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# STUDY OF THE BASIC CHARACTERISTICS OF AN INTERACTIVE TV SERVICE

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## Abstract

The iTV service was too conceptually nebulous to readily comprehend. It was variously mistaken as referring to a network television service and a digital television service. To avoid further setbacks, it is very important that we clarify the basic characteristics of iTV service for the benefit of the fields of information technology, MIS, broadcasting, commerce and so on. After conducting literature reviews and interviews, we were able to delineate the basic characteristics of iTV service as follows: 1. The contents of iTV service; 2. The supply and use process, and components of the iTV service.

## Format Instructions

### 1. Background and motivation

The fall out from the financial tsunami has severely affected every industry. Without exception, enterprises are actively seeking new business opportunities to ward off its effects. With the developed networks of the current era, e-commerce is receiving particular attention and making serious waves. The embedding of advertisements on the World Wide Web is growing in prevalence. However, only 50% of this embedded advertising is seen by users. This is considerably smaller than the 93% of advertisements seen in the Yellow Pages and the 97% seen on television. Indeed, it demonstrates that the development of e-commerce has been largely unsuccessful. In addition to holding the highest rate of television advertising, Tsaih, Chang and Huang [22] state that transmitted ITV content has the following four characteristics and each of them can be referred to as a (customer) value driver of the proposed iTV business: appeal, direct interactivity, accessibility of information, and customization. Therefore, enterprises are again focusing on television, and are using the interactive model of e-commerce to guide the development of interactive television services. In turn, this is prompting the evolution of other services such as in the digitalization of book content. This evolution forms as a background to the current study.

Given the novelty of interactive television services, it is easy to form misconceptions. A simple example is the misunderstanding that network television and digital television can provide interactive television services. This has affected the development of these services, thereby delaying the

next wave of business. In addition, this also affects the reach and evolution of related services. The major tasks and purposes of this study are to determine how to define the fundamental characteristics of interactive television services, to effectively grasp the focus of development and to encourage the realization of new business opportunities and services.

### 2. Literature review

The following literature review was carried out to establish the foundation and coherent development of this research.

#### 2.1 Television services

Kim and Sawhney[14] argue that television services have the ability to generate and exchange of control information. Culturally, the audience passively receives the services provided by the company (television station and system operator). Institutionally, television services are controlled by government and supervisory bodies. Technologically, television services preserve the social structure under the central government and the audience passively receives services from the company (television station and system operator).

Television services present content in the televising equipment of the audience during the process of broadcasting (as in Figure 1 [5]). However, for each generation of television services the business models, control strategies and regulatory models are different (see Table 1: Galperin and Bar, [10]).

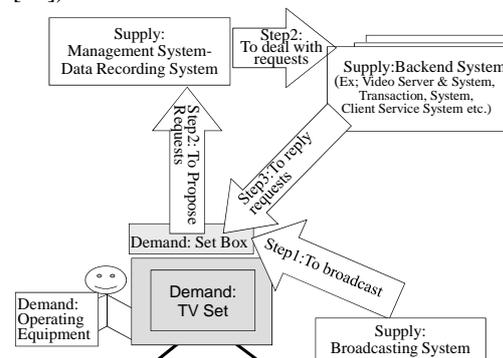


Figure 1: Process

Source: Chiung-Yu Huang[5]

Table 1: Table of comparisons of three generations of broadcasting

Generation	First generation: Fordist television	Second generation: Multi-channel television	Third generation: ITV
Service	One-way broadcasting of few video channels	One-way broadcasting of multiple video channels	Two-way delivery of multiple video channels and other services
Business model	Mass advertising and/or license fees	Mass advertising, license fees and subscriptions	Targeted advertising, subscriptions and transaction fees
Control strategies	Property rights over spectrum license	Integration of distribution and content assets	Access control and proprietary standards
Regulatory Model	Public trustee (incumbent protection)	Mix of public trustee and limited utility regulation	Yet to be defined

Source: Galperin and Bar [10]

### 2.2 Interactivity and interactive media

Interactivity that is not integrated with media technology is simply face-to-face dialogue. If it is integrated with media technology, then there are three approaches: communication, mediated environment and empowerment of the users [14]. With regard to communication, it is argued that the key components for interactivity are information analysis and exchange. The emphasis is on the scope of awareness and depth of experience in terms of the mediated environment, and the communication in the mediated environment is highly valued. By empowering users, it is believed that interactive media can provide a platform for different levels of communication through the generation and exchange of control information on consumer usage.

