AN ANALYSIS OF ELECTRONIC NEWS GATHERING VIDEO TAPE FORMAT USAGE BY COMMERCIAL TELEVISION STATIONS IN THE UNITED STATES

By

KENDALL CARLTON DURFEY

Bachelor of Science

Oral Roberts University

Tulsa, Oklahoma

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Thesis Approved:

Charles A. Fleming
Thesis Adviser

Philip E. Paulin

Constance M. Lacy

Thomas C. Collins
Dean of the Graduate College

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

General

There are many broadcast quality video tape formats used in electronic news gathering (ENG) at today's television stations. In most cases it is the task of the station's chief engineer to decide which video tape format best suits the station. Since there was a lack of empirical data concerning video tape format usage and the various factors involved in the Chief Engineer's decision making process, it was necessary to determine the reasons for choosing one format over another. This study identified which of the many ENG video tape formats were most prevalent in the industry and the reasons why they were chosen.

Background

The decade of the 1980s brought many changes in technology to the field of electronic news gathering (ENG). In the mid-to-late 1970s television stations across the country made a switch from film to video tape as their

primary news gathering medium. Film cost, and the time required for film processing and editing were the primary reasons television stations switched to video tape as a means of recording news events. Video tape offered stations instantaneous news pictures and quicker editing capabilities which allowed stories to be prepared much closer to the time of broadcast (1).

Three-quarter-inch video tape was the mainstay of ENG equipment in the early 1980s, but technology and ENG equipment evolved quickly. By the mid-1980s there were multiple video tape formats available to television broadcasters, each format had been improved and refined. No longer was 3/4-inch the sole video format of ENG. The final years of the decade saw stations making changes and committing to new formats of ENG equipment.

Statement of the Problem

With the evolution of ENG technology, television stations have options in video tape formats. Due to this, multiple video tape formats are in use today in the television industry. However, limited research has been conducted concerning ENG video tape format usage, and for choosing one format over another.

Purpose

The purpose of this study was to determine the dominant video tape format used for ENG at commercial broadcast television stations in the United States. In addition, this study was designed to gather information pertaining to the length of time a station has used a particular format, which format they used prior to switching to their current format, why they switched to their current format and which format (if any) they would consider switching to and when.

Importance of the Study

No similar studies using scientific research methods for the purpose of determining the type of video tape format and the reasons for its use in ENG have been conducted. Television broadcast practitioners can use the results of this research to make educated decisions about trends in video tape format usage and video tape format compatibility with other stations. Broadcast educators can also use the results of this study to inform students about current video tape format usage in the television industry.

Methodology

A mail survey was sent to a representative sample of chief engineers of commercial television stations in the United States to determine the type of video tape format used for ENG and the reasons for its use.

Definition of Terms

For the purpose of this study, the following terms will be used as defined below.

The Area of Dominant Influence (ADI). "The Area of Dominant Influence is geographic market design that defines each television market exclusive of the others, the total of all the ADI's represents the total television households in the U.S" (2). Arbitron (a ratings company) determines the ADI's, there are a total of 212 ADI's with No. 1 being the largest and No. 212 the smallest.

Electronic News Gathering (ENG). "Electronic News Gathering is the use of portable cameras, videotape recorders, lights and sound equipment for the production of daily news stories and short documentaries. ENG is usually done for immediate post-production but can also be transmitted live from the field" (3).

Independent Television Stations. A broadcast television station not affiliated with a television network, such as ABC, CBS, NBC or FOX.

Network Affiliate. A broadcast television station affiliated with a television network, such as ABC, CBS, NBC or FOX.

Ultra High Frequency (UHF). "UHF is television transmission on the channels above 13 (channels 14-83 of the home receiver) UHF signals occupy 470-890 Megahertz (MHz)" (4).

Very High Frequency (VHF). "VHF is television transmission on the channels 2 though 13 of the home receiver. VHF signals occupy 54-88 Megahertz (channels 2-6) and 176-216 Megahertz (channels 7-13)" (5).

Video Tape. "A plastic, iron-oxide coated tape of various widths (from 1/4 inch to 2 inch) for recording of video and audio signals, as well as additional technical code information" (6).

