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New Television and Old Campaign: The Experience and Lessons in Digital Television Transition in Taiwan

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Abstract

Although digital terrestrial television has undergone significant development over the last two decades, no single protocol for transition has been poised to break out as bona fide replacement for terrestrial TV programs for those elderly in the rural area in Taiwan. This paper discusses the process of digital switchover and assesses the effect and implementation of a grassroots campaign. The first part examines the advantages and drawbacks of digital switchover, and identifies a number of challenges about the delivery method of the messages matters. When the project of terrestrial television digital switchover began in the 2009, many people from civil servants, policymakers and academics warned that it might be 'premature,' and claimed that Taiwan were not ready for ready for this transformation. Part two presents an overview of two pilot field experiments to show that personally delivered campaign messages can influence people's perceptions and attitudes toward issues for encouraging digital take-up. The third and final part deals with the collaboration among different parties especially focusing on the cooperation between the central government, the TTV/CATV broadcasters, the local government officials, community leaders, and the citizens/viewers. The paper proposes recommendations for how to encourage cable services providers and public's interest in DTV transition in the future.

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Introduction

Since the beginning of July 01, 2012, Terrestrial Television (TTV) signals all over Taiwan have been digital. Analogue TTV signals that served Taiwanese people for almost 50 years completely went into history. The switchover freed spectrum in the bands of 76-88MHz, 174-210MHz and 608-710MHz as parts of "digital dividends" and laid the foundation of High Definition TV broadcasting. DTTV signals have been on air in Taiwan since 2003 and there had been more than 2.5 million standard definition (SD) digital TVs or set top boxes sold. As cable TVs had penetrated to more than 80% of households and the main TTV channels are must-carry by cable TV, the DTTV switchover (DSO) mission seemed to be simply "turning the analog TTV signals off and releasing the corresponding spectrum" at the policy level. In fact, there involved many challenges in execution.

Taiwan adopted digital television as the cornerstone of the future broadcasting systems in 1997. Digital television has the capacity for higher resolution and different aspect ratio. HDTV images are more vivid and an effect can send as many as five digital SDTV signals. Another digital capability is for the broadcaster to use new kind of video and data services, such as pay TV programming, commercial messages delivering and interactive services. These broadcast services are known as ancillary and supplementary services. They include such potentially revenue-producing innovations as the providing of stock prices, sports score, classified advertising, and interactive television shopping. Many innovative types of video programming and information will emerge. All this suggests that broadcasters will use digital television to provide improved television broadcasts (programming and services, revenue sources, corporate partnerships and ownership structures) over the next 10 to 15 years [1].

The digital switchover of television has become a global trend, and Taiwan is no exception. The first country to switch off the analogue terrestrial television was the Netherland in 2006 [2]. Taiwan embarked on a policy toward digital switchover relatively early before 2000s. From the government's perspective, the objective of switchover was to keep abreast of changing television and telecommunications technology, and to achieve greater spectrum efficiency by ending analog terrestrial transmission. The switchover has the potential to impact positively on consumers and citizens, the broadcasting sectors, related industries, the government and the society as a whole. Government plays an active role in regulating the transition to digital, for it considered it an important public policy. Adda & Ottaviani [3] argue that the transition to digital terrestrial television (DTT) is a public policy problem. Governments should take an active role in the transition because of the interplay of two motives, one economic and the other non-economic. Completing the switch to digital will bring significant benefits both to consumers and broadcaster. National economies as a whole are also expected to benefit. More significantly, digital broadcasting brings increased choice and quality for viewers. Since media has a social role, an increased and more competitive supply of television channels should improve overall flow of information in the society, with positive economic, social, and political effects [4]. After all, the path to the digital promise land is indeed becoming a complicated journey.

Digital TV originally emerged as a solution to the problem of bandwidth conservation in the transmission of HDTV. At its most basic, digital TV consists of sampling and encoding video signals as a stream of zeros and ones and transmitting this data stream through a transport platform (e.g., terrestrial transmitters, satellite, cable, the telephone network) to a receiving device (a digital TV set or a set-top box terminal) where the original video signal is reassembled [4]. Before implementing the switchover

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policy for the public, the term 'digital switchover' is defined as the progressive migration of households, from analogue-only reception to digital reception. Analog turn-off refers to the termination of analog broadcasting, which considered being possible when most households are equipped to receive digital signals [5].