Kim and Sawhney [14] argue that new interactive media can provide all kinds of objectives for users, such as communication platforms for entertainment or knowledge sharing. Therefore, new interactive media should include communicability – which can take the form of any type of communication (such as one-to-many, many-to-many, or many-to-one); malleability – so that it can adapt to the needs of individuals and groups and provide them with a voice; information and images are also elastic; programmability – so it can design information

platforms to handle and generate information; and creativity – so the potential is created for individual news. Therefore, interactive television has consumer power of control at the center and has already surpassed traditional television media, which only offers a complete set of programmed content. It is different from traditional television media, where control is centralized and cannot be transferred.

Pramataris et al [17] argue that the greatest contribution of interactive television is the new opportunity for personalization of the media. In traditional media, sellers or advertisers have to use direct consumer surveys from market research companies in order to obtain information about customer responses. Thereafter they can improve their advertising or implement enhanced customized services. However, with this method it is very difficult to verify whether these services or advertisements are really being provided to potential target consumer groups. With interactive media, customers can directly or indirectly provide their viewing or usage information through their interactive behavior. In addition, they can also amend or present individual customer information, rather than information for a large consumer group.

### 2.3 Interactive television services

The definition of interactive television services according to the Independent TV Committee in Britain is that “interactivity is a function and not a special form of service, and it can be used in many different situations” [13].

Viewers can be involved in the exchange in the following ways. Firstly through changing the content that appears onscreen, like choosing television programs or advertising background information, or scene selection. They can also watch a secondary program while watching one of these programs. Secondly, through providing information to television stations through return channels (usually phone lines), such as ordering goods, providing opinions on television programs and through voting or participating in game shows. These services, whether provided via satellite, cable or wireless digital, can only be used by members of the public with digital equipment. Furthermore, Britain’s Independent TV Committee argues that the general approach of interactive television services is different from network services. Its content and services are developing well, but only in an environment with the support of more broadly identifiable standards can station managers, advertising representatives and viewers become more willing to trust and utilize each other.

Yu-li Liu [25] argues that although two-way interactive television services have both narrow and broad definitions, feedback is the essential factor in both. The narrow definition refers to the system (or channel) operator placing the scheduled programs

into the video server, which at any time can respond to subscriber demands. Consumers can receive all their desired programs and services through their television set via transmission networks, transmitted program signals, and digital decoders. The broad definition refers to interaction with the programming source, not necessarily through a network. Communication can be over the telephone, such as song selections, call-in shows, and responding to voice and multimedia information. These all come under the broad definition.

Brown and Anderson[4] argue that the concept of interactive television services, where the level of audience participation is clearly increasing, is that consumers can become programming managers and enter information and areas of entertainment, transforming television into a consumer entertainment center and shopping cart. Additionally, ITV services also emphasize initiative and immediacy; it can provide users with a large amount of information and can immediately present information such as user opinions and lists.

Galperin and Bar[10].believe that ITV is a pull strategy: subscribers request services from multi-channel video programming distributors (MVPD), which are not necessarily linked to specific video programming. ITV has already surpassed the concept of a simple expansion of current television. Furthermore, viewers themselves take the initiative to send requests to providers. Services are not actively provided on the supply-side.

Galperin and Bar[10].categorize ITV as follows. One is a program-related ITV service, which is integrated with any particular video stream; and the other is a dedicated ITV service, which is not integrated with any particular video stream. The former is directly linked to one or several video streams and can be used to strengthen and expand the core business of television stations. The latter is independent from any specific program stream, and is sent with multi-channel video programming to third parties who have signed contracts, such as those pertaining to information, shared content and services for car salespeople and bankers. Multi-channel video programming is sent to station managers and subsequently offered to third parties for their input.

According to Tsaih et al.[22]., interactive television services can be split into the categories of "walled gardens", where multi-channel video programming controls the transmission, and online "wild forests", which are not restricted by multi-channel video programming. The difference between the two ITV services is in whether or not the consumer can receive third party content or services that are not in collaboration with multi-channel video programming.

