Revista Latina de Comunicación Social # 067 – pages 068 to 098
Research | DOI: 10.4185/RLCS-067-948-068-098| ISSN 1138-5820 |31 pages

Household adaptation to digital terrestrial television in its first phase of implementation in Spain

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Abstract: For the European Union the key players in the digital transition are the citizens, the market and the local authorities. The complexity of this process does not allow the existence of a unique model to implement the digital transition, which in many cases is limited by local conditions. Based on this hypothesis, this article aims to identify the national, regional and local policies in support of the implementation of DTT; to examine the market conditions of television, DTT receivers, and infrastructure installation services; and to describe the digital transition process in households belonging to a Spanish area where the first phase of DTT transition has been completed. This study involves three methodologies: the examination of official documents in relation to DTT; interviews to a sample of commercial establishments; and a probabilistic survey questionnaire applied to a sample of the population from the area of Ricote's Transition Project.

Keywords: Digital transition; digital terrestrial television; policies; DTT receivers market; consumers; users.

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1. Introduction. Spain within the framework of the European policies in support of the DTT transition

The introduction of DTT in Spanish households constitutes an unprecedented technological change in the history of television (Bustamante, 2008a: 5), insofar as it is not an optional service improvement, as it was the case with the increase in the broadcasting range of TVE's second channel in UHF or the transition from black and white to colour television, but a demand orchestrated by the European Union. This is why "the digitalisation of terrestrial television broadcasting [became] a key item on the politic agenda of the different European governments" (Fernández-Alonso et al., 2009: 16).

The role of the European and national authorities was established in Lisbon's 2000 Conference on DTT, in which the participants agreed that while the Governments are responsible for executing the technological change in the Hertzian broadcasting system within their territories, the European Union must "coordinate and facilitate the exchange of information between States" (Suárez-Candel, 2009: 257-259).

In this context, since the beginning of the transition the European Commission showed a strong interest in its completion and became the leader in the design of the analogue switch-off plans among member States (Humphreys, 2008: 175).

In this regard, and in order to promote the technological change, the Commission requested, through its 2002 Action Plan entitled "eEurope2005: An information society for all" **[1]**, that by end 2003 member states should publish their intentions regarding a possible switchover, "…a road map, and an assessment of market conditions, and possibly a date for the closure of analogue terrestrial television broadcasting…" (COM (2002) 263 final: 20).

A month later, the European Parliament, in response to a question about the use of the MHP standard in Europe, presented a resolution which requested the Commission and the member States an Action Plan to introduce DTT successfully in Europe and to give "…maximum priority on the political agenda to the development of digital television and its general access to the public" (Resolution of the European Parliament. Answer to the question B5-0254/2002).

The following year the Commission discussed once again the transition process from analogue to digital broadcasting. It recognised that "each country follows its own

conversion plan, usually based on the local conditions of broadcasting", but stated that "the ideal plan would be to switch-off the analogue broadcasting system only when the digital system had already reached a wide penetration and there were only few analogue users left" (COM (2003) 541 final: 7).

Two years later, in May 2005, in view of the transition plans of the member states, and in response to the recommendations of the Panel for policies on radio spectrum, the Commission decided to establish a transition timetable, which considered that by 2010 "…the transition process should be already advanced across the European Union, and set early 2012 as the deadline for the analogue switch-off in all member States" (COM (2005) 204 final: 10).

After the Commission of Industry raised a question on the switchover to digital broadcasting in October 2005, the European Parliament offered a resolution which requested the member States that had not published their switchover plans to do so by the end of the year in order to "…offer clear signals and certainty to consumers and broadcasters". On the other hand, it "urged [the EU countries] to minimise the period of parallel broadcasting in order to avoid high broadcasting costs and the delay of the switchover" (Resolution of the European Parliament. Answer to question B-6-033/2005: 3), since "the economic impact of the digital switchover increases -negatively- as its duration increases…" (Rodriguez-Pardo, 2007: 93).

Another argument used by the Commission to encourage the EU countries to deal with the analogue switch-off with immediacy was that the expansion of the radio-electric spectrum would bring important economic benefits (Bustamante, 2008b: 200).

In Spain, its 1998 National Technical Plan for digital television established January 2012 as the deadline for the analogue switch-off (Royal Decree 2169/1998). In December 2003, in response to a request from the European Commission in the framework of the eEurope 2005 Action Plan, Spain's Ministry of Science and Technology developed its Strategic Plan for the Transition from analogue to digital television, which aimed to complete the digital switchover by 2012. However, the entrance of the new national Government in March 2004 and its new policies on DTT made this document invalid.

In December 2004 the Ministry of Industry, Tourism and Commerce announced a plan to boost the DTT switchover, which included bringing forward the deadline for the analogue switch-off. The new National Technical Plan for Digital Terrestrial Television, adopted in July 2005, set the 3rd of April, 2010 as a deadline for the analogue switch-off (Royal Decree 944/2005).

However, two months before the European Commission published its communication of May 2005, Spain became one of the seven Member States committed to complete the transition to digital TV before the end of 2010 (COM (2005) 204 final:10). Thus the implementation of the analogue switch-off became a challenge for Spain, which brought forward its deadline two years earlier than other EU countries, like the United Kingdom.

The second Plan for the transition to digital terrestrial television, which was adopted in December 2007, established "3 April, 2010 as the deadline for the full switch-off of analogue television broadcasting and its complete replacement by broadcast based on digital technology" (Agreement of the Council of Ministers II PNTTDT, 2007: 1).

It also established that the analogue switch-off had to be carried out by areas -73 technical areas, constituted in 90 Transition Projects- and executed in three phases: the first one was scheduled for 30 June, 2009, and affected 1,200 municipalities; the second one was scheduled for 31 December, 2009, and includes 2,500 towns/cities; and the third one was set for 3 April, 2010, and affected the rest of the territory (Sarabia and Sánchez, 2009). This way the analogue switch-off was established as a gradual disconnection process that depended on the power and coverage of each broadcasting area" (López-Izquierdo, 2007: 117).

Although in the migration to DTT citizens are who must take the initiative to change and assume the costs of adaptation in their households and to purchase the decoder to be able to continue watching television (Suárez Candel, 2010: 100), this process also requires the participation of other actors.

According to the European Commission, this process demands the intervention of the public authorities -national, regional and local- and the involvement of other agents such as the television and network operators, DTT receivers manufacturers, retailers, and installers. The commission considers the digital switchover as "…a long process that is influenced by many variables and affects more or less directly many parties, including users and consumers, industry and public authorities" (COM (2003) 541 final: 10).

Of all these variables, the citizen participation has been symbolic in the discourse and introduction of the new television system, and reduced to consumption (García-Leiva, 2008: 294). However, in this scenario, "the commercial interests are what have led the transition to DTT not only Spain, but in the whole European Union" (Marzal and Casero, 2009: 98).

In the design of its policies, the European Union understands that the citizens are key players in the digital transition of the member States and, therefore, is essential that they have all the information necessary to deal with technological change, a goal that

requires a communication policy focused on the users and their needs (García-Leiva, 2008: 59).

In this sense, the EU also notes, on the one hand, that "…the market forces should be the ones to promote the switch-over process by focusing on users" (COM (2003) 541 final: 14), and that, on the other hand, "…the Government intervention can facilitate the switch-over process in certain circumstances, and contribute to the achievement of objectives of general interest" (COM (2003) 541 final: 28). But the European Commission also makes clear that, because of the complexity of the process, there is no "formula or pattern for the conversion process" (COM (2003) 541 final: 10), and that in many cases the implementation of the transition is conditioned by local circumstances.

Taking into account the three axes of the digital switchover set by the European Commission -the public authorities, the market and users- and bearing in mind the warning that the conversion can be affected by local conditions, insofar as "despite the existence of common obstacles in the reception, their particularities vary from territory to territory" (Suárez-Candel, 2007: 194), this study is based on the hypothesis that the actions of the market and the public authorities as well as the singularities of the scenario in which the switchover occurs condition users' adaptation to DTT.

Thus, this research has three main objectives. The first one is to identify the national, regional and local policies that were created to promote the completion of the digital switchover. The second is to identify the market conditions of television, DTT receivers, and telecommunications infrastructure installation services. The third objective is to describe the real digital switchover process in households. The general purpose is to be able to measure the impact of the public policies and the actions of the market over the behaviour of the user in relation to the digital transition.