Digital switchover is largely seen as an inevitable result of technological progress. But in some countries, it is an unpopular policy that people often see as coercive. This is partly because the national governments' rationale and motives for switchover are not entirely understood and trusted, and partly because people think analog television will be 'taken away' and therefore they will have to incur costs to be able to continue to watch TV [6].

In the wake of the pioneering countries, the Taiwanese government was becoming a follower, the objective, first announced in 1997, was to achieve full switchover from analogue to digital only when the following tests are satisfied [7].

- To ensure that everyone who can currently get the terrestrial broadcasting services can receive them on digital system.
- To ensure that switching over is affordable for the vast majority.
- To ensure that viewers can have more choice and quality of better digital television viewing.

Public communication is one of the many policy fields with a role to play in promoting consumers' awareness and appealing enough to motivate to invest in the necessary digital television receivers. As more than 80 percent of Taiwan's 8.2 million TV homes have cable and less than 20 percent have terrestrial TV. Switching off analogue terrestrial TV would not therefore alienate the majority of households. Ministry of the Interior estimated in 2010 that about 15.8 percent (13 thousand households) relied wholly on terrestrial TV, noting that these households were disproportionately indigenous, older and very poor. With such needs in mind, government invited the terrestrial broadcasters and the receiver manufacturing industry to design cheap converted boxes which could keep analogue TV sets functioning once they switchover and only received a digital signal. After the Administrative Yuan set the policy of free installation of a set top box per low income household, there were two government bodies in charge of promotion and education (P & E) of the general public about DSO. The first one was the Government Information Office (GIO) that took responsible for P&E at the concept level while the other authority was the National Communications Commission (NCC) for being responsible for technical assistance. In practice, there needed many coordination efforts between the two organizations.

In sum, the government, industry, and viewers all knew that they must work together if switchover was to be achieved with the set timeframe. A strategy for completing digital switchover by a fixed date emerged. The favored timing was June 2012. The NCC decided doing a phased switch-off, region by region, because of the public campaign and frequency boundary issues. In execution, there involved many challenges.

This paper explains the national politics leading up to two pilot field experiments for transforming analog television signals in two phases: Pinglin (New Taipei City) and Tachia (Taichung City) during July 2010 and July 2011. This article examines the disadvantaged people with regard to their access to the digital terrestrial television and the role of communications policy in implementing the digital switchover. Based on these experiences and the diagnosis of the situation after a small scale of switchover, Taiwan's government could assess the rate of diffusion the role the media and household communication play in the process. The collaboration between the government and the market is fundamentally important in the switchover process. How the public-private sector partnership was established to enhance the elderly's interests in digital television services and made it possible to switch off the analog television services will be examined.

Background and The Switchover Process

Taiwan's terrestrial television started in the early 1960s. Prior to the launch in the 1993 of cable and satellite pay television services, all Taiwan television viewers were restricted to just three terrestrial channel. With analog TV structure historically dominated by state, offered viewers a relatively narrow range of analog terrestrial channels. Cable television services started 1993, and satellite channels were added at the same time.

Indeed, as stated by Starks [2], no country has embarked on full digital switchover without first launching digital terrestrial television, and no country has launched DTT without also intending to switch off analog terrestrial service. The digital switchover plans may primarily be the responsibility of national policy-makers, but there was also a local dimension that requires cooperation among broadcasters, operators and consumers.

Digital switchover initiatives in Taiwan began in the late 1990s [7] By 2009, terrestrial TV coverage has reached 90 percent. The NCC coordinated a group of broadcasters, digital receiver manufacturers, cable TV companies, local government bodies, and other stakeholders issued a two-year action plan, focused on the end goal of converting all households to digital terrestrial by June 2012.

Since the government's announcement on the move to all-digital transmission, its decision to adopt America's ATSC (Advanced Television Systems Committee) system has been controversial. The terrestrial broadcasters saw the European system as technically superior and a more economically viable opting in the long run. The Ministry of Transport and Communications decided to accept the calls for the European system- DVB-T (Digital Video Broadcasting-Terrestrial) to link technical standards for satellite, cable and terrestrial television, and later for mobile TV. The aim is to preserve the role of terrestrial television as universal and affordable services.

