. It is necessary to consider that an eventual downturn of the social use of the terrestrial platform could have consequences over pluralism, public opinion or programming diversity. This fact will also raise (again) discussions about its use for broadcasting instead of other services like mobile telephony or wireless. Despite the higher number of channels offered by other platforms, the terrestrial one will continue being a perfect option for many citizens that do not need more than 40 channels or do not wish to become pay-tv subscribers.

3. Digitalization and Public Intervention

Public intervention in the media system has been constant along the past decades: it has controlled the market operation through legislation and it has started/promoted the activities within the sector by creating public broadcasters or arranging funding schemes and subventions that the private players have benefited from too. Initially, this public intervention was exclusively national but currently it is also carried out at a supranational level (Humphreys, 1996).

Through its diverse institutions, the European Union (EU) has created a positive discourse about digitalization.[16] The main arguments have been that this technical innovation brings new possibilities for the industry and for the citizens. In the digital context, television is considered a basic access point to the Information Society, a tool to fight against the digital divide.[17]

Moreover, digitalization is regarded as an opportunity to reinforce the project of creating a European common market for the audiovisual sector and to reallocate its industry at the international level. However, the EU's strategy for the digitalization process, commanded by the European Commission, has followed a "light-touch" model of public intervention. This means that public action is frequently reduced to create, by means of legislation and policy, the appropriate conditions that will assure stability and free competition within the market in order to motivate the investors and the market agents to develop their activities. The leadership of the migration has been frequently transferred to the market players. Consequently, in the last years, when setting the objectives of the European policies concerning digital television, the industrial aspects have prevailed over the social and cultural topics (Crusafon,1999) (Suárez, 2005).

On the other hand, the member states have shown different attitudes towards digitalization. The national migration plans for DTT are designed and executed considering the particularities of each national media market. The strategies used by the public institutions in charge of the process vary from one case to another depending on the previous audiovisual model and the future objectives. Due to this heterogeneity at the national level, the implementation of DTT is asymmetric and asynchronous within the European Union.[18]

Nevertheless, when designing policies in order to face digitalization, the challenges that public institutions must overcome are more or less similar everywhere. They can be classified in three fields or transformation areas:

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[16] COM (2003) 541, *on the transition from analogue to digital broadcasting*; COM (2003) 781, *on the future of the regulatory policy for the audiovisual sector*.

[17] Opposite to computers, which are still lacking in many European households and are expensive for certain social groups too, television sets are present in almost every living-room. In addition, television requires fewer skills to be used. Therefore, it might become a solution to access the Information Society for an important segment of society.

[18] For news and updates about the development of the national implementation plans for DTT, visit the website of the Digital Terrestrial Television Action Group (DIGITAG): http://www.digitag.org [February 2007].

a) Technological transformation

- Digitalization implies the need of replacing equipment at all the stages of the value chain. Although a direct intervention will not be appropriate from the perspective of free market and competition, public institutions could contribute to the process by creating favourable conditions for the renewal (E.g. VAT % reduction on equipment, tax deductions, renewal plans, etc.). In that way the transition would be a bit easier for the analogue operators and the citizens.
- Promoting agreements on open and horizontal technical standards (concerning transmission, middleware, conditional access or electronic program guides) would create an interoperable market that would benefit producers and consumers at the same time. It will also make the forecasted and desired multiplatform environment more real. It might strength the articulation of a European common market too.
- Public institutions are key players when planning the deployment of infrastructures for digital broadcasting along the national territory, especially in the case of the terrestrial network. Their intervention should guarantee universal access and service. A simultcast period is a necessity that they should plan and coordinate to favour a smooth transition process for the viewers.

b) Business/market transformation

- Once the public institutions have experienced and learnt that the digitalization of the terrestrial platform will not be successfully driven by an exclusive action of the market forces – at least fulfilling all the social objectives set –, they have become responsible for designing the migration plans and business models for DTT.[19] The shape and dimension of the institutional structure involved and the intervention style are decisive. It is important that governments define clearly and suitably in advance their objectives as well as the dates, strategies and plans to deal with the challenges that DTT raises. This will allow the market players to confront the process with equality of opportunity and will provide them with trust