The territory under study is the area covered by Ricote's Transition Project, which is one of the two projects that constitute the technical area of the Autonomous Community of the Region of Murcia (hence ACRM). This area, which is part of the first phase of the national analogue switch-off, comprises 18 municipalities located in the north of the autonomous community.

2. Methodology

This study is based on three different methodologies, one for each of the objectives. For the objective about the public policies, it was necessary to review official documents, monitor the news on the actions of the public authorities, and to interview the heads of certain public entities –municipal bodies, Spain's General Directorate of

Telecommunications and Information Society, and Murcia's Ministry of Industry, Tourism and Commerce-.

To achieve the second objective, which is to describe the market conditions of television, DTT receivers, and telecommunications infrastructure installation services, it was necessary to undertake a hemerographic review and to visit the small appliances shops that operate in the area under study. This work was conducted in the second half of April, 2009, two months before the expected date for the analogue switch-off **[2]**, and in order to gather information about the range and characteristics of the types of DTT receivers offered for sale in this area **[3]**.

The sample of establishments visited -20 shops in 7 different municipalities- is not probabilistic but strategic. The sample was selected from the universe of shops registered in the 13 municipalities that have this type of shops (73). The configuration of the sample was based on the following criteria **[4]**: whether it was owned by chain of shops, the size and population of the municipality where the shop was located, and its weight in the administrative structure of the area (Sarabia and Melendreras, 2010).

To fulfil the third goal, the methodological instrument was a survey questionnaire applied to a probabilistic sample. The survey was conducted in the second half of September, 2009 (two months after the analogue switch-off), and was applied to a sample of 625 people in a universe of 178.046 people (men and women, of over 14 years of age, residents of any of the 18 municipalities of Ricote's Transition Zone), which is a statistical margin of error of +/-4%. The sample unit was randomly selected, and only one interview was conducted through telephone **[5]**.

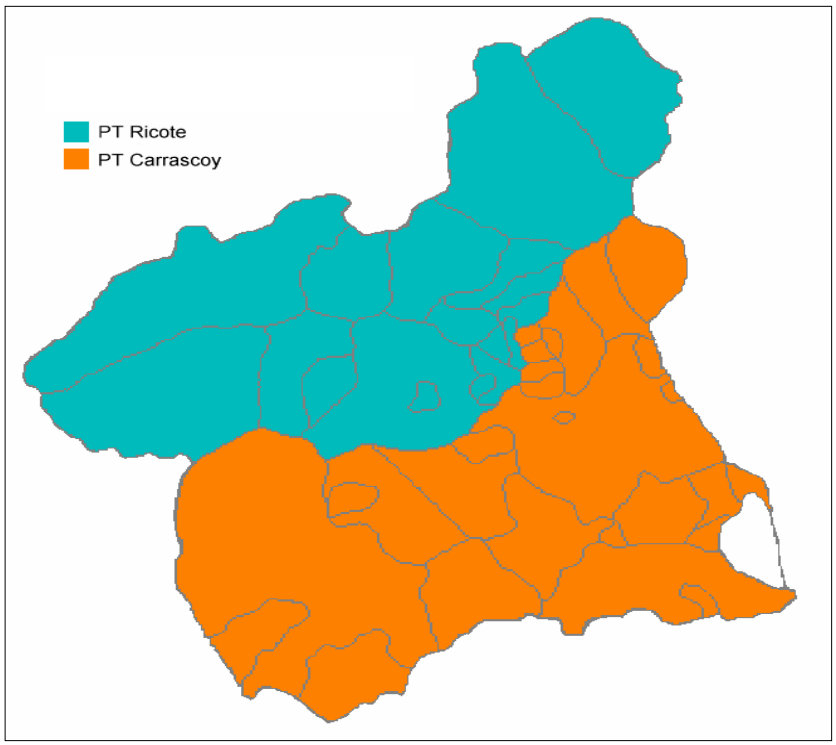
The questionnaire included 42 questions that can be grouped into five main sections: respondents' identification; technological equipment at home; citizens without DTT; process of adaptation to DTT among those who already have it; and perceptions about the benefits of DTT.

3. First phase of the analogue to digital TV switchover project in Spain

For the purposes of the digital switchover plan, the region Murcia, which is the territory under study in this research, is constituted on a single technical area: Carrascoy. This area was, in turn, divided into two units of radio-electric coverage. One of them is "Ricote's Transition Project", which covers 18 municipalities, and is included in the first national phase of the analogue switch-off. The other unit is "Carrascoy Transition Project", which includes the 27 remaining populations, and is part of the third phase of the analogue switch-off. The date of this final stage was initially scheduled for 3 April, but was then brought forward to 23 March **[6]**.

Research | DOI: 10.4185/RLCS-067-948-068-098 | ISSN 1138-5820 |31 pages

Figure 1: DTT Transition Projects in the region of Murcia



Source: Digital Transition Plan of the ACRM (2008-2010)

The 18 municipalities covered by Ricote's Transition Project are located in the North of the Region. In most cases they are located in rural areas far from the capital **[7]**. Although four of these municipalities have more than 25,000 inhabitants **[8]**, various municipalities barely reach 5,000 residents and some have less than 1,000 **[9]**. So, the population of the region of Murcia affected by this first phase of the national analogue switch-off is relatively low: only 15.4% of all the inhabitants of the community (214,128).

The interest on the digital transition in this area of the Region of Murcia lies on the fact that this is the first experience towards the definitive digital transition in this community and mainly on the uniqueness of this territory.

This area is of especial interest in the configuration of the television market and the consumption habits of this medium, since it has a strong presence of cable television that undoubtedly has affected the way in which citizens have faced the technological change in their homes. On the other hand, because it this region has many small and rural populations, the access to the receivers, the adaptation of telecommunication infrastructure, and the public information and subsidies are also conditioned.

4. Public policies in support of the household digital conversion

Due to the importance of the implementation of DTT as a technological change, the intervention of the public authorities in different areas is essential in the digital switchover process in households. This section presents the most significant actions undertaken by the public authorities in relation to Ricote's Transition Project.

4.1. Digital Transition Plan of the Autonomous Community of the Region of Murcia

In July 2008 the Autonomous Community of the Region of Murcia presented the *Plan de Encendido Digital 2008-2010* (Digital Switch-on Plan for 2008-2010), which aimed to establish the mechanisms to "…guarantee a coordinated and ordered digital transition" (*Plan de Encendido Digital*, 2008: 5) and ultimately achieve the digital transition in all the households of the region.

The plan is organised around different issues. One of them is related to the deployment of infrastructure and focuses on specific actions such as the creation of a system of information and consultation on DTT coverage, the installation of new centres for the distribution of DTT signals, and the extension of telecommunications lines with return channel to facilitate citizens' access to DTT's interactive services.

The "support to citizens" is another subject on which the plan is based. In addition to the measures aimed at the DTT adaptation in households, the plan includes the implementation of a series of campaigns to inform the population about the arrival of the new technology. The plan also involves the creation of an Observatory of DTT for the region, and the signing of agreements with the different agents involved in the process of DTT implementation, as well as collaborations with the municipalities of the region.

The initiatives designed for the dissemination of information about DTT among citizens include: the dissemination of information and awareness campaigns about the transition to DTT on the media, like the regional public television network **[10]** and the regional and local private DTT channels **[11]**; the implementation of an information telephone number for citizens; and the creation of a website **[12]** offering a range of services (information on DTT coverage, the DTT adaptation at home, and the level of DTT implementation in the region, among others).

Despite the informational efforts, the regional level experienced the same deficiencies identified in the national information campaigns which did not contemplate "policies to promote interactivity in DTT, and did not promote the MHP standard, based on the principle of 'no interference' which tries to avoid benefiting a technology to the detriment of others and thus influencing the free market" (Franquet and Ribes, 2010).

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Between December 2008 and April 2009 the subventions for the implementation of the 2008-2010 Digital Switchover Plan designed by the Autonomous Community were delivered. All the municipalities included in Ricote's Digital Switchover Plan received the financial aids from Spain's Council of Economy and Finance, through the Department for Telecommunications and Information Society. These subventions were aimed at "the expansion of DTT signals in the region; the adaptation of centres for the reception of these signals, and the promotion of knowledge about the DTT transition and technology among citizens" (Decree n° 524/2008).