The Executive Yuan announced details around early switch-offs in November 1997. After a defeat of the ruling KMT Party (the Nationalist's Party) by the Democratic Progressive Party in 2000, the DTV Policy at first was turning its objective to Campaigns for Political Power out of Media. This could be seen as a political decision following the Presidential election in 2000. In 2003, the DPP government invested US$4.5 billion to build main transmitters and gap fillers nationwide to cover the digital signals and improve broadband infrastructure and environment. The DPP government thought the improvement in transmission and reception facilities would solve the DTV reception problem. In order to eliminate political intervention on broadcasting businesses and to reflect the trend of the times for the integration of broadcasting and telecommunications, the National Communications Commission (NCC) modeled after the Federal Communications Commission (FCC) of the United States was founded in February, 2006.

KMT returned to power in the elections of 2008 and 2012. The most pressing critique from the broadcasters and the elites in Taiwan was that the policies for digital television were postponed. Since most EU countries has set an early switch-off date around 2007 to 2010, the KMT government decided to set a new switchover project and allowed the regulators to take full account of the interests of broadcasters, viewers, and other key stakeholders. Some outcomes of switchover were clearly recast as positive to the consumers, with consumers' choices increasing with regard to distribution mode, technology and content, as a result of digitalization. Consumers are able to watch more television channels with enhanced quality with technologies such as high definition (HD), wherever (at home or on the move), and whenever (thanks to DVRs and video on demand). Meanwhile, broadcasters can adopt a multi-channel strategy driven by reduced costs resulting from digitalization. The digital switchover has positive effects on related industries such as technology providers, manufacturers, TV retailers. Spin-off effects for government are triggered by the freeing up of frequencies which can be sold at premium rates to mobile telephony companies or open to new applicants. Finally, societies as a whole can be benefited with the increasing bandwidth for digital media, the digital upgrade of households and the possibility of participate in a communal digital television culture [8-10].

- Improve coverage and quality of the digital signal;
- Create a digital dividend;
- Promote digital television electronics industry;
- Increase public awareness;
- Offer set-top-boxes for low-income households;
- Accelerate amendments of related regulations;
- Switch off analogue TV by June 2012
- Accomplish cable television conversion by 2015

The NCC 2010 report (NCC, 2010 December) revealed that the total costs for digital switchover (including HD program production and digital transmission facilities) for the major broadcasters (TTV, CTV, CTS, FTV, and PTS) alone is expected to be around US$5 million by 2011. The Government Information Office had received $3 million a year before the transition date of June 30, 2012, and the NCC had received $1.4 million as consumer awareness campaigns to connect for 23 million people in Taiwan. Since only small proportion of main TV sets are dependent on terrestrial reception, the particular difficulties the terrestrial television broadcasters caught in were a classic "chicken-and-egg" dilemma.

To speed up the construction of gap fillers or boosters, NCC team needed to coordinate with local governments at either city, county, town or village level, TV broadcasters, and even telecommunication operators, especially in solution selection and in locating and acquiring the site for radio towers. During 2010 to mid 2012, NCC raised DTTV coverage to more than 96% of population by jointly completing 50+ gap fillers/boosters with HD modules with local governments. In conjunction with the use of satellite TV broadcasting, digital TV signals cover the whole country.

What would be government's household assistance scheme for DSO? Who is eligible? After the Administrative Yuan set the policy of free installation of a set top box per low income household, how should it be carried out effectively? How about many none low-income households that had analog TTV as the only source of TV programs but could not afford the set top box and/or antenna? All these posed the second challenge. The NCC team designed the procurement specifications that a set top box must have the new features of compliance to DVB-T2 standard, parental control and less than 1 W standby power consumption and that a remote controller should be easy to use for the senior citizens. Based on the low income household list provided by the Ministry of the Interior, NCC contracted and managed three regional contractors to provide 100,000+ low income households nation-wide with DSO assistance from August 2011 to June 2012.