[19] Clear examples of how the market was not able to launch the DTT offer successfully by means of private operators are the cases of the United Kingdom (OnDigital-ITVDigital) and Spain (QuieroTV). In both countries, in addition to the simultcast licenses for the analogue broadcasters, the government licensed private companies with a higher number of digital channels. Those operators were supposed to lead the implementation of DTT. The impossibility of reaching a minimum number of subscribers to counterbalance their investments brought those operators to bankruptcy in 2002. After the collapse, the intervention of public institutions was quite different in each case. In the UK, the BBC, together with BSkyB Channel 4, ITV and National Grid Wireless, were immediately re-assigned the leadership of a free to air project. Freeview, the new offer launched in October 2002, has proved to be a great success, with spectacular growth rates and approaching the number of satellite subscribers in 2006 (7mill. Freview vs 7.8mill. BSkyB; source: OFCOM). Contrary, in Spain, the implementation of DTT was stopped for 3 years. In 2005, the Spanish government finally re-launched the digital terrestrial offer, by means of a new licensing procedure specially addressed to the analogue broadcasters. However, despite being granted with the highest number of channels, the Spanish public service broadcaster (RTVE) has not been completely able to lead the process. On the other hand, the private analogue broadcasters show reluctant attitudes to invest resources in the new channels they were granted. Nevertheless, the implementation of DTT in Spain cannot currently be described as totally negative. The audience is starting to respond and the set top box selling rates are increasing. However the quality of the new offer and the public communication campaign need to be improved.

as well. The public migration plan should determine the role of public broadcasters and their functions, objectives and position in the final digital scenario.

- Together with the implementation plan, a flexible and stable regulation would definitely help the migration process. Clear rules set up a safer environment for investment. The fragmentations that have characterized the regulation for analogical broadcasting should be overcome. Governments and public institutions involved should collaborate to create a suitable legislation framework for the new scenario of technological and business convergence, where new contents and services appear. However, that is not an easy task. Digital television is not an independent legislative and policy field but is placed in between the regulation addressed to telecommunications, audiovisual, information society, competition and standardization (Näränen, 2005). In addition the existing double level of intervention – national / European – adds complexity to this question.
- The public institutions are responsible for licensing the new digital frequencies (at the terrestrial platform). This is a direct way of intervention in the market that shapes it to a high degree. Depending on the criteria that the public contests are based on, the market scenario would change drastically concerning competition, pluralism, diversity, funding schemes, business models etc. Therefore, in order to guarantee the fairness and transparency during the drawing up of the clauses, the assessment of the applications and the final distribution of frequencies, the participation of an independent institution like a national regulatory authority or an audiovisual/broadcasting council would be appropriate. These institutions could also be suitable to control the fulfilment of the conditions established by the licenses and the regulatory framework.
- Public institutions can also contribute to the development of DTT by creating the necessary conditions and forums to promote the debate among the players involved (public and private). This measure is necessary to overcome vicious circles that slow down the migration and bottlenecks that fragment the market.
- Research can contribute with new and innovative solutions to the obstacles of digitalization. It also provides reflections about what has been done until the moment. This can be useful to face the future avoiding the repetition of mistakes from the past. Monitoring the development of the migration towards digital television is necessary to be able to introduce correction measures on time. Therefore, public funding for research, development and innovation in this field should be promoted. In addition, stimulating the private companies to invest in this field might be a good measure as well.