The subsidies granted to the municipalities of Ricote's transition area, which ranged from 15,000 to 175,000 euros depending on the needs of each town, amounted nearly 1.1 million euros. With the help of these funds, the corporations had to execute the relevant actions directed at the expansion of the DTT signal in their territories, the provision of DTT equipment, and the information campaigns.

All municipalities in Ricote's transition area developed information campaigns on DTT. Most of them organised group talks, distributed posters, handed-in leaflets, and placed advertising on different media, among other activities. In certain municipalities **[13]** part of the subvention, which ranges between 1,000 and 5,000 euros, was used to provide a free diagnostic service for DTT reception in households, which in some cases included giving basic training to residents on the operation of DTT receivers (tuning and organisation of DTT channels).

Another action which all municipalities agreed to undertake was the acquisition of equipment for DTT broadcasting, whose cost has not exceeded 5,000 euros -with the exception of Cieza, which used 105,000 euros of the funding-.
However, only half of all the municipalities needed to install DTT broadcasting and repeating centres, while the rest did not **[14]**. In certain municipalities **[15]** the expansion of the signal totalled 45,000 euros, in others **[16]** it ascended to 90,000 euros, and in another with a more complex orography **[17]** the cost reached 180,000 euros, of the subvention received by the City Council for the expansion of DTT coverage.

4.2 Subventions granted by Spain's Ministry of Industry, Tourism and Commerce to guarantee people's access to DTT receivers

Few days before the analogue switch-off in Ricote's transition zone, the Ministry of Industry, Tourism and Commerce, through the Department for Telecommunications and Information Society (SETSI), launched the Plan to support groups in risk of exclusion from the transition to DTT. This plan, which is aimed at those affected by the first phase of the DTT Switchover Plan (18 municipalities of Ricote's transition plan), focuses on the assignment of DTT receivers for 4 years to people meeting the following requirements:

- Having a medically-recognised visual or hearing disability that is total, or equal to, or greater than 33%.
- Being over 65 years of age and having a medically-recognised dependency of second or third grade.
- Being over 80 years of age and living alone or with another person over 80 years of age.

In late July, 2009, a month after the analogue blackout, 481 people from the municipalities included in Ricote's transition zone had already been benefited by this scheme. In most cases, the applications to get a DTT decoder were sent to the Ministry of Industry, Tourism and Commerce and processed by the City Councils' social services departments or the town's local development agent.

The municipalities of Ricote's transition zone that had received the largest number of decoders by 31 July, 2009, were Caravaca de la Cruz, Yecla, Mula, Calasparra and Abarán. In such cases, the distribution of decoders has responded, perhaps, less to the citizens' needs than to the municipal bodies' ability to advertise the existence of this aid and process the applications.

5. Role of the market in the digital switchover process in households

The DTT transition in a household, which his understood as another form to access television, along with cable, satellite or DSL technologies, is a decision that the user must take and that may be affected by the weight of the TV content market available to the consumer. Likewise, the DTT adaptation in households may also be conditioned by the market of DTT receivers (which are essential in the digital conversion) and telecommunications infrastructure installation services (which is necessary in many households). Thus, this section analyses the offer of each of these markets in order to understand the extent to what they may impact the DTT transition in households.

5.1. The television market

The presence of cable television networks in most of the 18 municipalities that are part of Ricote's transition project is a distinctive feature of this area. 12 of these towns, which are different in size and population (ranging from 3,864, like in Pliego, to 34.898, like in Cieza), have one or even two cable television service providers **[18]**. In the mid-1980s the problematic terrain and the initiative of entrepreneurs to avoid technical problems in the dissemination of the television signal via Hertzian waves led to the development of a business model of local cable TV, which not only prevails but also has experienced a significant growth.

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The liberalisation of telecommunications and cable television (laws 11/1998 and 32/2003), as well as the incorporation of new technologies –the digitisation of the infrastructure- have enabled these local operators **[19]** to consolidate their businesses and to improve their networks and expand their services. By the late 1990s their offer was limited to one local channel and a package of national and foreign television channels, while in the past five years the cable television service has not only increased its range of channels but has incorporated telephone land lines and Internet access (Sarabia, 2004).

ONO, which was granted a cable telecommunications license in 1998 in the Region of Murcia, only operates in two of the towns that are part of Ricote's transition zone **[20]**. The multinational company has extended its infrastructure in the most populated municipalities of the area, but despite its expansion and range of services it has failed to strongly penetrate the pay TV sector in this territory, which has been dominated for more than two decades by the historical local networks.

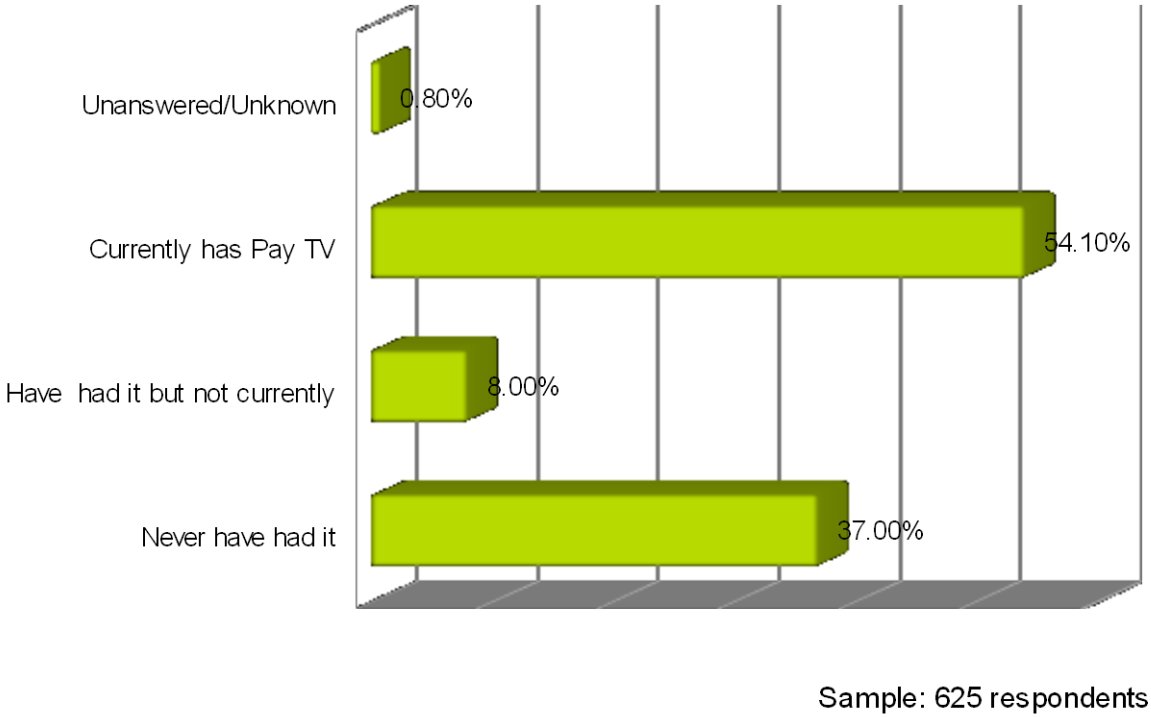
5.2. Consumption of pay TV

The consumption of pay television in the Region of Murcia is deeply rooted. The penetration of this type of television has undergone a singular evolution over the past four years (Sánchez et al., 2011). In 2006, 34.4% of households were subscribed to this service. In 2007 pay television reached 36% of the households, and a year later it reached 42.8% of them. The trend reversed slightly in the region, and in 2009 the number of households equipped with pay TV decreased to 40.1%.

These figures about the presence of pay television in the municipalities of Ricorte's transition area are very revealing (Sarabia et al., 2009). In June 2008, 53.3% of the households in the area, which is more than half of the families in this territory, were subscribed to some type of pay TV service. Of these subscribers, 74.9% were clients of the local cable television operator, 9.2% of ONO, 13.5% of *Digital +*, and 2.4% of *Imagenio*.

A year later, in June 2009, the trend is the same. 54.1% of households were subscribed to pay television. It should also be noted that in 8.2% of the contacted households, the users had terminated their subscriptions. So the fact that the overall number of subscribers is the same as in 2008 means that in the past year about 8% of families subscribed to pay television.