Because the broadcasters lacked incentives to produce (or purchase) and distribute more digital programming. Lack of digital content gave the Taiwanese audience few incentives to invest in upgrading their receivers, which in turn made these receivers less affordable (because of small manufacturing volumes). The process of switchover is expensive and takes time. It was also noted that low-income, elderly, disabled, indigenous, and rural Taiwanese were targeted the most, because these groups mainly watch analog antenna TV more than any other groups. Both the on-air announcements and government-funded telephone hotlines receiving viewer inquiries directed consumers to Internet sites to seek information.

Public Awareness Campaigns

Different models – with variations in the free provision of set-top boxes changed to new digital services on offer – had been explored in different areas and cities. Taiwan is a populous country with 7.65 million TV households possessing over 8 million TV sets. Moreover, the population is densely crowded, with a high level of communal reception. Perhaps the greatest challenge comes from Taiwan's mountainous topography. This requires Taiwanese terrestrial television to rely on huge numbers of small relay transmitter: in total Taiwan has around 77 transmitting devices mounted around 9 transmission masts in Taiwan mainland and 3 transmission masts in different islands in the Taiwan Strait. Spectrum is intensively used and vacant frequencies correspondingly scarce. The Taiwanese government decided to spend 0.5 billion NT dollar (about US$20 million) reorganizing the analog terrestrial frequencies in order to make space for digital terrestrial television. While the initial disruption for viewers – over 1 million homes had to adopt TV retuning (Table-1).

Year	2009	2010	2011	2012
New gap fillers	N/A	7	34	12
Total stations	24	31	65	77
Increment of population	N/A	10,610	93,009	27,152
population	21,993k	21,994k	22,037k	22,064k
Percentage of population	96.20%	96.24%	96.65%	96.77%

Table 1: DTV Coverage.
Source: NCC report, 2010.

The transition from analog to digital television can be seen as the most significant advancement of television technology since color TV was introduced. For full-power TV stations, the transition went into effect on Sunday June 30, 2012, with stations ending regular programming on their analog signals no later than 11:59 pm that day. Consequently, a digital-to-analog converter, an electronic device that connects to an analog television, must be used in order to allow the television to receive digital broadcasts. The box may also be called a 'set-top' converter, 'digital TV adapter' (DTA), or 'digital set-top box' (DSTB).

Consumers may discover their old analog televisions, VCRs, and other devices which lack a digital tuner no longer receive over-the-air television. The only real 'solution' to this is to buy an external tuner (called a converter box) that receives DTV signals directly and converts them to analog for the VCR or other analog device. Next problem is how to assist consumers through the conversion.

In practice, there needed many coordination efforts between the two organizations – the GIO and NCC. Besides government sponsored advertisements over major media, promotions in large-scale events and 3C chain stores and distribution of flyers, posters and banners by local governments, NCC had hundreds of workshops at townships or villages to explain what DTTV is about and demonstrate to both the public servants and the general public about the preparation and DIY for DSO. Ministry of Economic Affairs helped informed set top box suppliers of manufacturing or import DVB-T/H.264 HD set top box only starting from year 2011. Furthermore, based on the design and experience of viewer service centers of the 5 TTV broadcasters, NCC set up a call center to answer DSO related questions and provided installation assistance to the home when needed. The center served over 100 thousands of call requests since July 1st, 2011 [11].

The government announced details around early switch-offs before June 2010. Pinglin and Tachia townships were selected to test a complete switchover for four reasons. Households in these two rural areas had access to far fewer channels than the cities, so the appeal of greater channels would be greater here. They were also towns had small populations and were suitable for the pilot. Pinglin and Tachia's locations had been near the metropolitan area. But they had bad television reception historically. The NCC thought the improvement in transmission and reception facilities would solve the problems. Third, 14 percent of the population in Pinglin (in 2011) was 65 years or older, the township that has the highest elderly population in Taiwan. In Tachia, 10.6 percent of the population was 65 years or older. The two pilot experiments can provide experiences about how local people assess the relevance and attractiveness of DTV when they adopt DTTV. Fourth, the neighborhood magistrates of two townships had done an extensive research for the needs of local viewers. Because the process of adoption is continuing, it is possible to examine the changes in communication (language usage) that shapes the meaning of digital television at different and crucial stage of diffusion.