Video Format. The various methods in which electronic information is recorded on video tape. Variations include tape width, tape speed, tape composition (chrome, metal, etc.) and the frequencies in which the video is modulated to be recorded on the tape.

Limitations of the Study

This study surveyed a representative sample of the entire population of commercial television stations throughout the United States. The sample was drawn from the Broadcasting Yearbook 1990, an annual directory of all television and radio stations in the United States.

This study did not consider public broadcasting or educational television stations. This study was concerned only with ENG video tape formats used for the production of news and news features only; the production of commercial advertisements and station promotional programming was not included.

Assumptions

Some logical assumptions had to be made in designing this study. It was assumed that the Chief Engineer at a commercial television station was the most knowledgeable person to respond to the questionnaire, and would do so honestly and to the best of his/her ability.

Organization of the Study

Chapter 2, Review of the Literature. This chapter reports a review of the literature conducted to identify studies similar to this one. This review included articles in journals and books, research studies, published reports and papers presented at meetings, as well as theses and dissertations related to the broadcasting medium.

Chapter 3, Methodology. This chapter discussed the research schedule, research design, survey instrument, pilot study, sampling procedure, cover letter, and statistical processes.

Chapter 4, Findings and Analysis of Data. This chapter presented the results obtained from the survey. These findings were presented in tables and charts and included frequency distributions, simple and complex chi-square test results and contingency tests.

Chapter 5, Summary, Conclusion and Recommendations. Chapter 5 of this study summarized the first three chapters of the study as well as the findings obtained from the

survey. This chapter discussed the significance of these findings for broadcast practitioners and broadcast educators and conclusions that were drawn from the study. The chapter concluded with recommendations for implementing the findings and further research possibilities.

CHAPTER II

HISTORY AND REVIEW OF THE LITERATURE

Overview of the Chapter

This chapter begins with a brief definition and history of electronic news gathering (ENG), continues with a review of relevant studies conducted concerning ENG, and concludes with an explanation of the importance of this study.

History

Although video tape technology was introduced by the Ampex Corporation in April 1956, nearly two decades passed before technology evolved to a level making ENG possible (7).

> ENG, Electronic News Gathering, is the use of portable cameras, videotape recorders, lights and sound equipment for the production of daily news stories and short documentaries. ENG is usually done for immediate post-production, but can also be transmitted live from the field (8).

ENG is a relatively recent development considering ENG technology has only existed for approximately 20 years.

Prior to the mid 1970s the primary news acquisition format was 16-millimeter newsfilm. Despite refinements and improvements to film cameras over the years, film had one major drawback as a reporting medium, it produced images via

a chemical process. Once a news story was shot on film it had to be returned to the station, processed, previewed, edited, and threaded on to a projector before it could be broadcast. This process typically required four to six hours to accomplish (9).

By contrast, video tape was ready to view the instant it was shot and editing was performed electronically, much more quickly and efficiently than editing newsfilm.

Aside from the obvious acquisition-to-air time differences, film stock and film processing was very expensive. An average network television affiliate in the early 1970s would spend approximately $10,000 per month in newsfilm costs. ENG equipment manufacturers used newsfilm costs as a sales strategy with station managers and engineers. Manufacturers explained that by converting from newsfilm to ENG the station could pay for their new ENG gear with savings from newsfilm in three years (10).

The first television station to convert from newsfilm entirely to ENG was KMOX-TV, the CBS network owned and operated station in St. Louis, MO, on October 14, 1974 (11).

Fred Burroughs, news director at KMOX-TV during the transition from film to ENG, cited numerous benefits from switching to ENG.

> The elimination of film processing reduced the time it took to put a story together, the time saved can be used to make editorial decisions. Three tape crews almost doubled the output of five film crews. With film we did eight to 10 stories a day, with ENG we were up to as many as 20 local stories a day (12).

By the end of the 1970s the majority (80.5 percent) of television stations had converted their news operations from newsfilm to ENG (13).

Review of the Literature

An extensive review of books, trade and consumer periodicals, reports, scholarly journals, papers presented at professional meetings, and theses and dissertations published or produced since 1980 netted only two studies relevant to this study.

Market Tech Associates, New York, New York (a commercial research organization), conducted research similar to this study approximately two years ago. Market Tech Associates was hired by a television equipment manufacturing company to perform research concerning video tape formats used by broadcast television stations.