Figure 2: Users of pay television in Ricote's transition area



Source: authors' own creation

Of the 54.1% people subscribed to any pay TV service provider in Ricote's transition area, 72.5% is subscribed to the local cable television service, 12.7% to ONO, 10.3% to the satellite service of *Digital channel +*, and 4.5% to ADSL, *Imagenio* (Sarabia et al., 2011).

5.3. The market of DTT receivers

The small appliances shop is the most common place where citizens go to purchase audiovisual equipment. In this scenario of digital transition it is also common to find DTT receivers in stores dedicated to the sale of other types of products -DIY, computers, electronic components, etc.-. In addition, buying a DTT receiver is also possible through e-commerce, and even through the marketing and loyalty strategies of banks and newspapers.

Despite the fact that, as it has been pointed out, the consumer can buy a DTT receiver through multiple forms, the description of the market of DTT receivers in the municipalities of Ricote's transition project is based on the offer of the small appliances shops of the area.

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It is important to note that 18 shops were examined for this study and that while there are two municipalities **[21]** with over 10 small appliances shops, in 5 municipalities none of these shops operate. The population of these municipalities **[22]** ranges from 626 to 6,119. Part of these citizens prefer to buy the DTT receivers in alternative shops (hardware stores, grocery shops, bazaars, "one-dollar shops", etc.), where this type of receiver is distributed sometimes, while others prefer to buy them in shops located in the closest city (e.g. capitals cities). In addition, in this territory the DTT installers and even the local cable television operators usually also sell this type of equipment.

As explained in the methodology section, in order to evaluate the offer of DTT receivers in the municipalities of Ricote's transition area, a total of 20 shops were visited. In these businesses we collected information on the variety of DTT tuners offered to consumers (number, brands, models and price) and interviewed the vendors.

Depending on the location of the tuner, there are two types of DTT receivers on the market: receivers built inside the TV set and external receivers, which are adapted to the analogue/digital TV. The latter type presents three different configurations: the basic receiver, which gives the user access to TV channels, radio and certain services; the combo receiver, which combines the basic receiver with other equipment such as DVD reader/recorder and hard disk; and the interactive one, which includes the option of accessing interactive services developed in MHP (multimedia home platform).

Given that in all the visited shops there was a large number of television sets with built-in DTT tuners (different models, sizes and brands), the study focused on analysing the market for external receivers. In the 20 visited shops there were 88 types of tuners for sale, of which 85 (96.6%) are basic tuners, only 3 (3.4%) **[23]** are combo, and none is interactive.

The prices of basic external receivers in the shops of Ricote's transition zone range from €24.90 to €99.00. Regarding the brands, there were 31 different manufacturers **[24]** of basic tuners. The most representative brands in this market are, in order of importance: LG, Sony and Samsung.

With regards to the diversity of models, it is limited in the municipalities under study, although most small appliances shops (15 of 20) offer customers between 2 and 5 different models of basic equipment. Only 4 shops offered between 6 and 10 different DTT receivers.

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As already mentioned, only 3 of the 20 shops offered combo DTT receivers. One of the distributed models is the Nevir 2309, which includes DVD reader and whose price is around €55. Another model is the Aris BDL AU086, which combines DTT and satellite television reception and whose price is € 129.

Finally, and in light of the responses obtained from the shops' vendors, it should be noted that they have become authentic agents of the digital transition.
The seller is not only the penultimate link in the introduction of DTT in households (only behind the consumer), but has also become an advisor for users. The seller provides information to citizens about the DTT receivers, the TV content, the analogue switch-off date, issues related to infrastructure, and the need to modify the antenna, among other things. The DTT receiver retailer is a figure which necessarily citizens have to contact because the decoder is the essential element in the household adaptation.

5.4. The market for telecommunications infrastructure installation services

The adaptation of household telecommunications infrastructure to be able to receive a DTT signal is essential in at least two situations: in households within buildings constructed before 1998; and in households with damaged installations. This explains the importance of the role played by the telecommunications systems installers in the digital switchover process (Caballero, 2007: 87).

There are in total 68 telecommunications infrastructure installation companies registered in the municipalities of Ricote's transition zone, but there are zero telecommunications installation companies registered in 6 of the 18 municipalities **[25]**. All companies are approved by the Ministry of Industry, Tourism, and Commerce and are listed in the DTT information website of the Autonomous Community. Of these companies, only 10, or 14.7%, are affiliated to the Community's Consumption Arbitration Board, which gives all the guarantees of quality necessary for contracting telecommunications infrastructure adaptation services.

A large number of the households tend to be detached houses due to the characteristics of the area, which is integrated by rural municipalities located in complex terrain areas, whose population density is relatively low. The poll conducted in September 2009 found that slightly more than half of the population (51.8%) lives in ground floor houses, which suggests that the number of interventions in the houses' telecommunications infrastructure may be relatively low, unless the wiring of the houses is deteriorated.

The prices cannot be specified since they vary substantially depending on the type of household modification required (antenna installation, renovation of wiring, reconfiguration, etc.) and the number of households in buildings, but they range from € 100 to € 700.

6. Study of DTT migration in households belonging to Ricote's transition area

As previously discussed, in the 18 municipalities of Ricote's transition project, the digital switchover occurred in June 2009. This section examines five aspects of the DTT migration process experienced by the households of this area.

The first aspect is the DTT technological equipping in the households. The second aspect is the percentage of households equipped with this technology. The third aspect is the DTT adaptation in households, which includes the study of access to information on DTT, the modification of telecommunications infrastructure, the technical equipment of DTT, and the relations between users and the new technology. The fourth aspect is the causes why some households in the transition zone have not started the digital transition. And finally, the fifth aspect is the variety of television users in the area under study.

6.1. DTT technological equipping in households

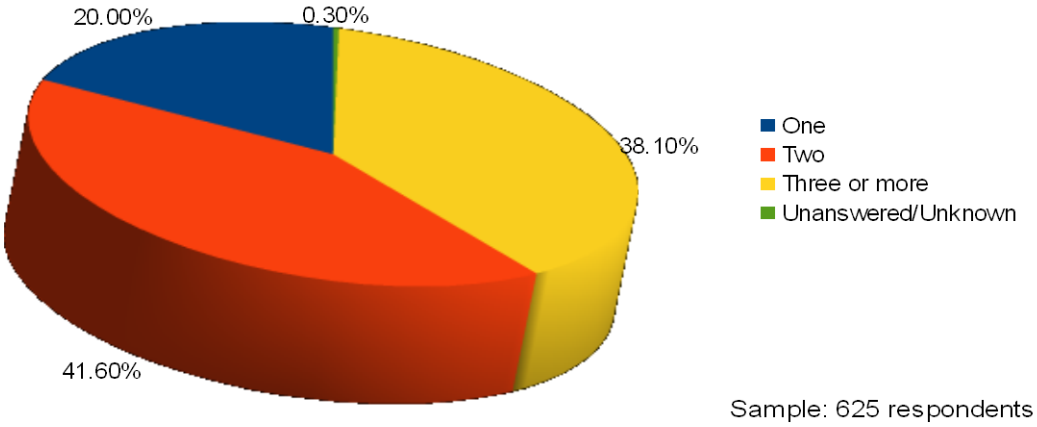


Figure 3: Number of televisions at home

In the analysed sample from Ricote's transition project, the allocation of DTT receivers is very high. About 80% of citizens with DTT reception at home stated that they had more than one television at home. The household technological equipping in the municipalities of Ricote's transition area is completed with the type of television screen. Almost 4 in 10 citizens (38.6%) had a plasma or LCD flat screen television at

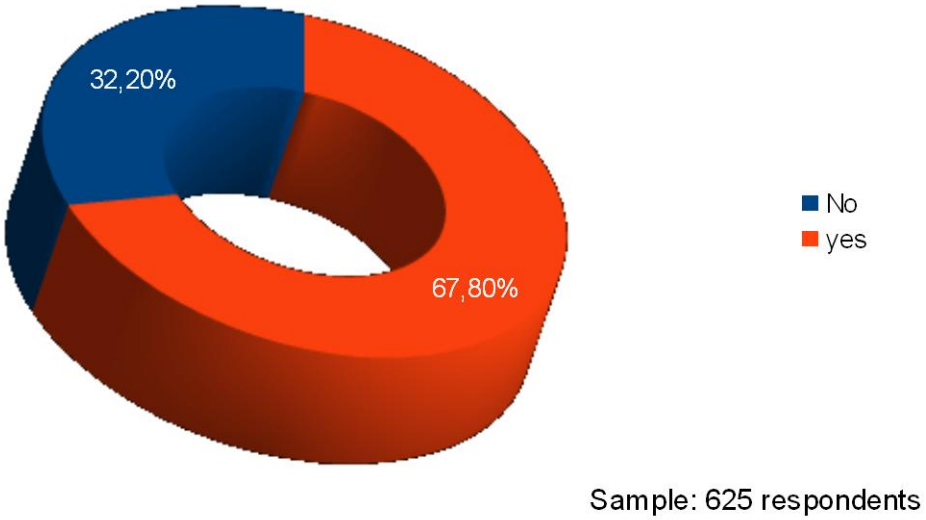
Research | DOI: 10.4185/RLCS-067-948-068-098 | ISSN 1138-5820 |31 pages

home. Of this group, 17% said they also had HD ready television sets. 1.9% stated they owned a TV with built-in HD 1080p technology. And the remaining 19.7% admitted they had HD ready flat screen TV, but did not know of what kind.