Pramataris et al. [17] argue that in terms of the

level of interactivity of ITV, it is believed that different types of interactive television programs can lead to different levels of viewer interaction. Therefore, interactivity is a two-dimensional structure. Firstly, the level of interactivity depends on the nature of the content. Secondly, the level is the inclination of viewers to interact. Yu-li Liu [25]argues that the two-way interactivity of ITV services can be separated into five levels (as in Table 2). The higher the level, the more sophisticated the level of interactivity.

Table 2: Levels of two-way ITV services

Level of interactivity	User operation model	Communication medium	Application
None (0)	Linear broadcast, users can change the channel and program	Telephone	Similar to pay-TV video-on-demand
Low (1)	Linear broadcast, users can talk to the host of the provided content and have the same control over programming as in the operation of a VCR	Cable TV, not in real time	Pay-TV video-on-demand
Middle (2)	Wireless broadcast, users can talk with the host of the provided content and have similar control programming as in the operation of LD	Cable TV network in real time	E-categories
High (3)	Wireless broadcast, users can select servers and terms of service	Cable TV network in real time	Electronic banking
Complete (4)	Wireless broadcast, users can select servers and terms of service, and can have	Cable TV in real time, and can also provide real time	Video conferencing and multi-

	exchanges with other users	voice and video streaming	player video games
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Source: Yu-li Liu[25]

### 3. Research method and limitations

The topic of this study is relatively new, and the research method and limitations are particular. They are described below.

#### 3.1. Research method

The purpose of this study is to clarify the concept of ITV services and confirm the key criteria for their operation (such as operation contents, process, elements and data return) to benefit future exploration of related topics. It is also related to discussion on governmental and national (broadcasting and technology) policy, legislation and industry support. Further, as the topic is relatively new, its promotion requires new mechanisms and there are many areas where knowledge is limited or relevant factors have not been confirmed.

Therefore, the nature of this study is similar to the qualitative research described by Marshall and Marshall and Rossman[16], which stretches across several different directions and social phenomena, has a naturalistic orientation and has an interpretive quality. Furthermore, the purpose of this study is, as Marshall and Marshall and Rossman[16] describe, an exploration into a novel and relatively uncharted system, and explore the relevant factors which have not yet been confirmed. This study has the value of qualitative research, it will therefore adopt this as its research method.

For qualitative research, the specific history and context is very important. This information largely exists in data and literature which must be reviewed. Then it is possible to describe meticulously and in detail specific values and beliefs [16]. Therefore, this study expands upon the analysis of Li Zhengxian[26]: a. Organized data; b. Determined categories, themes, styles and patterns; c. Organized data into groups according to category, theme, style or pattern; d. Tested emerging rational understanding gradually; e. Sought other possible explanations; f. Ordered key points and wrote a report; and g. Conducted deeper explorations and conclusions in the hope of bringing forward rational and objective content.

#### 3.2 Research limitations

This study's research limitations are mainly in the limited literature and nature of the research.

##### A. Limited literature

a. Exclusive literature is limited; b. Significant literature focuses on technology, and there is confusion and overlap with the situation of network television; c. All current experiments and case studies are overseas, services are limited and

first-hand information is difficult to obtain.

##### B. Research limitations

This study has innate qualitative research limitations, such as no supporting quantitative data, no statistical significance as analogy, no genuine empirical hypothesis and no structured research sequence.

### 4. The basic characteristics of interactive television

From the above analysis, it is clear that ITV can come under the categories of service or operation. However, both use the platform of television, have an interactive nature and fundamentally can derive content, process and key factors, and feedback material. This is described below.

#### Characteristic 1: Content of ITV

ITV service content, also called ITV content, refers to the ITV enhancement of television content. This offers users another interactive television content code which enables them to click and interact. Currently, the code is not embedded. The World Wide Web can be used to ameliorate understanding of the above terminology. Web pages are text with coding for hyperlinks, where another page of content appears after the user clicks on them. Currently, television content is just like the above-mentioned webpage text without the added hyperlink coding. ITV content, however, has the addition of this coding. Clicking on ITV links brings forward more ITV content, just like clicking on a web page hyperlink brings another web page.