The findings of that research were not available to this researcher. The client who retained Market Tech Associates to perform the research owns the results of the study. While Market Tech Associates confirms the study was conducted, it will not release the findings of the research.

This researcher was able to ascertain from Market Tech Associates that while the methodology of their study was similar to this study, the scope of their study was not. Market Tech Associate's research effort was concerned with

overall video tape format usage by broadcast television stations, and not solely on ENG video tape format usage, as was this study.

A search of the Dissertation Abstracts International from January 1980 to December 1991 identified a doctoral dissertation, "The Use and Acceptance of Electronic News Gathering Equipment by Local Television News Departments in the United States" by William James Rugg, completed in August 1980 at the University of Mississippi.

Rugg's study, now over ten years old, remains the only scholarly research on this subject prior to this study. Ironically, it was Rugg's dissertation that gave this researcher the idea to develop and conduct this study.

Rugg's study was conducted in the late 1970s, when the majority of television stations in the United States were converting from film to ENG equipment. The study was designed to examine the extent of use and degree of acceptance of ENG equipment by television news departments in the United States.

A mail questionnaire was sent to the entire population of television stations listed in the 1979 Broadcasting Yearbook during the spring and summer of 1979. This mailing and a subsequent mailing produced a response of 765 from 996 television stations for a response rate of 76.8 percent.

The data collected were analyzed via computer for frequency distributions, crosstabulations, and the chi-square test of statistical significance. Frequency

distributions from the study showed that the extent of use of ENG equipment by respondents was 80.5 percent. ENG equipment purchases were examined for the period 1969-1979. The greatest number of purchases occurred during the years 1975-1979, 958 percent more than 1969-1974.

Rugg used crosstabulations to examine relationships between stations which owned ENG equipment and station market size, geographic location, station designation (ownership), network affiliation, and frequency allocation (UHF, VHF).

The use of ENG equipment was represented among all types of television stations. No market size designation was unrepresented. The lowest rate of usage of ENG equipment by market size was 70.8 percent, for the Small Market category (ADI 151-211). No geographical location in the country was unrepresented. The lowest rate of usage of ENG equipment by geographic location was 69.9 percent, for the North Central states. No station designation was unrepresented. The lowest rate of usage of ENG equipment by individual station designation was 64.4 percent, for the Independent Commercial stations. Network owned and operated and independent Non-commercial station respondents each indicated 100 percent ENG usage. Each of the three major commercial TV networks was well represented with 92.0 percent for ABC, 86.2 percent for CBS, and 85.7 percent ENG usage for the NBC network. Each category of frequency allocation also showed a high percentage of ENG usage with

87.3 percent for VHF and 67.7 percent for UHF stations (14). While Dr. Rugg's study was similar in methodology to this study, his primary concern was with station adoption and acceptance of ENG equipment, while this study focused on station ENG video tape format usage.

1980 to 1990, A Decade of ENG Evolution

In the period between Dr. Rugg's study and this one, there have been many technological advances in ENG equipment.

The process of ENG hasn't changed drastically since 1980, but the equipment used for ENG has. The primary goal of ENG equipment manufacturers was to reduce the size and weight of ENG gear while retaining, if not improving, the picture quality capabilities of the ENG equipment (15). The two primary advancements in ENG equipment were the development of the Charged Coupled Device (CCD) and component video technology. CCDs (chips) replaced tubes in ENG cameras as the image pick-up device. CCDs, aside from being much smaller and lighter than tubes, also proved to be more efficient in low-light ENG situations. Component video technology improved ENG picture quality and resolution by allowing the separation of chrominance and luminance signals in the video signal (16). In the late 1970s when Rugg was compiling the data for his research study, one primary video tape format was being used for ENG. While 3/4-inch U-matic video tape is still used today, other video tape formats

emerged with the evolution of ENG equipment. The various video tape formats currently used for ENG were determined for this study by consulting broadcast industry periodicals, video tape and ENG equipment manufacturers, and broadcast practioners. The video tape formats used for ENG differ by physical size of the tape cartridge, width of the enclosed tape, length of the tape, the composition (metal, chrome, etc.) of the tape, and the method by which the audio and video signals are recorded on the tape.

