

TV Formats and Bandwidth Requirements - Costing

Paper Submission: 01/01/2018, Date of Acceptance: 20/01/2018, Date of Publication: 24/11/2020



Ramesh Chandra Keer

Associate Professor,
Dept. of Economics,
M. L. V. Government College,
Bhilwara, Rajasthan, India

Abstract

In the present paper, "TV Formats and Bandwidth Requirements-Costing" have been studied. Broadcasting through satellite involves synthesis of multiple technologies. Television content broadcasting depends mainly on visual resolution in specific formats e.g. NTSC, PAL or Secum in Standard Definition (SD) then HD ready, Full high Definition (FHD with 1920*1080), 4K and 8K. In the same way broadcasting depends on compression techniques e.g. MPEG-2, MPEG-4 and HEVC. Content resolution and compression formats affect the rates for auction of TV slots on a satellite transponder which may be observed in the auction process of Free-Dish of Government of India. Generally TV channels on MPEG-2 slots are priced higher than MPEG-4 or HEVC compression.

Keywords: Broadcasting, Standard-Definition, High-Definition, MPEG-2/4, Auction, Satellite-transponder.

Introduction

Broadcasting costing has some peculiar characteristics. Broadcasting costs depend upon matrix of TV formats and compression standard specific compression along with specific resolution tends to have a unique costing feature which plays a crucial role in the pricing of TV channels. Since costing has a prime bearing on pricing which may be observed globally in the broadcasting industry.

Objective of the Study

1. To bring in light different types of TV formats and compression standards.
2. To explain inter-dependence of TV channels' pricing on TV formats and compression standards.

Review of Literature

Srivastav (2002) focused on TV technology but ignored pricing aspects. Salvatore (2009) focused on product pricing however not explained TV product pricing. Craig (2007) mainly focused on TV production business in general and ignored technical aspects. Sen (1999) highlighted inter linkages among employment, technology and development in general but TV technology aspects could not be highlighted. Herbert (2012) highlighted on in-house and outdoor TV content production but ignored satellite broadcasting aspect. Chakravarty (1989) highlighted on development planning particularly in macro contexts ignoring highly technology sensitive industry. Bernal (1969) systematically highlighted historical account of science but failed to give an account of broadcasting

Methodology

Secondary data related to TV content formats and compression standards have been used. Correlation between broadcasting cost and broadcasting pricing observed and then used as the basis of analysis of auction of TV slots on satellite transponder

Result

Television broadcasting is influenced by content formats and compression standard which are further used as basis of pricing of TV slots on satellite transponder. The content has been explained in Figures. A product can be produced with the help of alternative but competitive technologies e.g. a broadcaster can have number of ways to choose from while making a decision regarding an optimum technology of broadcasting and in India there are evidence of rising ICOR from the mid-fifties to the early eighties hence efficiency in production becomes of crucial importance. Let there may be a typical TV channel which serves a particular segment of viewers' TV contents on it say, kids.

Generally, in smaller television operations; the person might carry out several different functions. For example, the producer may also write and direct the show, and the floor manager may take on the responsibilities of the line producer. The art director may also function as a graphic artist, and most medium-sized or smaller production companies have little use for a permanent costume designer, wardrobe person, property manager, or sound designer. Television talent—the performers and actors who work in front of the camera—are usually considered part of the non-technical production in the same way broadcasting too has the same personnel. In the same way, the personnel employed may be technical, non-technical and office and accounts etc, in a DTH broadcasting organization too.

The technical personnel consist of people who are primarily concerned with operating equipment. These are usually part of the crew. The technical personnel include camera operators, audio and lighting people, digital video recorder (DVR) operators, video editors, C.G. (character generator) operators, and people who set up communication and signal transmission equipment look after the up linking and down linking related activities.

Basic Television System

A system is a collection of elements that work together to achieve a specific purpose. Each element depends on the proper functioning of the others, and none of the individual elements can do the job alone. The television system consists of equipment and people who operate that equipment for

the production of specific programs. The basic television system consists of the equipment and the people who operate the equipment to produce specific programs. In its simplest form, the system comprises a television camera that converts what it sees into a video signal, a microphone that converts what it hears into an audio signal, and a television set and a loudspeaker that reconverts the two signals into pictures and sound in accordance with appropriate technology. Once the alternative but competitive technologies are provided by the Engineers; here in the case of Broadcasting- the Broadcasting Engineers, the only task of Economics to select the optimum (most efficient) technology and resources which are required accordingly comparing output quality and cost-structure and magnitude.