c) Reception transformation

- The main objective for public intervention in this field is to guarantee the general interest. In that sense, one of the basic concepts that should be taken into account is universal service. Bringing the digital signal to areas that are less attractive from an economic point of view will not be a priority for commercial broadcasters. Public intervention must find ways to counterbalance these 'market failures' and to guarantee that digitalization is not only a benefit for those living in 'profitable' urban regions. Together with universal service, universal access should be considered here too. Some social groups might have special difficulties to cover the migration process successfully. Elderly, handicapped or low income people would need some extra support to gain access to DTT. National migration plans should include measures to avoid that DTT becomes a factor of social fragmentation.
- Despite the existence of common obstacles in the reception field, their particularities vary from country to country. In order to design suitable corrective measures, it is important to monitor the citizens and the main players involved. Several measures can be carried out at a local or regional level: Pilot projects to study the signal deployment; research to find out the best strategy to adapt the reception infrastructures; tests about the installation of the receiver sets; panel groups to analyse the usability and interactivity of the new applications; etc. The results would be valuable either to prevent possible incidences on a national scale or to stimulate the digital switch-over.
- A well informed audience is a key factor for the success of the digitalization of any television platform. The current high pace of the technological development and the convergence process between telecommunications and audiovisual usually confuse the citizens. Moreover, many concepts as pay-tv, interactivity or even high definition have been attached to digital television in wrong ways. Since it might not be linked with particular private or commercial interests, communication from the public institutions in charge of the migration towards DTT is a basic tool to clearly inform the citizenship about what this process is about and which the requirements in order to have access to the digital terrestrial offer are. However, the viewers are not the only ones needing information. Retailers, landlords, installers, producers – among many others – also depend on a good flow of information to be aware of the migration process. Then, they will be able to take on their responsibilities and to advice the citizens properly.

4. Challenges for Public Service / Broadcasters

As it has been stated in the previous section, the characteristics of the terrestrial network require public intervention during its digitalization. Several challenges and issues for that intervention have been identified within the fields of technology, business and reception. In addition, some action proposals have been suggested too.

One of the reasons for that intervention was the historical link between the terrestrial platform and the public service concept, which has attributed special functions and objectives to this means of broadcasting. At the same time, the public broadcasters have been one of the main ways used by the European states to intervene in the audiovisual sector (Humphreys, 1996). Despite the fact that several audiovisual models can be identified within Europe (Hallin & Mancini, 2004) and, therefore, different definitions and articulations of the public service remit have been implemented (Hujanen, 2005), the challenges that digitalization rises affect the European public broadcasters more or less in the same way.

Within the changing scenario, public broadcasters can be seen from a double perspective. First of all, as passive subjects: digitalization influences their internal transformation processes. It modifies the pace of their structural, producing and programming changes and introduces new evolution lines. Secondly, public broadcasters can become active subjects: depending on the role that the administration would attribute to them, they would take part in the digitalization with more or less involvement, becoming or not boosting agents.

Furthermore, together with the role of its operators during the migration, the public service should consider the position, functions and objectives to achieve at the end of the process. Maintaining a social relevance among the private broadcasters will demand important efforts.

Despite the fact that public broadcasters have been required to become more independent from politics everywhere in Europe – and they have done so (Hallin & Mancini, 2004) –, it would be naïf to obviate the strong links still remaining between them and the public administration (Cuilemburg & McQuail, 2003). Even in those countries where this is less the case, it is clear that public broadcasters can be important allies and collaborators of the government and the public institutions when designing and putting an implementation plan for DTT into practice. Indeed, this collaboration is necessary. Their long tradition and experience dealing with market changes and audiences cannot be underestimated. In addition, they still maintain a noteworthy level of social trust and market share, which can turn them into important prescriptors of digital broadcasting. Moreover, their particular independence from certain market factors puts them in a very appropriate position to deal with topics as universal service and access, public communication, programming diversity or social representativeness, which become crucial and controversial in the digital scenario.

On the other hand, this changing context has also accentuated the ongoing debate about the role of public service and public broadcasters within the media system.[20] In the first place, the increase of the number of channels is regarded by some market players as a guarantee for freedom of speech, pluralism and social representativeness. They also support the thesis that a higher number of channels implies the full coverage of the diverse social functions associated to television. Secondly, it has been stated that the complementarity of technical platforms will solve the questions connected with universal service and access. Thence, those concepts would not be a justification for the existence of public broadcasters (Hujanen, 2005).