Many of the ENG equipment refinements were the product of technological upgrades to consumer video cameras and recorders. Beta, an early consumer video tape format (late 1970s, early 1980s) evolved into Betacam (early 1980s), a professional ENG video tape format. VHS, the most popular current consumer video tape format, evolved first (mid 1980s) to become MII, a professional ENG video tape format, and later (late 1980s) to become SVHS (Super-VHS) an industrial and professional ENG video tape format (17).

ENG in the 1990s

If miniaturization of ENG equipment was the wave of the 1980s, digitalization of ENG may be the wave of the 1990s. Grass Valley (a professional video equipment design and manufacturing company) has developed a prototype computer disc-based recording and editing system for ENG. While the prototype is able to record up to seven minutes of video and audio, Grass Valley claims 40 minutes-to-an-hour will be

possible. The system records audio and component video signals directly from a video tape source onto disc, allowing instantaneous digital editing of ENG footage. Since the audio and video signals are converted to digital there is no generational picture degradation as with current tape-to-tape editing (18). With recent advances in digital audio and video, solid-state computer memory, and recordable video disc technology, the prospects for a compact, high quality replacement for video tape may not be far off. One candidate is the videocard. The videocard would resemble a credit card, but have enormous data storage capabilities. The principle of the videocard is similar to that of Nintendo videogame cartridges. Today's generation of videocards are known as smart-cards. Smart-cards contain one or more computer chips with a predetermined amount of memory. Currently, one megabyte of data can be stored on a single card. Five minutes of video would require more than a gigabyte (one million kilobytes) of memory for storage. The Massachusetts Institute of Technology Media Lab has shown that the amount of data in digitized video can be compressed. To compress the data without altering the original video, only the visual information that changes from frame-to-frame is stored, conserving precious memory capacity (19).

With improvements in data compression and memory storage capabilities on the horizon, the videocard could become a reality by the end of the decade, revolutionizing ENG.

Importance of This Study

While Dr. Rugg's study considered all commercial and public/educational television stations in the United States and their adoption and acceptance of ENG equipment, this study was concerned only with commercial television stations in the United States and their ENG video tape format usage.

Because so many different video tape formats are currently used for ENG, this research effort was developed to ascertain which video tape formats were most common. This study will also examine relationships between station market size, geographic location, network affiliation, and frequency allocation (UHF or VHF), and video tape format used for ENG.

CHAPTER III

THE MECHANICS OF THE STUDY

Overview

This chapter discusses research design and methodology, the pilot study, sampling techniques, the questionnaire, data collection and recording plan, the statistical analysis and study limitations. The chapter concludes with a brief summary.

Methodology

A mail survey of a representative random sample of all chief engineers of commercial television stations in the United States was conducted to determine which video tape format stations used for electronic news gathering (ENG) and the reasons why they used it. A systematic random sample of 400 was surveyed.

Sampling Plan

There are approximately 1,200 commercial television stations in the United States. A representative random

sample of 400 stations was drawn from the 1990 Broadcasting Yearbook (an annual national directory of television stations).

Since there are approximately 1,200 commercial television stations in the total population, every third commercial television station listed in the directory was included in the random sample of 400 stations, beginning with a randomly-selected starting point.

Research Design

The primary hypothesis to be studied was: There is no relationship between station market size, geographic location, network affiliation, station frequency (UHF, VHF), and ENG video tape format usage.

The independent variables in this study include the station's market size, geographic location, network affiliation, and station's frequency allocation (UHF or VHF). The dependent variables include the type of video tape format used for ENG and the reasons for its use. The reasons considered in this study were cost, compatibility, convenience, quality, reliability, time used, amount of news programming per week, and corporate/management influence.

The Pilot Study

Eight chief engineers from Tulsa and Oklahoma City, Oklahoma, commercial television stations were selected to participate in a pilot study conducted in late October 1991.

Each chief engineer of the ABC, CBS, FOX and NBC affiliates in Tulsa and Oklahoma City television stations received a copy of the questionnaire. Upon completion, they were asked for suggestions and feedback pertaining to the survey instrument. Suggested adjustments were considered, the questionnaire revised, and a final version prepared for the first mailing.