6.2. Households that migrated to DTT

By June 2009, when the first phase of the analogue switch-off had been completed in Spain, 67.8% of all households belonging to Ricote's transition project had migrated to DTT. This figure indicates that two months after the analogue blackout, nearly one third (32.2%) of the population did not migrate to DTT.

Figure 4: DTT-equipped households



Source: authors' own creation

6.3. Household adaptation to DTT

The migration to DTT involves a series of key changes which range from the modification of the telecommunications infrastructure -for homes built before 1998 **[26]**- to the technical adjustment of the DTT receiver. This section revolves around the households equipped with DTT in Ricote's transition zone, and analyses the digital migration and user's attitudes towards the new technology.

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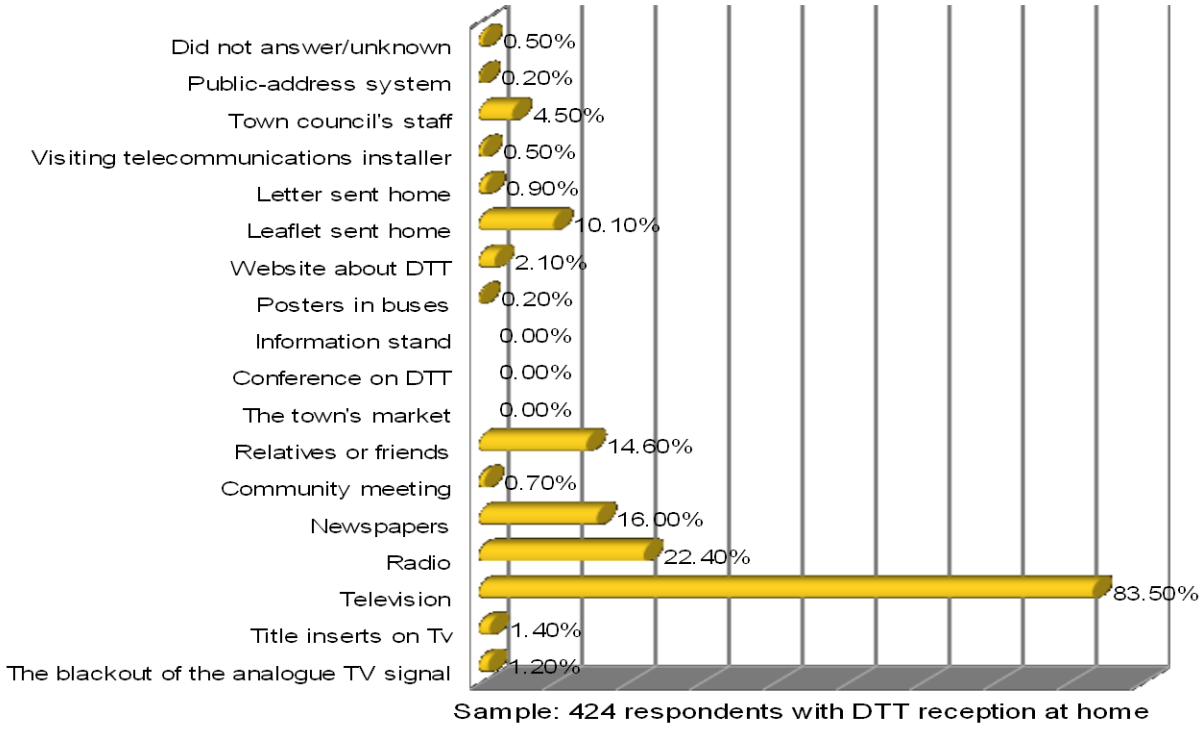
6.3.1. Access to information on DTT

The first aspect that must be rated from the digital transition is the degree of information that the user has about the technology. In this case, it is necessary to determine whether the DTT ready citizens of Ricote's transition project knew the date of the analogue switch-off before it took place in June 2009, since this fact affects the success of the migration.

The majority of DTT-equipped citizens of Ricote's transition project had sufficient information about the digital migration process. For 83.7% of the population in this area, the information about how to switch to DTT reached them without having to search for it. In the same way, a high percentage of respondents -61.8%- knew the date of the analogue blackout more than 6 months before it took place.

As the following figure shows, despite television has been the main provider of information on DTT for the citizens of Ricote's transition area (more than 8 out of 10 said so), there are other sources of information.

Figure 5: Sources of information on DTT



Source: authors' own creation

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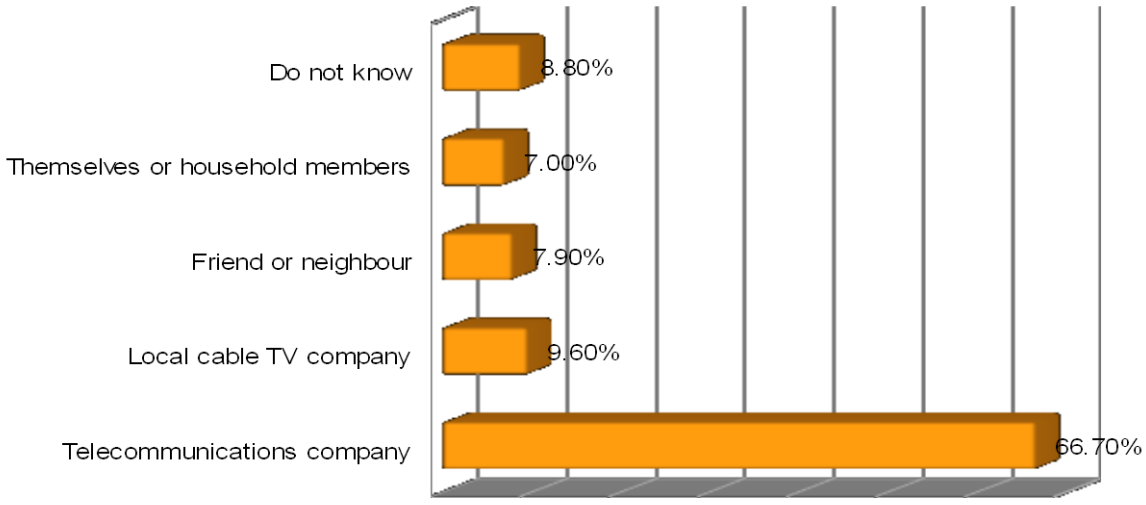
6.3.2. Modification of telecommunications infrastructure in households

In the area of Ricote's transition project almost 7 in 10 citizens (67.8%) did not have to adapt their house's antenna to access DTT. There are two different reasons for this: because they live in a single-family house, or because their building was built before 1998. Therefore, the inhabitants who were in any of these two situations were exempt from adapting their homes' telecommunications infrastructure in order to receive DTT.

However, a significant number of people (26.9%) had to modify the traditional telecommunications infrastructure of their home to gain access to DTT. Of these people, 3 of every 10 were aware of the antenna problem when they installed the decoder at home and it did not work. The adaptation of the TV antenna was entrusted by most citizens (66.7%) to a telecommunications company. A very small number of inhabitants of Ricote's area, 9.6%, resorted to their local cable television company. However, nearly 8 out of 10 citizens asked for help to their neighbour or friend. And 7% of the inhabitants of Ricote performed the adaptation by themselves or with the help of a member of their household. Although the cost of the installation has been varied in these municipalities, it can be concluded that 2 out of 10 people have paid more than 100 euros in the adaptation of the antenna.