Despite these arguments, before it is assumed that public service belongs exclusively to the analogical broadcasting context, the important role that it has had – and will have – for democracy, for promoting social debate and for creating public opinion might be considered. Public service also has a relevant function when talking about spreading culture, supporting diversity and defining identities. Consequently, it would not be accurate to consider digitalization an exclusive opportunity for the market, its private operators and their pay-tv services. It is suitable and necessary to assess how this technological innovation could increase and improve the public functions of television. Due to the important transformation that it implies, digitalization could also be an opportunity to redefine and reinforce the public broadcasting service remit.

Following the arguments above and what has been previously stated in this paper, it might be suitable to identify the main challenges that digitalization rises for the public broadcasters. They could be systematized in the following areas:

a) Redefinition / Legitimacy of the public service remit

In spite of the existence of national public broadcasters in all the member states of the European Union, their models are quite diverse. Distinct functions and objectives have been attributed to them in each case (Humphreys, 1996) (Hallin & Mancini, 2004). This is the result of different political and administrative traditions. However, there is a set of concepts that can regularly be found within any model: universal service, content and programming diversity, internal and external pluralism, social representativeness, quality, balanced information, promotion of national culture and identity, etc. (Hujanen, 2005).

[20] Public broadcasters have been the base of the European national television models, which were initially articulated as public monopolies. Beyond the liberalisation of the market, the existence of public operators and the concept of public service have been continuously questioned, together with the scope of its remit and the sort of services that they should deliver. Depending on the model implemented in each country, the simultaneous funding of PBS activities with public budget and incomes from advertising has made the cohabitation with the private commercial operators conflictive. It has also been denounced that the PBS programming style and contents are becoming clearly similar to the private offer. The use of the audience measurement as a criterion to determine the success of the channels is one of the main causes for that evolution towards a more commercial profile.

As the media systems have evolved towards a more liberalized model, the multiplicity of players within the market and the free competition have been seen – from a neoliberal perspective – as suitable tools to achieve the aforementioned objectives (Hallin & Mancini, 2004). In addition, globalization, technological convergence, market internationalisation, digitalization or multiplatform environment are concepts that are frequently used to found the idea that the media system should evolve towards a structure where public broadcasting is not necessary, useless or marginal. From that point of view, public intervention in the audiovisual sector – in any of its forms – is also seen as an archaic and slowing down factor opposite to the flexibility, the independence and the agility for innovation that characterize the market and private companies.

In this paper, it has already been affirmed that there should be a place for public service in the digital broadcasting scenario. Nevertheless, it would be necessary to clearly define the role of the public broadcasters as well as the scope of their activities and their funding schemes. In that way, the constant discredit of the public broadcasting service carried out by the private operators could not be maintained any longer. Then, regardless of the existence of opposed opinions, the public service will be able to appeal for its social legitimacy. In addition, it would be positive to use any opportunity belonging to the new scenario in order to improve the performance of its remit.

b) Internal restructuring / Professional routines

At this moment, many of the public broadcasters have complex and oversized labour structures as a consequence of their monopolistic position in the past, their producing strategies and their professional routines. They used to have total control over all the activities within the audiovisual value chain, from creation to distribution. Nowadays the technological innovation and the market liberalization have changed the configuration of that value chain and the public broadcasters need to adapt themselves to the current conjuncture in order to avoid economic difficulties.

Moreover, the growth in content and services demand generated by digitalization rarely comes together with a proportional increase in economic resources. Contrary, the budgets are reviewed down and technology has reduced the number of workers needed. Public broadcasters are forced to become more flexible and productive. Outsourcing has been a common and welcomed tendency by the public broadcasters during the last years in order to lighten the cost of their production activities. It has also been considered a way for public broadcasters to contribute to the stimulation of the national audiovisual sector. Therefore, it has been well received among private producers, especially by those called independent. These operations must be carried out taking care of maintaining the free

competition of the market. On the other hand, they should not place the public broadcasters in a weak position with regard to the producers. This could affect its social objectives and the quality of content (Hujanen, 2005).