Research Instrument

A questionnaire was developed to collect data pertaining to information about the station and station ENG video tape format usage. A cover letter explaining the research effort and the research instrument accompanied this questionnaire.

The cover letter included questionnaire completion deadline information, participation importance, and an offer of a summary of results to those interested. A copy of the cover letter is included in the appendix. The questionnaire was developed to be quick and easy to complete. In most cases, only a check mark in the appropriate box, or a short one-word or one-phrase answer was required. The questionnaire was designed to take only the front and back of one page of paper in hopes of increasing the response rate. A copy of the research instrument is included in the appendix.

Data Collection Plan

The first mailing of the questionnaire was sent to the sample of chief engineers in early November 1991, and the second mailing was sent in early January 1992.

A number printed on each questionnaire corresponded to each station in the sample and was used to identify non-respondents. Those non-respondent stations were sent a second mailing of the questionnaire with a revised cover letter requesting their participation in this study. A copy of the revised cover letter is included in the appendix.

Data Processing and Analysis

As the completed questionnaires were returned, the responses were recorded into a matrix on SYSTAT (System for Statistics), a statistical analysis computer program. SYSTAT was used to provide descriptive statistics and to perform simple and complex chi-square tests to analyze the frequency data by comparing observed with expected results. SYSTAT also provides a phi or contingency test to determine the strength of relationships. For example, in this study SYSTAT was used to determine if relationships existed between station market size, geographic location, network affiliation and the dependent variables, as well as the strengths of those relationships.

Limitations of the Study

This study surveyed a representative sample of the entire population of commercial television stations throughout the United States. The sample was drawn from the Broadcasting Yearbook 1990, an annual directory of all television and radio stations in the United States.

This study did not consider public broadcasting or educational television stations. This study was concerned only with ENG video tape formats used for the production of news and news features only; the production of commercial advertisements and station promotional programming was not included.

Summary

A representative random sample of 400 commercial television stations was drawn from approximately 1,200 commercial television stations in the United States from the 1990 Broadcasting Yearbook. A questionnaire was developed to gather data about the stations and their ENG video tape format usage. A pilot study was conducted in late October 1991, involving eight chief engineers from Tulsa and Oklahoma City, Oklahoma. Feedback about the questionnaire from the engineers was considered, and the survey instrument was revised. The complete sample was sent the first mailing of the cover letter and questionnaire in early November

1991, and non-respondents received the second mailing of the questionnaire in early January 1992.

SYSTAT, a statistical analysis computer program was used to provide descriptive statistics and to perform simple and complex chi-square and phi or contingency tests with the data collected from the questionnaire. Relationships between station market size, geographic location, network affiliation, frequency allocation (UHF, VHF), and the video tape format used for ENG were examined.

CHAPTER IV

FINDINGS OF THE STUDY

Introduction

The purpose of this study was to determine electronic news gathering (ENG) video tape format usage by commercial television stations in the United States.

A mail survey was sent to a representative random sample of 400 chief engineers of commercial television stations. The sample was drawn from the Broadcasting Yearbook, 1990. The first mailing of the questionnaire resulted in a response from 203 stations. A subsequent mailing yielded 73 responses for a total of 276 respondents and a response rate of 69 percent. Of the 276 respondents, two returned questionnaires were incomplete and unusable resulting in a final response rate of 68.5 percent.

Demographics

The demographic factors considered in this study were station market size, geographic location, network affiliation, and frequency allocation. Tables I through V present the demographic data collected.

Respondents were asked to select the market size category which represented their station, based upon the ADIs in the Broadcasting Yearbook, 1990. These data were necessary to determine if a significant relationship existed between station market size and ENG video tape format usage. Table I indicates the percentage of respondents by station market size.

TABLE I

PERCENTAGE OF STATIONS BY MARKET SIZE

Market Size	Frequency	Percentage
1-10	24	8.8%
11-50	57	20.8
51-100	73	26.8
101-150	81	29.4
151-212	36	13.1
Undesignated	3	1.1
Total	274	100.0%

Respondents were asked to indicate the geographic location of their station. This data was necessary to determine if a significant relationship existed between

station geographic location and ENG video tape format usage. Table II indicates the percentage of respondents by station geographic location.