Figure 6: Who modified the household's antenna?



Sample: 114 respondents who had to adapt their Tv antenna

Source: authors' own creation

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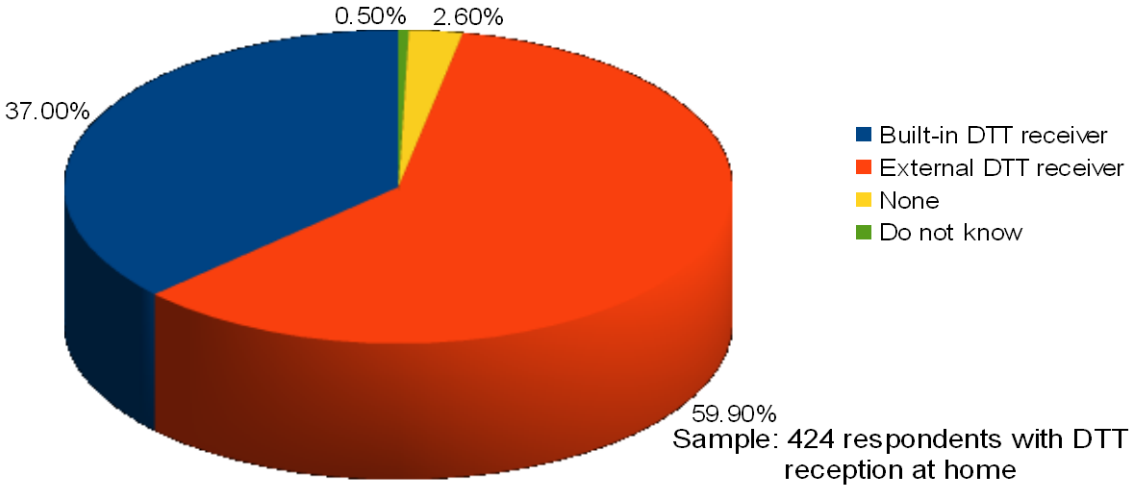
6.3.3. Types of DTT receivers

By January 2009, six months before the analogue blackout took place in Ricote's transition area, almost half of the households that already had DTT were prepared to face the digital switchover. In order to complete the DTT adaptation process, in addition to the modification of the antenna in certain households, citizens had to install an external decoder or buy a TV with built-in decoder. The head of the family has been the primary agent in charge of introducing the technological change at home. In 76.4% of households, parents have been responsible for buying the decoder. For more than 3 of every 10 families, the decoder, which has been installed in the house' living room, cost less than € 50.

Almost 6 of every 10 decoders (59.9%) installed in the households belonging to Ricote's transition project are external devices that are adapted to the television set. The rest of the receivers (37%) are integrated in the TV sets. Although the DTT receiver is preferably located in the household's main TV (almost 6 out of 10 citizens stated so), 1 of every 4 people in the area of Ricote has enabled 3 or more TV sets in their home with DTT decoders.

Figure 7: Type of DTT receiver



Source: authors' own creation

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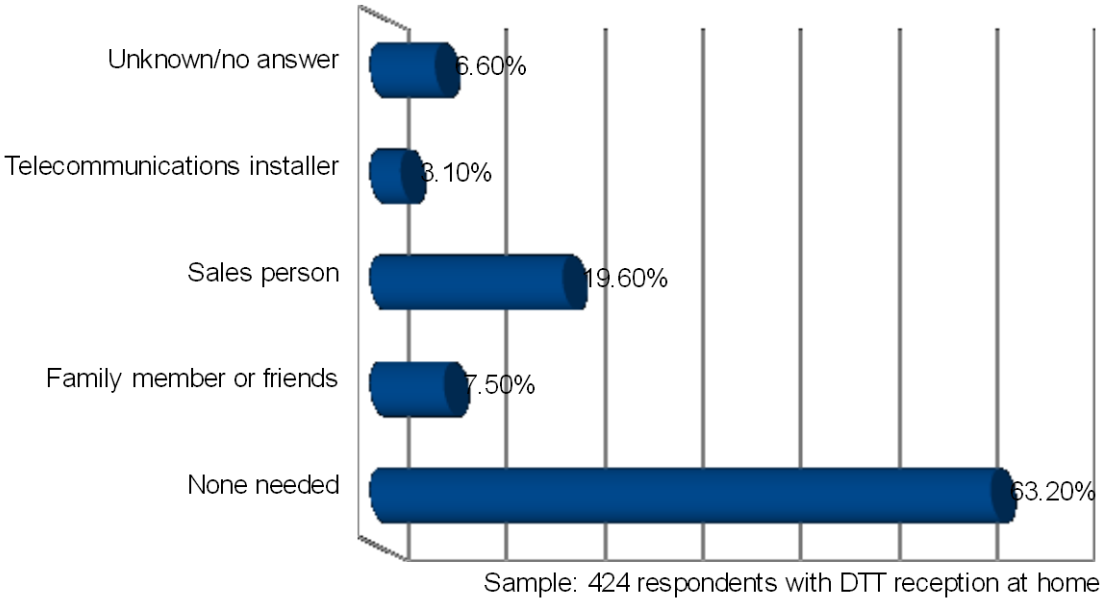
As discussed in section 5.3, the market of DTT receivers is varied in terms of brands, models and prices. In many cases, in order to determine the type of decoder that best suits their needs, users can ask for the advice of friends, family, sellers, or telecommunications installers. In this sense, however, 6 of every 10 DTT-ready people from Ricote's transition project did not asked for help when buying a decoder. Of the people who needed advice on the various types of decoders 7.5% obtained it from friends, 19.6% from the sellers, and 3.1% from the telecommunications installers.

As it was addressed in the section about public policies in support of the digital switchover, the intervention of the public authorities is crucial to successfully complete the transition to DTT. In this sense, the population of Ricote could apply for the aid provided by the local councils, the autonomous community and various associations. None of the DTT ready citizens of Ricote's transition area knew about this aid or how to request it.

Figure 8: Sources of advice on DTT receivers



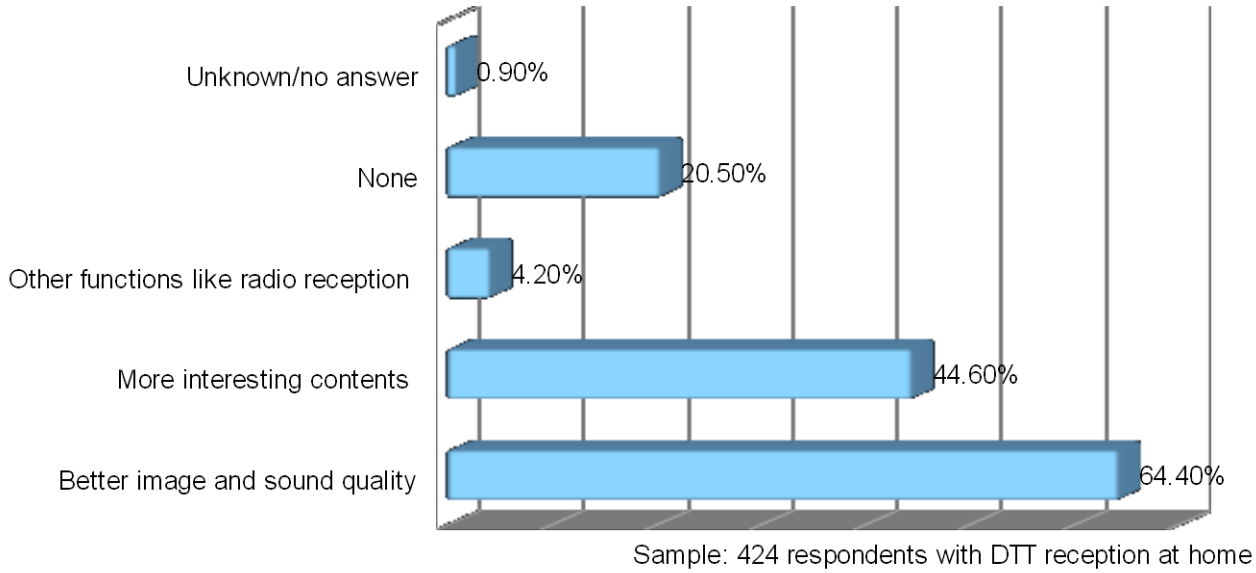
Source: authors' own creation

6.3.4. Users' perceptions of DTT

Users' evaluation of a technology is decisive for its effective introduction in society. Therefore, it is important to know the opinions of the DTT viewer about its benefits and uses, in comparison to analogue television.