Cost of Production

The expenses incurred on all factor and non factor inputs of production is known as cost. The factor inputs include Land, labour, capital and organization. Raw materials, fuel, equipments, tools etc are non factor inputs. Thus, cost is a function of various factors. Symbolically as:- $C = f(Q, T, Pf)$ Where C is the total cost of production, Q is output; T is technology, and Pf is the prices of factors of production.

The Broadcasting-factor-inputs requirements vary according to the technology adopted for the broadcasting platform and corresponding Bandwidth requirements; less bandwidth for lower resolution in Standard Definition and more in the case of High Definition as is evident from figure-1 and table 1:-

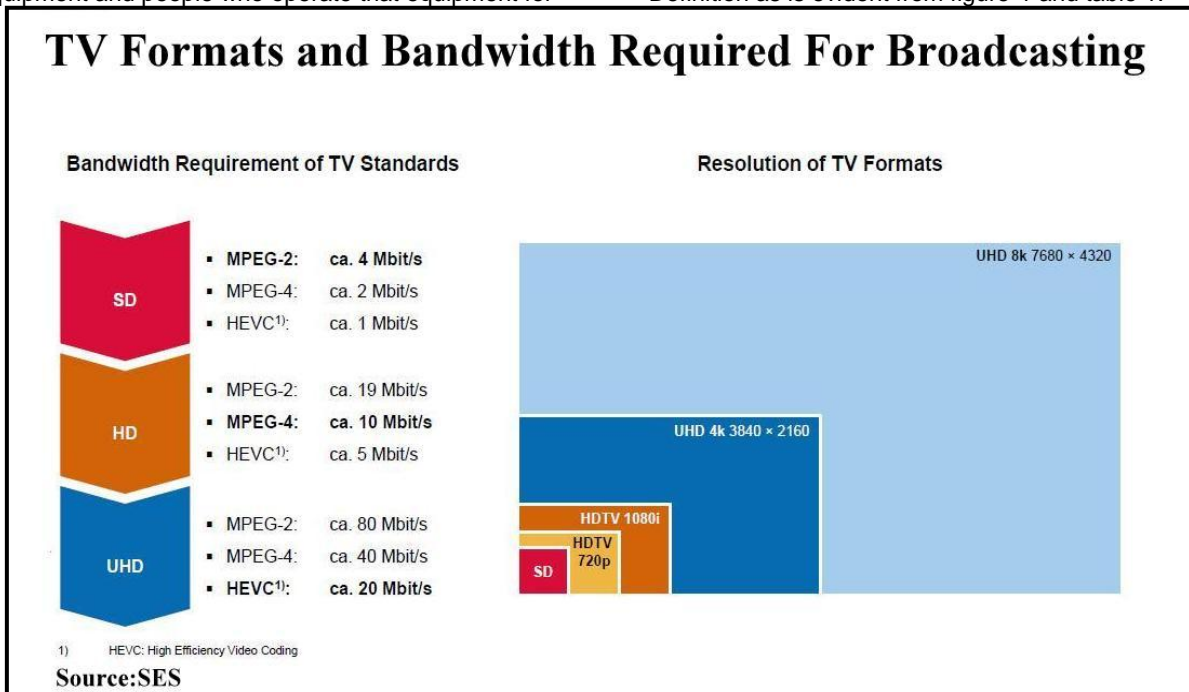


Figure-1: Resolution, Broadcasting and Bandwidth Required

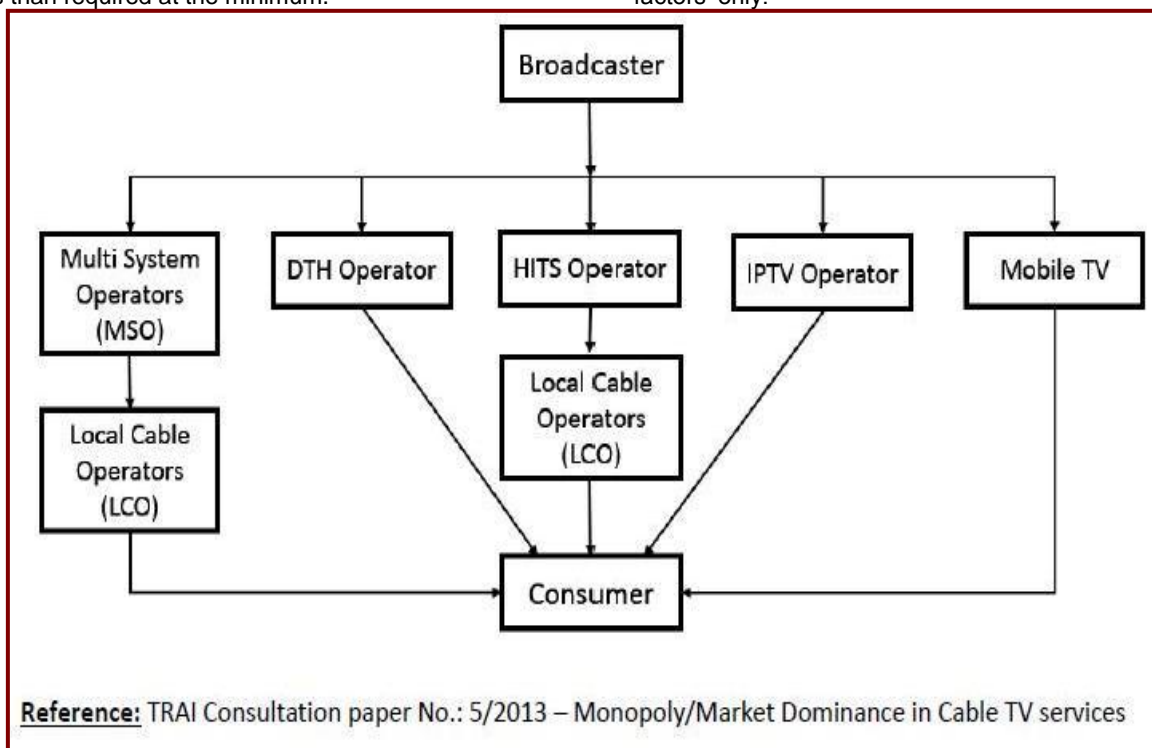
Table-1: Compression Advantages in Different Picture Formats in Bit-Rate

Format	HDTV	EDTV	SDTV	LDTV
Quality	High	Enhanced	Standard	Limited
Comparable to	2X ITU-R 601	ITU-R 601	PAL/SECAM/NTSC	VHS
Data rate before compression	1 Gbps	432 Mbps	216 Mbps	108 Mbps
Data rate after source coding	30 Mbps	11 Mbps	4.5 Mbps	1.5 Mbps
Compression	MPEG-2	MPEG-2	MPEG-2	MPEG-1
Utility	Telepresence	Home viewing	Home viewing	Mobile TV

(Source: Interactive TV Technology and Markets-2002)

Production functions of this variety are called separable, and there are at least two major forms of Production functions. In the following definition, we use $f_i(x)$ as a shorthand for the marginal product of input i , i.e., for $\partial f(x)/\partial x_i$. Here, it is to be noted that substitutability is within a range but not as perfectly substitutable that one of the factors either be zero or less than required at the minimum.

Since, band-width requirements for different TV formats, therefore a TV channel of lower formats, MPEG-2 on Standard Definition (SD) may be substituted with lesser and lesser number of TV channels of higher formats, i.e. - MPEG-4 Full HD / UHD 4K / 8K. In this way, broadcasters can substitute 'not perfectly and non-zero quantity of any of the factors' only.



(Figure-2: Choices with a TV Consumer (Source: TRAI const. paper: 5/2013))

From the above figure-2 we may deduce that a product (a TV programme) can be produced for consumption in five ways (let us assume that that is possible with the help of technology and that is the job of the Broadcasting Engineers) and the mere work of an economics- manager is just to make a rational

decision either on maximization of production, profit, increase in market share, or minimization of uncertainty or cost⁵ with technology and its concerns of evolution.