TABLE II

PERCENTAGE OF STATIONS BY GEOGRAPHIC LOCATION

Geographic Location	Frequency	Percentage
Northeast	32	11.7%
Mid-Atlantic	26	9.5
South	55	20.1
North Central	37	13.5
Midwest	38	13.9
Northwest	28	10.2
Southwest	58	21.1
Total	274	100.0%

Respondents were asked to indicate their station's network affiliation. This data was necessary to determine if a significant relationship existed between station network affiliation and ENG video tape format usage. Table III indicates the percentage of respondents by station network affiliation.

TABLE III

PERCENTAGE OF STATIONS BY NETWORK AFFILIATION

Network Affiliation	Frequency	Percentage
ABC	66	24.1%
CBS	71	25.9
FOX	27	9.9
NBC	79	28.8
Independent	31	11.3
Total	274	100.0%

Respondents were also asked to indicate their station's frequency allocation. This data was necessary to determine if a relationship existed between station frequency allocation and ENG video tape usage. Table IV indicates the percentage of respondents by station frequency allocation.

TABLE IV

PERCENTAGE OF STATIONS BY FREQUENCY ALLOCATION

Frequency Allocation	Frequency	Percentage
UHF	95	34.7%
VHF	179	65.3
Total	274	100.0%

The majority of the ABC-, CBS-, and NBC-affiliated stations were VHF stations. However, the majority of FOX and independent station respondents indicated they were UHF stations. Table V indicates the percentage of stations by network affiliation and frequency allocation.

TABLE V

PERCENTAGE OF STATIONS BY NETWORK AFFILIATION AND FREQUENCY ALLOCATION

Frequency Allocation	Network Affiliation				
	ABC (N=66)	CBS (n=71)	FOX (N=27)	NBC (N=79)	IND. (N=31)
UHF	27.3%	15.5%	85.2%	29.1%	64.5%
VHF	72.7	84.5	14.8	70.9	35.5
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Analysis of Study Findings

Initially it was necessary to determine if respondent stations produced any locally originated news programs. The findings indicated that 88.7 percent of stations produced locally originated news programs, and 11.3 percent of the stations did not produce locally originated news programs.

Significant relationships existed between station network affiliation and local news origination as well as station frequency allocation and local news origination. A Pearson chi-square test indicated a relationship between station network affiliation and local news origination at a confidence level of .05 or less and a contingency coefficient (strength of a relationship on a scale of 0 - 1.0) of .5374. Table VI indicates the percentage of respondents by network affiliation and local news origination.

TABLE VI

PERCENTAGE OF STATIONS BY NETWORK AFFILIATION AND LOCAL NEWS ORIGINATION

Local News Origination	Station Network Affiliation ABC (n=66)	CBS (n=71)	FOX (n=27)	NBC (n=79)	IND (n=31)
Yes	100.0%	98.6%	37.0%	97.5%	64.5%
No	0.0	1.4	63.0	2.5	35.5
Total	100.0%	100.0%	100.0%	100.0%	100.0%

An interesting oberservation was that 63 percent of FOX affiliated stations and 35.5 percent of independent stations did not produce any locally originated news programs. Simple chi-square calculations indicated no significant differences among ABC, CBS and NBC network affiliated stations and local news origination. However, at a confidence level of .05 or less, significant differences did exist among FOX and independent stations and local news origination.

A Pearson chi-square test indicated a relationship between station frequency allocation and local news origination at a confidence level of .05 or less and a phi value of .4177. Table VII indicates the percentage of respondents by frequency allocation and local news origination.

TABLE VII

PERCENTAGE OF STATIONS BY FREQUENCY ALLOCATION AND LOCAL NEWS ORIGINATION

Local News Origination	Station Frequency Allocation UHF	VHF
Yes	70.5% (67)	98.3% (176)
No	29.5 (28)	1.7 (3)
Total	100.0% (95)	100.0% (179)

Respondents were asked how many hours of news programming their station produced during a normal news week. Respondents were given a range from which to choose, from one to 26-plus hours per week. Table VIII indicates the percentage of respondents by hours of news programming per week.