The transition from analogue to digital terrestrial television involves improvements in various aspects of television such as a larger number of channels, higher quality of image and sound, the possibility of interaction through the TV set, etc. In general, the DTT-ready population of Ricote's transition zone have been able to appreciate the benefits of DTT in comparison to the analogue broadcasting system. Image and sound quality has been an important feature for 64.4% of the population of the 18 municipalities of Ricote. Meanwhile, the new content offer has satisfied 4.6% of the population under study. And for 4.2% of the citizens the main benefit has been the access to other extra services that add value to DTT like radio reception and interactive content.

Figure 9: The benefits of DTT



Source: authors' own creation

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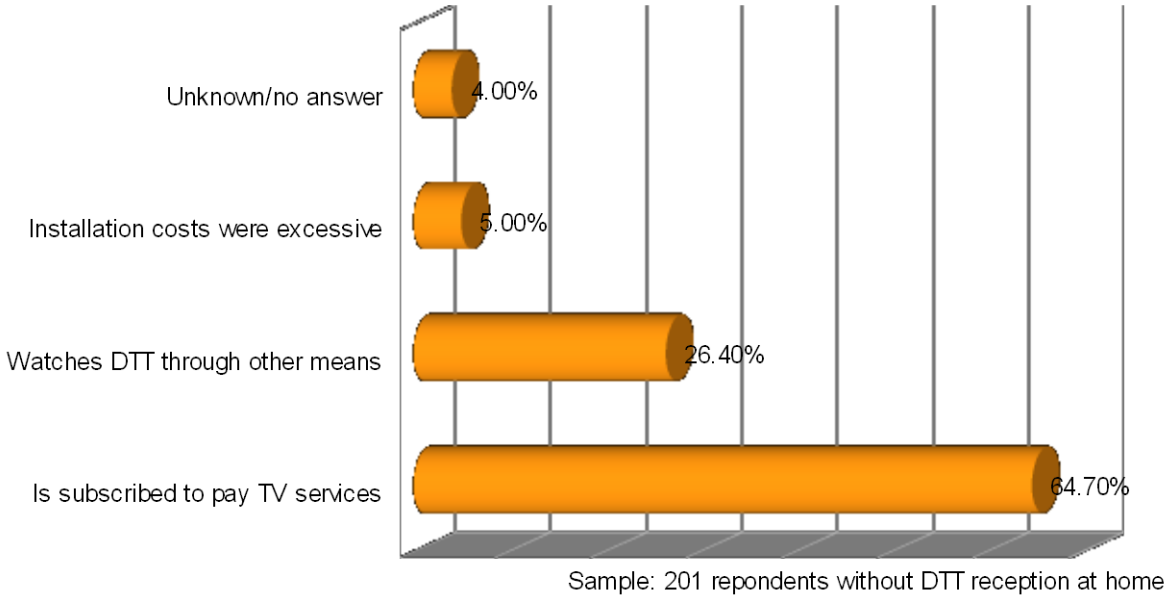
The DTT ready population of Ricote's transition area considered that the management of DTT is not complicated. 8 out of 10 people equated the use of DTT technology with the analogue television system. The remote control of DTT has been mainly used to change the channel (96.5%), but has also been used in order to find out information about programming (42.2%), and to listen to the radio (15.3%).

6.4. The pending transition

This section analyses the reasons why more than 3 of every 10 people in Ricote's transition area still have not migrated to DTT, and the predisposition of this sector of the population towards the technological change, i.e., their willingness to install DTT at their home in the near future.

The reasons why 32.2% of the population of Ricote's transition area have not migrated to DTT are diverse. 64.7% of this group has chosen to subscribe to pay television. 26.4% has obtained access to DTT through other means and has not felt the need to migrate to digital technology. And 5% decided not to install DTT because the cost of the installation was excessive. Ultimately, the operators of cable, satellite (*Digital Plus*), DSL (*Imagenio*) and Internet provided alternative DTT access to the people from Ricote's transition area who do not have DTT at home.

Figure 10: Reasons for the no adaptation to DTT



Source: authors' own creation

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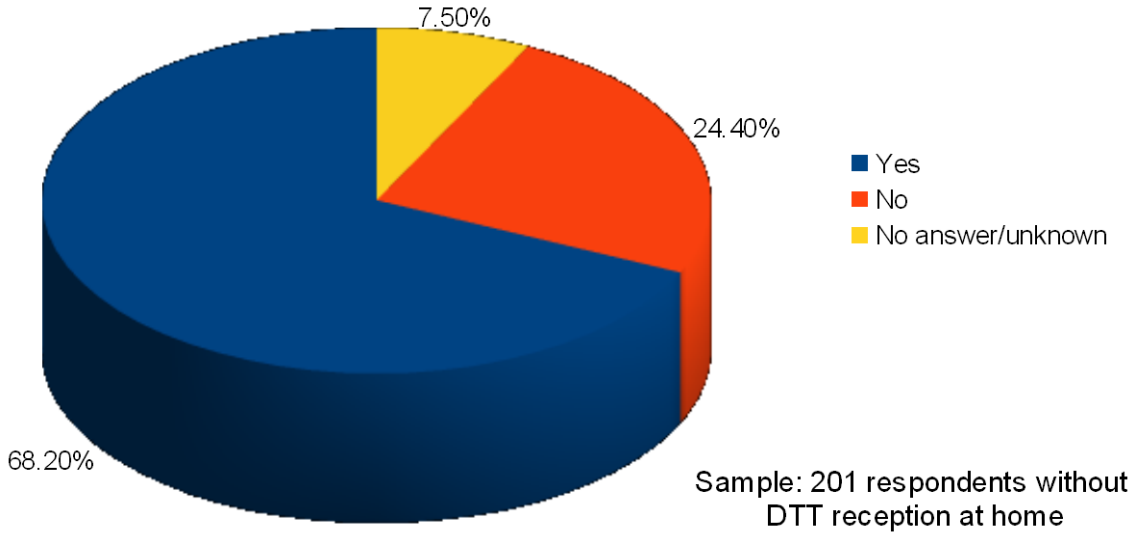
The population of Ricote's transition zone without DTT reception at home do not plan to migrate to this technology in the short term, because they have alternative DTT access available. Only 8.5% admitted they plan to adapt their home to access DTT in a short period of time.

Interestingly, most of the population of Ricote without DTT at home and without the plan to adopt it, does believe they have enough information to carry out technological adaptation at home. In fact, 68.2% of citizens in this situation feel well informed.

Figure 11: Information on DTT among respondents without DTT reception at home



Source: authors' own creation

6.5. Variety of television users in Ricote's transition area

There are four different situations of television access in Ricote's transition area:

1. People who, for the first time, enjoy a multichannel television offer via DTT. 34% of the population from Ricote's transition area are in this situation.

2. People who have both DTT and pay TV. 25.6% of the population from Ricote's transition area enjoy a double multichannel offer.
3. People who only have pay TV. 28.5% of the population from Ricote's transition area has opted for this modality of television
4. The rest of the people accesses TV through other ways.

7. Conclusions

The intervention of public authorities in a territory's digital transition is essential. In addition, it is necessary for the authorities to coordinate their actions in order to facilitate citizens' migration to DTT.

In the implementation of the analogue blackout in Ricote's transition project the involvement of the public authorities occurred in different levels -national, regional and local- and in different areas -coverage, deployment of infrastructure, analogue blackout awareness, provision of public subsidies for access to DTT receivers.

Of the actions carried out by the various public authorities, the only ones that can produce a visible result are those related to public awareness. The national, regional and even local awareness campaigns have been effective, according to the data on the level of information of people with and without DTT at home. In this process, the media, and particularly television, have become the main sources of information on DTT. Other sources are individuals' environment and, in third place, the informative leaflet. The population of Ricote's transition area considers that the information on DTT came to them and they did not have to look for it. Even those who do not have DTT stated they have the necessary knowledge about this new form of television.