Pinglin Township had 2477 households and was most famous for producing Pouchong tea. It was located in the rural mountain area near Taipei City. In Pinglin, about 200 households need for a free converter box or monetary support. Public awareness and understanding of the DSO were both relatively low. Tachia Township has a total population of 80,000 (about 21,000 households). Although Tachia is located near Taichung City, about 10 percent of all households had not yet converted.

Despite the considerable proportion of the population in need of technical support, technical help centers opened at the same time within local staffs in helping installing and adjusting their digital equipment. Pilot experiments and dynamic feedback are key to effective execution control and management. Pilot experiments such as the one in Pinglin township, summer 2010, and then the ones in Tachia district, allowed NCC team to clearly identify the needs by the TTV viewers, the concerns of local governments and how to plan the collaboration for large-scale switchover.

The campaign messages were very local focus and tailored for grassroots viewers. The work of the regional teams and local roadshow staffs manage to deliver a human touch helped the pilot towns accomplish the goal for early switch-off. However, when the NCC teams worked with local government and charity groups, they found that more elder people living alone than expected and they need a new digital television set or digital converter. As a result, some neighborhood magistrates asked the charity groups to collect more digital TV sets/converter and donate to these households. The government learned some important lessons from the two pilot experiments. The field experiments allowed the field staffs to gauge the effects of personally delivered campaign messages on attitudes about the emerging issues of DSO. Besides, developed a campaign required a scrupulous planning. After all, face-to-face contact has proved more effective than impersonal tactics (such as phone calls and DM). Similar to other countries using by-stage-and-by-region strategies such as Austria and Czech Republic, the switchover of remaining regions went the later, the smoother.

After the two pilot experiments, the NCC knew the importance of how to outsource the services to a few small-scale, single-purpose organizations, which had limited human resources, to lead the switchover program. The importance of enabling the collaboration between the community leader, government officials, and elected representatives was also critical. They had to learn the effects of the digital television on society. They could help by supporting local households to raise their awareness and knowledge about the likely benefits of DTTV.

NCC now handled requests from low-income households for up to US$100 for per digital-to-analog converter box beginning January 1, 2010 via a toll free number or a website with the help from local government and GIO. The NCC had sent trained staffs to offer practical help at switchover to older and disabled people who may face greater barriers in switching to digital TV. The Help Action Plan is committed to managing a service which best meets the diverse needs of eligible people. This commitment is set out in the Code of Service Standards. Equipment provided as standard through the Help Action Plan must meet a set of core receiver requirements designed to ensure it best meets the needs of older and disabled people, such as easy-to-use menus, remote controls, rescanning capabilities with large print, audio and video formats.

The NCC team designed the procurement specifications that a set top box must have the new features of compliance to DVB-T/H.264 HD standard, parental control and less than 1 W standby power consumption and that a remote controller should be easy to use for the senior citizens. Based on the low income household list provided by the Ministry of the Interior, NCC contracted and managed three regional contractors to provide more than 100,000 low income households nation-wide with DSO assistance from August 2011 to June 2012 [11].

The government wanted to subsidize 120,000 households in Taiwan. However, these government resources were limited to an initial sum of $0.8 million with the option to grow to $2 million, which were far short of the estimated 30,000 more low-income households in Taiwan when Ministry of the Interior adjusted its poverty line of low-income homes. In January 2010, the government approved a proposed new digital switchover plan, based on a division of the country into 4 technical areas. With aid approved by the Congress, the NCC began placing subsidy requests on a waiting list after the program reached its maximum allowed funding, the estimated amount only for the low-income households were $8.7 million (Table 2 and Table 3).

Item	Content
Target	About 120,000 low-income households
Method	Install a HD STB for each low-income household
Budget	US$ 8.7 million (STB US$40, Install fee US$43)
Schedule	Apr-Aug 2011: 1,000households (trial) 2011 Sep-2012 Apr(all) 119,000households
Benefit	Reduces burdens of low-income households Safeguards viewing rights Reduces complaints and protests

Table 2: Set-top box subsidy policy and process.
Source: NCC, 2012.