ITV content can appear as soon as a subscriber turns on the television, and can also appear after the user clicks. Three explanations are given below of the key points in the appearance of ITV services and user exchange:

##### 1. ITV broadcasted Contents:

This content is relayed according to a fixed schedule and is actively transmitted via the video stream of the channel in question. Subscribers only need particular equipment (currently a remote control) to select a channel and view content. This content can be either programming or advertising. The option for interactive television is included in transmitted ITV content. Subscribers can use this function to click and make selections, and transmit their opinions or view parallel ITV content. This is the origin of interactive television. In other words, for subscribers, ITV content provides scheduled programming and (still in its infancy but emerging nonetheless) windows for interactive television activities.

##### 2. ITV enhanced contents

This content requires users to click within interactive television content for embedded ITV enhanced contents coding. Only then can they receive transmitted video files from video sites.

The ITV enhanced contents contains the

option for embedded ITV coding. Users can utilize their equipment to click and make selections, and transmit their opinions or view parallel ITV content. This is an extension of ITV services. In other words, for users, ITV provides additional viewing content and is continuing to provide windows for interactive television activities.

### 3. ITV inserted contents

This content is actively displayed in marquees or other small windows from broadcasting systems or video sites to present the text strings or graphics in ITV content or ITV enhanced contents. It does not require users to click as it automatically appears. Within inserted ITV content there is the option for embedded ITV coding, and consumers can use their equipment to click and make selections. They can also transmit their opinions or view parallel ITV content. In other words, for users, inserted ITV content provides additional viewing content, and with greater prevalence is providing windows for interactive television services.

For example, when users are watching an interactive television transmission of baseball from a broadcasting system, they can use the remote control to make selections from ITV enhanced contents, such as the uniform numbers of team members, sponsoring organizations, team member histories, or commercial product descriptions. If promoted products appear in the marquee, the remote control can be used to make a selection and receive the product description. Users can even conduct purchases or exchange pre- and post- purchase opinions. Also, if users are watching the broadcast of a political commentary, they can use the remote control to directly participate in public opinion polls.

Characteristic 2: Process and key criteria for ITV services

The discussion below is from the standpoint of consumers on the demand-side and system operators on the supply-side who directly come into contact (via cable television) with consumers.

#### A.Process

The enjoyment process for subscribers on the demand side is as follows:

Step 1: Watch. View the interactive television content.

Subscribers view the interactive content on a particular channel.

Step 2: Request. Submit a request for interactive television services.

When subscribers wish to submit a request for interactive television content, they can use certain equipment (currently a remote control) to make selections from broadcasts or inserted content and transmit requests for broadcast information or additional interactive content.

Step 3: Respond to ITV service requests.

Broadcast information should be entered into

operating equipment according to its instructions. To change the channel, return to Step 1. To view the requested ITV enhanced contents, go to Step 4.

Step 4: Continue or conclude a request – to continue or conclude an ITV service request.

When subscribers wish to continue their requested ITV service, that is, use their equipment again to select ITV (additional or inserted) content (such as transmitting their opinions, or again requesting ITV enhanced contents), or change the channel, they should return to Step 3.

When subscribers wish to end their request for ITV services, they use the equipment to click on the corresponding selection and return to Step 1. They can also directly select channels and return to Step 1, or turn off the television.

The provision process for supply-side (cable television) system operators is as follows:

Step 1: Broadcast. Broadcasting ITV content.

After (cable television) system operators obtain the content station managers include in their ITV broadcasted Contents, it is broadcast through the transmission system. Short relevant ITV enhanced contents can also be transmitted at the same time and temporarily stored in the consumer's set top box.

Step 2: Handle requests. Responding to and logging ITV service requests.

If the corresponding ITV enhanced contents is already stored in the consumer's set top box when the consumer submits a request for ITV services, the set top box can immediately display the content on the consumer's television screen. Through the return channel it can transmit related consumer usage data in regards to ITV services to (cable television) system operators to use when handling the main system and usage data logging system.

If the corresponding ITV enhanced contents is not temporarily stored in the consumer's set top box, then the set top box will immediately send a request for corresponding ITV enhanced contents through the return channel to the relevant back end system (such as a video server system, exchange system or customer service system) in the far-end video site. Through the return channel it will also send relevant usage information to (cable television) system operators who handle the main system and data logging.

The provision of the above ITV services, usage processes and relevant equipment can be seen in Figure 1.