In the digital context, public broadcasters must face up to changes in their production structures. Necessarily, it means to modernize their management culture and strategies as well.

c) Programming changes

Digitalization means that more channels can be broadcasted. It extends the possibilities concerning offers and services provided. Besides, programming tendencies are evolving towards the creation of thematic channels, more focused on single content-units and branding strategies than the usual flow-channels.

Given this situation, private operators demand that public broadcasters should limit themselves to their primary functions. They consider that the development of public thematic channels or interactive applications funded with public budget would mean an unfair competition. On the other hand, public service corporations see the digitalization as an opportunity to reach their public and social objectives better. Consequently, they are designing children, news, sports or cultural channels. Their final aim is to create a portfolio that would allow them to confront the ongoing fragmentation of the audience and to maintain the market share that they had until now (Marsden & Ariño, 2005). Public operators also argue that in those thematic offers they are including topics, social groups and events that probably will not be covered by private channels due to their low profitability.

This is a difficult debate that could be partly solved by defining with precision the remit of the public service, as it has been previously stated.

d) Accountability

The Amsterdam Protocol (1997) recognized the sovereignty of member states of the European Union to articulate their own public broadcasting service using a public budget. The main condition for that was the requirement of non-interference with the free competition of the market. In order to achieve that objective, first of all, the functions and objectives of the PBS should be clearly defined. Secondly, a systematic accounting method was demanded. Unfortunately, the concepts upon which the public service is built are not always very concrete but abstract. For that reason, the implementation of the aforementioned conditions has proved to be quite difficult and seldom (Llorens Maluquer, 2005) (Steemers, 2003). On the other hand, the combination of an analytic accountability with a "framework-

contract" seems to have been successfully applied in some cases.[21] External auditing can also be useful to check the proper use of the budget, to monitor the compliance of the contract and to improve the operating procedures and strategies.

6. Final remarks: Leadership of the Public Service Broadcasters during the migration towards DTT, a tool for the public intervention

In the early years of the digitalization of the terrestrial broadcasting network, the European institutions and the national administrations used to apply a "light touch" model for public intervention in this field. Their activities were self-restricted to create the appropriate conditions for the market to implement that process. This favoured the industrial and commercial facets of digitalization. The social or cultural issues, although frequently mentioned, had less relevance.

Initially, digital terrestrial licenses were granted to private applicants, which developed subscription offers. This strategy had one basic objective: to create more competition within the pay-tv market, which was clearly dominated by satellite operators. Public broadcasters were not decisively included in those initial plans for DTT. They just had a license to simultcast their analogue channels.

This model proved to be a failure. The offers did not achieve enough social support. Without a sufficient market share, the granted operators went into bankruptcy and withdrew their licenses.[22]

While the European institutions continued with their "light touch" style, the failure of the private DTT offers forced national authorities to reconsider their strategies. They turned to the incumbent analogue broadcasters to try to re-launch DTT. Despite the fact that this reorientation of the process might benefit the private analogue broadcasters, they have shown a reluctant attitude to the new market configuration that DTT would imply. More channels equal more fragmentation of the audience and possibly more competition as well. Their current profitable business models – based on selling advertising time slots – seem to be threatened by this scenario. In addition, the new sources of revenue that digitalization promises have not been robustly tested yet. According to these determining factors, private analogue operators will not imply themselves in the DTT project, unless they see clear options to increase their presence in the market and to secure and to improve their incomes.

Considering this conjuncture, taking into account the need for success that public administrations have – not only as a responsibility in front of the national market or the audience but also with regard to the

[21] A framework-contract consists of a detailed agreement between the public administration and the public broadcaster where the objectives, terms and economic and material resources are accurately detailed (Jakubowicz, 2003).

[22] It was the case of ITVDigital in the United Kingdom and Quiero TV in Spain. Review footnote #19 for a detailed analysis of both cases: (UK) Goodwin (2005); (ES) Arrese & Herrero (2005). Also: Iosifidis (2006).