Body	Content
Government Information Office	Propagate STB subsidy policy
Ministry of the Interior	Providing information on low-income households
Local (County) governments	Lists and renewed information on low-income households
Village chiefs	Send notifications
Connect with lo-income households	
Technical Help Center	Answer the public's concerns and resolve problems about installation of STB and viewing

Table 3: Set-top box supporting measures.
Source: NCC, 2012.

Surveys from some pilot areas showed that none of the broadcasters had a lead role in communicating about the digital switchover. The government had the responsibility to communicate with the most of the non converted households who were neither elderly nor low-income household. The NCC proposed the installation of three digital switchover support centers nationwide, but it is not clear who would run those centers, or with what resources of funding. The NCC set up 60 helpline and service center to send technicians to respond most callers if the consumer requires one. Second, there were lots local resident who knew about the switchover but had not prepared for the switch. The NCC sent extra personnel to Yualing, Chiayi, and Kaohsiung to deal with difficulties in those counties and cities in Southern Taiwan. Since vast majority of older people still report listening to AM/FM weekly, radio advertisings still being a good local strategic approach to older people. There were a lot of campaign banners hanging on public buses or public locations for arousing public awareness. Local cable systems and local radios also provided help in public awareness campaigns (Table 4). All radio stations (local or regional) played an important role in joining the campaign and provided paid radio advertising intensively in the process. The Taiwan Power Company and the Postal Office used the billing system to print the switchover complete date in a public announcement format. Source credibility was the most powerful predictor of persuasion effectiveness in DSO, therefore, the community leaders could play a vital role in helping local viewers for switchover.]

NCC and GIO officials played their parts in the supervision of day-to-day activities. The mutual trust among those involved and their experience of regulatory discussions over the years proved invaluable when challenges arose or difficult decisions had to be made. As it turned

North Central South	Regions			Total
Workshops at townships or villages	79	40	101	220
Public transportation				
Stage 1	60	50	50	160
Stage 2	135	NA	165	300(approx.)
Local and regional radio stations				119

Table 4: On the ground Campaign and event.
Source: NCC, 2012.

NCC and GIO officials played their parts in the supervision of day-to-day activities. The mutual trust among those involved and their experience of regulatory discussions over the years proved invaluable when challenges arose or difficult decisions had to be made. As it turned out, many viewers didn't need persuading. They willingly converted to digital TV of their own volition, attracted both by the popular extra channels and the new generation of flat-screen TVs. Advice line team played a vital role in helping viewers to receive their preferred regional service and became highly adept at resolving these and other reception equipment issues. Another important source of help was the broadcasters' local branches which lent their support. A small army of volunteers from local government was mobilized in each region, staging information events and staffing advice points on switchover days. This was invaluable community help which was well beyond the resources of the core Switchover Help Action Scheme teams in Taiwan [12-14].

Taiwan really needed to have a fully modernized terrestrial TV network, capable of delivering multichannel TV, high-definition channels, digital radio, text and a new generation of on-demand services to virtually every home in the country. Without switchover, this would never have happened [15-17]. The transmitter network to be upgraded comprised more than 77 separate sites, serving 8 million homes. Spectrum planners from the NCC and Ministry of Transport and Communications, the NCC together devised a plan around a complex web of interdependencies, taking into account factors such as local topography, incoming signals from the continent and the potential for a change at one site to have knock-on effects elsewhere affecting thousands of viewers. NCC and GIO had built a nationwide communications campaign to fit around this change also brought unique demands. In looking back at the delivery of the switchover process, a select committee report in 2009 was clear in its assessment that switchover was a 'brave' policy decision and that delivery of this 'highly complex undertaking would require co-ordination and co-operation across a wide range of organizations. Delivery of a campaign with hundreds of critical dates also required scrupulous planning and close management to ensure the right messages were delivered to the right viewers at the right time. The combined efforts of the Switchover Help Action Scheme and the thousands of volunteers who lent their support also ensured those early fears of viewers being left staring at blank screens were never realized [18-21].

Conclusion

At the start, the strategy for switchover was not dissimilar to other pioneering countries such as of the Go Digital in UK or of the FCC in the US. The main incumbent analogue terrestrial broadcasters were all located sufficient spectrum to simulcast in their digital services in full.