#### B.Key criteria

The provision of content or services

The providers of television content or services can include program producers, television station managers, and advertising agents and companies (or third parties). Providers responsible for content or services should have the right skills, materials, hardware and software, and financial resources in

order to fulfill the two criteria below: providing interactive television content or services, and ensuring the procedure is smooth.

The first criteria for providing interactive television content or services:

1. Produce ITV content or services.
2. Manage and control ITV content or services.

There are two methods in producing ITV content or services:

Method 1: Revise traditional television content to become interactive;

Method 2: Produce interactive television content directly.

Both methods must include the following:

(a) Content must be planned and produced for MPEG video streaming, which is necessary for ITV content; (b) ITV coding should be embedded in the program content described in (a); (c) This television content must be managed and controlled.

Method 1 adds the function of ITV content to traditional television content: 1. Produce MPEG video streamed television content; 2. Replan and reproduce television content described in (1) so it conforms to the requirements of ITV content, such as the production of MPEG video streamed content requesting and explaining user responses; 3. Embed corresponding interactive television coding and related functions for the MPEG video streamed television content mentioned in (1) and (2); and 4. Manage and control the above-mentioned ITV content. Content or service providers can take full responsibility for these tasks. Tasks 1 and 2 can be entrusted to other program producers, station managers, or advertising agents, or ITV service providers can take responsibility for Tasks 2, 3 and 4.

Tasks in Method 2 are to directly produce ITV content. There are two main forms:

1. Directly plan and produce television content so that it is suitable for interactive television services, and enter interactive content, such as requests for consumers to respond to topics and explanations after these responses, into MPEG video streaming before embedding the necessary code for additional ITV into the content; and 2. Manage and control the above-mentioned ITV content. ITV service providers can also take full responsibility for these tasks, or Task 2 can be entrusted to an ITV service supplier.

Integration and presentation of channel (broadcast) content

Individuals who integrate and present ITV content may be station managers or system operators. They must have the right skills, source material, hardware and software, and financial resources to fulfill the criteria below: to provide pre-integrated ITV content for channels and ensure it is presented in its entirety.

Criterion 1 is to provide pre-integrated ITV content (including programs and advertisements) for

channels. This refers to the integration of ITV relay, attachments, inserted content and non-interactive TV content to become content for one or many channels.

As for Criterion 2, which is to ensure the delivery of ITV content in its entirety, it is necessary to sign a contract with the broadcasting channel's (cable television) system operators to obtain the commitment to ensure that there will be no disturbance to the broadcast. This commitment includes: the verification that there are no problems with pre-integrated ITV content for the channel; verification that there are no problems with the relay of additional and inserted ITV content; and the guarantee that the set top boxes or home terminals of subscribers can handle and present all the ITV content.

Transmission of ITV channel content and handling of ITV services

Those who handle the transmission of ITV channel content and ITV services can be system operators. They need to have the right skills, source material, hardware and software, and financial resources to completely fulfill the two criteria below: transmit ITV content in its entirety and comprehensively handle ITV services for customers.

The task for Criterion 1, which is the complete transmission of ITV services, is to provide a broadcast system and signal channels for transmission systems to broadcast ITV content.

Criterion 2 is the comprehensive handling of ITV customer services. The four main items are: 1. A return channel to transmit signals of user service requests to system operators' video sites, and transmit ITV (additional and inserted) content from back-end systems (such as video server networks of content providers or station managers) to subscribers; 2. Video sites, back-end systems and network connections to receive and decipher signals of user service requests, and respond to these requests; 3. Subscriber set top boxes or home terminals to show the ITV content from the operator; and 4. Information systems to record customer usage information.

According to Galperin and Bar's (2002) description, it is best to use a broadband internet connection for the return channel described in Criterion 2. Video sites are responsible for handling and recording user requests for services. They receive and decipher service request signals transmitted by subscriber set top boxes or other systems, record user-related response data, and command self-related systems or back end system operations to respond to user requests. These video sites usually include a main system and data logging system. The back end system receives video site commands and transmits appropriate responses to all kinds of ITV service requests to subscriber set top boxes. This usually includes video server computer

systems, exchange systems, and customer service systems. The video server computer system is the most important in presenting television content. It can deposit a large amount of attached ITV content and receive commands and transmit appropriate attached ITV content to subscriber set top boxes.

Operators themselves can handle tasks related to additional ITV services in Criterion 1 and 2, and can wholly or partially entrust responsibility to ITV service suppliers.