European Commission guidelines[23], and if the characteristics of the terrestrial network and the public service/operators are considered, then it might be right to conclude that the leadership of the public broadcasters should become a suitable public intervention tool in order to favour the success of the migration towards DTT.

In order to support this argument, some of the requirements and benefits that public leadership implies are detailed below:

a) Licensing / Coverage / Universal Service

The number of full multiplexes or digital channels that is granted to public broadcasters is a determining factor for their leadership. It is also necessary that the public budget is sufficiently increased in order to afford the expenses generated during the simultcast period and to confront a complete deployment of the digital transmission. The digital universal service must be guaranteed in the same conditions as it was deployed in the analogue scenario. With these premises, together with those related to content, the public broadcaster might be able to create a viewing mass that will have an inertia effect on the rest of the market players.

b) Content and Services Offer

A wide offer of quality contents and services is required to engage the audience. In this direction, public broadcasters should have a leading and innovative attitude. Their independence from certain market determining factors might allow them to develop contents with a high social profile and attractiveness but not necessarily economically profitable. Quality, diversity, pluralism and social representativeness must continue being the values associated to the public offer and they should be considered when designing the framework-contract. In that way, public service/broadcasters will become a tool for democratizing the access to multichannel television (Brown, 2005).

c) Public Communication Plans

Public broadcasters could become prescriptors of DTT. Communication campaigns and special contents providing information about the requirements for having access to DTT could be included within their programming. Maintaining the necessary independence, public broadcasters could spread information about the plans of the administration concerning digitalization. The social trust and influence that these broadcasters have enjoyed for years should not be underestimated but used to promote and foster the migration of the audience.

[23] With the communication COM (2003)541, *on the transition from analogue to digital broadcasting*, the European Commission manifested their guidelines to confront the switch-over. This communication required the member states to design a migration plan and to concrete a switch-off date, which preferably will not be later than 2012.

d) Assistance Programs for Disadvantaged Social Groups

Although well informed, elderly, handicapped or low-income groups might have problems to access DTT. The public administration should consider this situation and maybe design some assistance programs. Here again, public broadcasters could be involved in those initiatives offering their know-how or acting as interlocutors.[24]

This paper has identified the main transformation issues within the television system that are caused by the digitalization. It has also been argued how this process is developing at different pace and should confront particular obstacles in each broadcasting platform. Due to its technical characteristics and its historical link to the public service, the terrestrial broadcasting network needs migration strategies different from those exclusively commercial. Public intervention is necessary.

It has also been detected which the main challenges for public intervention in the digital scenario are. They have been systematized in three areas: technology, business and market transformation and the reception field. Moreover, the issues that public broadcasters should deal with due to digitalization have been analysed and classified in four sections: Redefinition and legitimacy of the public service remit, internal restructuring, programming changes and accountability.

Finally, it has been concluded that the leadership of the public broadcasters during the migration towards DTT would be an interesting tool for public policy. The need to foster the implementation of the digital terrestrial platform and to achieve certain social and public goals besides the market interests brings an opportunity for public institutions and public operators to collaborate. That leading role could also be positive for the public service to face its necessary reallocation within the digital context with a certain degree of independency from the market pressure.

To conclude, this paper wants to stress the need for more research within this field in order to overcome the asymmetry and asynchrony that characterize the implementation of digital terrestrial television within the European Union. This is necessary to achieve the objectives linked to the creation of a common European audiovisual market and to speed up the arrival of the Information Society. Comparative research analysing the different public policy strategies carried out by the EU's member states will provide public institutions with a valuable knowledge about the best practices and strategies in this field. The results of that research might also be useful for the market players, as they will obtain valuable information about the public policy tendencies. This would help them to plan their development strategies.

[24] In this direction, the Office of Communications (OFCOM) has publish a Switch-over help scheme. Available at: http://www.ofcom.org.uk/research/tv/reports/dtv/ [February 2007] - Document: «Switch-over progress report Q4-2006 », chapter 3, pp. 12-16.

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