As for the rest of the policies, it should be noted that the public aids available for household adaptation has been scarce and have not been noticed by the residents of the area. None of them knows what aids they can get or where to get them. Regarding the coverage and infrastructure deployment, although citizens are benefiting from them, they may not appreciate these actions as they do not know how these actions affect them.

The DTT configuration in a given territory is conditioned by the market of television, DTT decoders and telecommunication installation services. This is the case in the Region of Murcia. The strong presence of the local television channels in Ricote's transition zone has created a variety of TV users, among which three types can be identified: the new DTT users, which for the first time have access to the multi-channel television model; those who renounced to the DTT multichannel offer because they already had the pay TV service and did not feel the need to adapt their

homes to receive DTT; and those who have access to a double multi-channel television offer: DTT and pay television.

The significant penetration of local cable television has led one of every four households to not migrate to DTT and, therefore, has led an important share of the population to self-exclusion from DTT technology. However, the conditions of those households that have not migrated to DTT have been favourable to the transition for two reasons: the high number of audiovisual equipment at home (more than two TV sets by household and important presence of flat TV displays); and the fact that, because it is in a rural area, most households are detached and do not required the adaptation of the antenna to receive DTT signals.

The market of DTT receivers is limited in Ricote's transition area because not all municipalities have small appliances shops and because the variety of receivers in these shops is scarce.

Although all shops sell TVs with built-in DTT receivers and basic external decoders, very few shops offer receivers with other functions such as DVD, hard drive and satellite reception, and none of these shops distribute interactive equipment. The characteristics of the DTT equipment market are slightly reflected on the households of Ricote's transition area, insofar as the basic decoder is the most common type in both households and small appliances shops.

In light of the results of the study, and based on the analysis of Ricote's DTT transition process, it can be concluded that in the case under study the transition to DTT is partly a consequence of the policies implemented in that territory. However, we should not overlook the fact that the weight of the pay television market has become a brake for the definitive household conversion and turned it into an open process.

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Communication from the Commission to the Council, the European Parliament, the European economic and social Committee, and the Committee of the Regions on the transition from analogue to digital broadcasting. COM (2003) 541 final (17.09.2003)

Communication from the Commission to the Council, the European Parliament, the European economic and social Committee, and the Committee of the regions on the acceleration of the transition from analogue to digital broadcasting, COM (2005) 204 final (24.05.2005)

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General Law of Telecommunications, Law 11/1998 of 24 April, [BOE n° 99, 25 April, 1998]

General Law of Telecommunications, Law 32/2003 of 3 November, [BOE n° 264, 4 November, 2003]

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Parliament's resolution calling for a Plan of action to introduce successfully digital television in Europe. Answer to the question B5-0254/2002 (16.09.2002)

European Parliament's resolution on the switchover to digital broadcasting. Answer to the question B6-033/2005 (6.10.2005)

Royal Decree 2169/1998, of 9 October, which approved the National Technical Plan for Digital Terrestrial Television. [BOE nº 248, of 16 October 1998]

Royal Decree 944/2005 of 29 July, which approved the National Technical Plan for Digital Terrestrial Television. [BOE nº 181, of 30 July 2005]

10. Notes

[1] The "eEurope 2005: An information society for all" is the result of the renewal of the previous Plan, which was created by the European Council in Lisbon in 2000 with the aim of turning Europe into an economy based on knowledge (Suárez Candel, R 2009: 262).

[2] Visits were carried out during the second half of April, 2009.

[3] In each of the visits to the shops we registered the available brands and models of receivers at that time. In order to systematise the information we developed a form that the investigator had to complete within the shop. In addition to the data

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collection, we interviewed the vendors of the visited shops in order to evaluate their knowledge about interactivity.

[4] Calasparra: *Establecimientos Manezuelas, S.L*; *Electrodomésticos Puerta Durán* (*Tien 21*); *Comercial Martínez. Caravaca de la Cruz: Feyisan* (Expert), *Videocaravaca*, *Electrodomésticos Caravaca*. *Cehegín: Tien 21*; *Electrónica Rodrigo*; *Electrodomésticos Ciudad. Cieza: Bazar Melilla* (*Tien 21*); *Iluminación Moreno*; *Caiguelas* (Expert). Jumilla: *Electrodomésticos Martínez Canals, S.L*; *José Gómez Antolí*; *Moda Hogar Martínez. Mula: Apaelectropio* (Cealsa); *Electrónica y regalos reyes* (activa). Yecla: *Pascual Vicente Expert*; *Javier Electro Hogar*; *Electrodomésticos E.D.O.*

[5] The interviews and the encoding of the data were conducted by the Institute of Marketing and Studies (IMAES). This work has been funded by the General Directorate for Telecommunications and Information Society of the ACRM.

[6] On 16 February, 2010, the government delegate Rafael Gonzalez Tovar announced in a press conference that the analogue blackout was brought forward to 23 March (and not 3 April as planned) in the 27 municipalities that are part of Carrrascoy's Transition Project. www.eleconomista.es. (consulted on 18 February, 2010).

[7] Altiplano, Vega Alta del Segura, Noroeste, Río Mula and Valle de Ricote.

[8] Cieza, Yecla, Caravaca de la Cruz and Jumilla.

[9] *Ojós* and *Ulea* have under 1,000 citizens

[10] The subvention given to the regional television of Murcia, S.A. to make the population aware about the transition to DTT (100.00 EUR) was regulated by the Decree n° 624/2008, of 29 December [BORM n° 16, 12/21/2009]

[11] The subventions given to the regional and local DTT concessionaries (330,000 euros), were regulated by the Decree No. 570/2008 [BORM n°2, 3/12/2009]

[12] The website activated in November 2008 is www.tdtrm.es

[13] Albudeite, Ulea, Villanueva del Segura, Ricote, Campos del Río, Ojós, Pliego, Blanca and Cieza

[14] Albudeite, Blanca, Calasparra, Campos del Río, Mula, Ojós, Ricote, Ulea nor Villanueva del Segura

Research | DOI: 10.4185/RLCS-067-948-068-098 | ISSN 1138-5820 |31 pages

[15] Abarán, Bullas, Cehegín, Cieza, Jumilla and Pliego

[16] Yecla and Caravaca de la Cruz

[17] Moratalla

[18] Municipalities with cable television providers and their population: Abarán (12,968), Blanca (6,119), Bullas (12,020), Calasparra (10,282), Caravaca de la Cruz (25,688), Cehegín (15,798), Cieza (34,898), Jumilla (24,596), Moratalla (8,379), Mula (16,570), Pliego (3,864), Yecla (34,161).

[19] The historical operators of cable television are organised into an association called AOTEC.

[20] ONO operates in Cieza and Yecla, which are the administrative centres of Vega Alta and Altiplano, respectively, and whose population is over 30,000.

[21] Caravaca and Calasparra

[22] Blanca, Ojós, Ricote, Ulea and Villanueva del Segura.

[23] These three DTT receivers have been located in the three major towns of the area: Caravaca, Jumilla and Yecla.

[24] Airis, Atom, Axil, Boston, Brigmton, Elco, Engel, Fagor, Fujitsu, Siemens, Grundig, Hori, Ijoy, Illusion, LG, Lauson, Nevir, NPG, Philips, Samsung, Satcom, Satycon, Schneider, Shoi, Sony, Sunstech, Sytech, Technisat, Televés, Woxter and Zodiac.

[25] Albudeite, Campos del Río, Ojós Pliego, Ricote and Ulea.

[26] Since 1998 the new buildings had to comply with the norm about the collective installation of telecommunications (ICT).

HOW TO CITE THIS ARTICLE IN BIBLIOGRAHIES / REFERENCES:

Sarabia-Andúgar, I., Sánchez-Martínez, J. (2011): "Household adaptation to digital terrestrial television in its first phase of implementation in Spain", at *Revista Latina de Comunicación Social*, 67, pages 068 to 098. La Laguna (Tenerife, Canary Islands): La Laguna University, retrieved on ___th of ____ of 2_____, from DOI: 10.4185/RLCS-67-948-068-098-EN

Article received on 18 May 2011. Submitted to pre-review on 18 May. Sent to reviewers on May 25. Accepted on 23 June 2011. Galley proofs made available to the authors on 1 July 2011. Approved by authors on 3 July 2011. Published on 14 July 2011.

Note: the DOI number is part of the bibliographic references and it must be cited if you cited this article.