### C. Enjoyment of services

To enjoy ITV services, subscribers must first order them from their ITV service provider (such as the cable television system operator). Second, they need to have a set top box or home terminal equipment which can receive and handle ITV services or content and link up with the main video servers of ITV service providers, and also equipment which can activate additional code for ITV services or content and convey requests for ITV services, such as a remote control.

The composition of the structure of the ITV service criteria can be seen in Figure 2.

Characteristic 3: Return information for ITV services

It is necessary to obtain user information in the processes of providing and enjoying ITV services, and carry out follow up work. As this information is transmitted through return channels, it is called return information. If the information is processed, it is called processed return information.

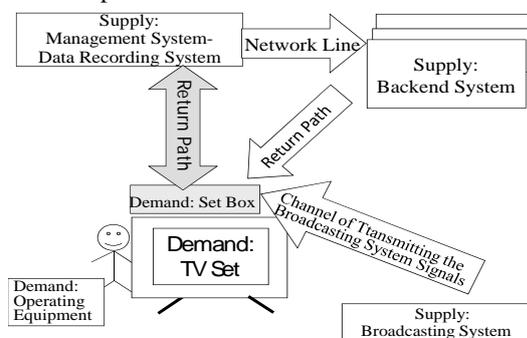


Figure2:Components

If users have a response or reaction towards ITV services or content, they can directly record this themselves through subscriber terminal equipment (currently a set top box), or after the user transmits to the above-mentioned subscriber terminal through certain operational equipment (currently a remote control), he or she can handle the main system and data logging systems of video sites achieved with the two methods through the return channels of system operators who log return information.

Detailed information can be separated into 1: Situational details (responses): when a subscriber opens, changes or lingers over certain ITV content, such as when the subscriber turns on the television,

or changes the channel or content. The subscriber's home terminal equipment records the information in detail, such as the program viewed, the content, or time period. With this data it is possible to effectively understand actual consumer responses. 2. Opinion details (replies): when consumers enter selections or numbers with particular equipment, such as entering numbers representing their selections and voting for the best performer or topic, entering data to participate in service quality evaluations, or entering selections that represent their opinions and opinions on the service quality. With this information it is possible to effectively deduce viewers opinions and the particular demands that subscribers hold toward their ITV usage.

From the above it can be observed that return information is a consumer response or reply to ITV services. But how can (cable television) system operators record and handle return information? First and foremost, in the process of organizing and analyzing the data, they may derive the positive and negative aspects of the broadcast or provided content and make improvements in order to promote an increase in ratings. Secondly, system operators may offer or sell the first-hand return information or processed return information, and obtain tangible or intangible benefits such as cooperation or direct profit. If system operators liaise with producers and station managers, they may further understand the viewing habits and opinions of consumers. This can promote a better understanding of consumer preferences, behaviour and time periods in which they watch television. It may also aid the further development in the area of ITV and, more generally, contribute to increasing television ratings.

The technological development of video-on-demand, broadcasts, and news reports continues to gain pace. Meanwhile the cost of relevant hardware and software is decreasing, along with the difficulties in recording return information and cost of resources. Recorded content is also becoming deeper and wider. However, as operators collect return information they should be cognizant of the fact that the main objective of subscribers using ITV services is enjoyment, and not return information. Therefore, when operators wish to collect return information, they need to offer suitable rewards. Only then will they attract enthusiastic responses. Moreover, the greater the number of items and the more time consuming the process, the more likely it is that they will be dissatisfied and responses will be harder to obtain. Attention must be paid to legal standards; personal information should be respected; and there should be adjustment for psychological resistance and encouragement to take the time required.

## 5.Conclusion and recommendation

As ITV is a new service, and in order to encourage the practical usage of ITV services, this study explored the fundamental characteristics as to offer a more comprehensive understanding of the necessary processes and key criteria for television relay, additional and inserted content; demand-side subscribers and supply-side (cable television) system operators; and the basic characteristics of return information on specific situations (responses) and opinions (replies).

However, ITV not only affects the development of television services, it also creates a new direction for viewing digital content. Therefore, in order to promote its effective expansion, this study also suggests the use of ITV services in national libraries. Finally this study recommends digital content, such as flashback query services (for television news), (multi-channel) meaning comparison search services and video-on-demand services.

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