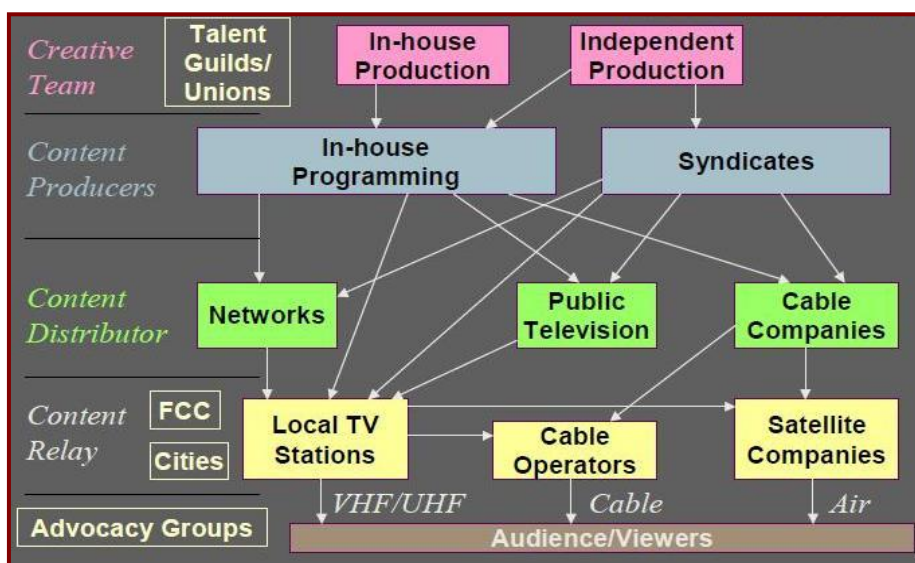


Figure-3: TV Content Production and Distribution Process Network (Source: TRAI const. paper: 5/2013) Broadcasting Cost of Production

The broadcasting costing reflects direct association between content resolution and

compression mode which may be deduced with the help of the hypothetical data as presented in table-2, as under:-

Table-2: Association Between Content-Resolution and Compression-Mode(In Crore Rs.)

Sr.No.	Particulars	Standard Defi.			High Defi.			Ultra-HD		
		MP-2	MP-4	HEVC.	MP-2	MP-4	HEVC.	MP-2	MP-4	HEVC.
1.	Mbit/s	4	2	1	19	10	5	80	40	20
2.	Mb. Rate per Sec.	4	4	4	4	4	4	4	4	4
3.	TV Channels Per transponder	10	20	30	5	10	15	2	4	8
4.	Auction Pricing/Per TV Channel	4/10	2/20	1/30	19/5	10/10	5/15	80/2	40/4	20/8
5.	=per TV channel price	0.4	0.1	0.033	3.8	1.0	0.33	40	20	2.5

The above table highlights existence of close association between Content-Resolution and Compression-Mode. As it is explicit from the figure-1 that Bandwidth requirements increases with increase in the Broadcast-Content resolution e.g. a content in Standard-Definition require lesser bandwidth compared with High-Definition content as more resolution means content divided in the more pixels that means more information therefore HD broadcast tends to be costlier than SD.

We can employ the above with respect to auction-pricing of TV channel's vacant-slots on the Free-Dish Transponders. If all columns of the Sr. No. 5th row are compared than costing of broadcasting of a TV channel on MPEG-2 happens to be costlier than MPEG-4 and HEVC. Because a single Transponder can broadcast lesser TV channels but the Satellite-launching, moving to a certain location longitudinally and management for its life-span remain same. In this way a Uniform-Cost is to be divided among number of channels to be broadcasted on a particular transponder. However, the cost tend to increase if the resolution is increased from SD to Full-HD (1920X1080i/p) and further to UHD-(3840X2160) i.e. 4K and K UHD-(7680X4320). In this way the Content Resolution and Compression-Modes and other factors determine broadcast-costs.

Conclusion

TV channels-slots on satellite transponder are priced logically and factually.

Suggestion

TV channels-slots on satellite transponders should be priced judiciously in order to expand broadcasting industry for revenue, employment and income growth.

References

- Bernal, J.D., *Science in History*, Vol-1, 1969, p. 47
- Chakravarty, Sukhamoy, *Development Planning, Second*, New Delhi, Oxford University Press, 1989 Page-53
- Collie, Craig, *The Business of TV Production, First*, Cambridge, Cambridge University Press, 2007, p. 197
- Hari Om Srivastav, *Interactive TV Technology and Markets, First*, London, Artech House Inc., 2002, p. 42
- Salvatore, Dominick, *Principles of Microeconomics, Fifth*, New Delhi, Oxford University Press, 2009 p. 177
- Sen, Amartya, *Employment, Technology and Development, First-(1975)*, New Delhi, Oxford University Press, 1999 (Tenth Reprint-2011) Page-12
- Zettl, Herbert, *Television Production Handbook, Eleventh*, Boston, Cengage Learning, 2012, p. 4-11