NCC workshops, visit to local governments, viewer phone surveys and call center services, and comments from the media had provided very valuable feedback to adjust the detailed execution. Effective identification of the households that have analog TV channels as the sole source of TV programs is an interesting research problem because of the rareness of such viewers.

The government and the terrestrial TV broadcasters grew concerned that to complete the switchover of digital cable television would be important and urgent in the near future in Taiwan. When planning the process of digital switchover, the government should also propose the implementation of a more effective communication strategy and the introduction of free digital terrestrial TV to complete the switchover of analogue signals. There are many lessons learned from digital switchover:

First, the pilot experiments and dynamic feedback are key to effective execution control and management. Pilot experiments such as the one in Pinglin township, summer 2010, and then the ones in Tachia district, etc. allowed NCC team to clearly identify the needs by the TTV viewers, the concerns of local governments and how to plan the collaboration for large-scale switchover. NCC workshops, visit to local governments, viewer phone surveys and call center services, and comments from the media had provided very valuable feedback to adjust the detailed execution. The conditions under which personally delivered campaign messages could influence people's attitudes, helping bring some clarity to a digital switchover process were also important. In considering adapting to DTTV, people look at a number of aspects, ranging from practical issues like cost and usability, through personal to social issues they concern most. Some people assessed the attractiveness whether the program contents being good enough. Others saw that there was a fixed date for the analog turn-off. Given these observations it became a huge task to convince people to switch to digital. Above all, the public awareness campaigns were the very local focus and grass roots work of governments' regional teams, roadshow staff, and charity volunteers which made the difference.

Second, effective identification of the households that had analog TV channels as the sole source of TV programs would be an interesting research problem because of the rareness of such viewers. Since the elderly, the disabled and low-income households were the targeted of the public communication and the most effective communication strategies in the pilot towns were face-to-face conversation and local radio programs. Human resources for face-to-face interaction as well as the use of information and personal networks could contribute to increased public awareness in a social network oriented society like Taiwan.

The third and final one would be effects of vigorous advertising and grassroots campaigns could increase public awareness and digital adoption among unconverted households. Advertising carried on terrestrial television and public television seemed to be most effective. However, promotions in large-scale events and 3C chain stores and distribution of flyers, posters and banners by local governments, and hundreds of workshops at townships or villages could also facilitate digital transmission policy. There would be a continued need for a centralized collaborating between the government, the broadcasters, the cable system operators, the television manufacturers and consumers/citizens to communicate more effectively and increase their concerns to overcome the remaining questions.

Digital transition process was not only a huge transition with significant impact on consumers, but also was not until the last moment adequately planned for or coordinated. It was a transition that led to problems that were largely predictable and one that Taiwan moved measurably forward from1996 to 2012 to the benefit of many, many consumers. But it's not an ending of the digitalization policy. The outcomes in the two pilot towns could bring deeper problems and answers for the government to know how to communicate to the public. Based on the lessons from the pilot towns, the future digitalization of cable television could learn some experiences from it. Four recommendations are proposed in order. First, the provision of consumer information and support should collect in details in advance. Public information is a crucial element of switchover planning and implementation, the more the government may know about the people and their social networks, the better the government can plan an effective public campaign to increase public awareness and digital adoption among the unconverted households.

Second, analogue switch-off is a firm political goal for cable companies. The top-down strategy may not important enough to support the cable service providers to accomplish the public policy goals from the government. Government and regulator will have to utilize the market force as well as the public funds as incentives to motivate DTV adoption.

Third, Starks describe digital switchover as a kind of mutual risk reduction scheme, it is more like two dancers dancing together. Government and regulator shall create a more pluralistic and competitive broadcasting environment, and successfully lobbying on the part of cable subscribers, cable service providers, and new content providers, in assessing their readiness for digital switchover. Subsidy can still play a role in the implementation.

Fourth, the article have identified who are major players should cooperate with each other in the switchover process of terrestrial TV. The digital transition in cable TV will be more complicated and can be seen as a combination of technical, financial, and political reasons. Common success factors are now to be identified. How to use a national digital communications strategy to address the significances of the policy will be greater challenges ahead.

Competing Interests

The authors have no competing interests with the work presented in this manuscript.

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