TABLE VIII

PERCENTAGE OF STATIONS BY HOURS OF NEWS PROGRAMMING PER WEEK

Hours of News Programming Per Week	Frequency	Percentage
None	32	11.7%
1-5 hours	34	12.4
6-11 hours	82	29.9
12-16 hours	69	25.2
17-21 hours	31	11.3
22-25 hours	15	5.5
26-plus hours	11	4.0
Total	274	100.0%

Respondents were asked which video tape format they used for ENG. The 3/4-inch and Betacam video tape formats

were indicated as the most prevalent by this study. Table IX indicates the percentage of respondents by video tape format used for ENG.

TABLE IX

PERCENTAGE OF STATIONS BY ENG VIDEO TAPE FORMAT USAGE

ENG Video Tape Format	Frequency	Percentage
None	31	11.3%
3/4-inch	117	42.7
MII	12	4.4
Hi-8	4	1.5
Betacam	95	34.7
SVHS	14	5.1
Other	1	.3
Total	274	100.0%

A Pearson chi-square test indicated a significant relationship between station market size and ENG video tape format usage at a confidence level of .05 or less and a contingency coefficient (strength of a relationship on a 0 - 1 scale) of .4904. Table X indicates the percentage of ENG video tape format usage and station market size.

TABLE X

PERCENTAGE OF ENG VIDEO TAPE FORMAT USAGE
BY STATION MARKET SIZE

ENG Video Tape Format	Station Market Size ADIs 1-10 (n=24)	11-50 (n=57)	51-100 (n=73)	101-150 (n=81)	151-212 (n=36)	Und. (n=3)
None	8.3%	17.5%	13.7%	7.4%	8.3%	0.0%
3/4-inch	20.8	14.0	41.1	58.0	72.2	33.4
MII	4.2	5.3	5.5	3.7	2.9	0.0
Hi-8	0.0	0.0	1.4	3.7	0.0	0.0
Betacam	66.7	61.4	35.6	18.5	5.6	33.3
SVHS	0.0	0.0	2.7	8.7	11.1	33.3
Other	0.0	1.8	0.0	0.0	0.0	0.0
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Simple chi-square calculations indicated at a confidence level of .05 or less that real differences existed between all video tape formats except Betacam among stations in the 1-10 market size category, all except Betacam in the 11-50 and 51-100 market size categories, and all except 3/4-inch in the 101-150 and 152-212 market size categories.

A Pearson chi-square test indicated a relationship between station network affiliation and ENG video tape format at a confidence level of .05 or less and a

contingency coefficient (strength of a relationship between 0 - 1) of .5780. Table XI indicates the percentage of ENG video tape format usage by station network affiliation.

TABLE XI

PERCENTAGE OF ENG VIDEO TAPE FORMAT USAGE BY STATION NETWORK AFFILIATION

ENG Video Tape Format	Percentage of Stations by Network Affiliation				
	ABC (n=66)	CBS (n=71)	FOX (n=27)	NBC (n=79)	IND. (n=31)
None	0.0%	1.4%	62.9%	2.5%	35.5%
3/4-inch	50.0	52.0	3.7	50.6	19.4
MII	3.0	1.4	3.7	8.9	3.2
Hi-8	0.0	2.8	0.0	2.5	0.0
Betacam	42.4	36.6	29.6	27.9	35.5
SVHS	4.6	5.6	0.0	7.6	3.2
Other	0.0	0.0	0.0	0.0	3.2
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Simple chi-square calculations indicated significant differences at a confidence level of .05 or less with ABC and CBS affiliated stations and all of the video tape formats considered in Table XI except the 3/4-inch and Betacam formats. The simple chi-square calculations

indicated significant differences among all but the 3/4-inch video tape format with NBC stations. Significant differences were indicated via simple chi-square tests among all the video tape formats in Table XI with the FOX and independent stations. A Pearson chi-square test indicated a relationship between ENG video tape format usage and station frequency allocation at a confidence level of .05 or less and phi value of .4308. Table XII indicates the percentage of ENG video tape format usage by station frequency allocation.

TABLE XII

PERCENTAGE OF ENG VIDEO TAPE FORMAT USAGE
BY STATION FREQUENCY ALLOCATION

ENG Video Tape format	Percentage of Stations by Frequency Allocation UHF		VHF	
None	(28)	29.5%	(3)	1.7%
3/4-inch	(37)	38.9	(80)	44.7
MII	(2)	2.1	(10)	5.6
Hi-8	(1)	1.0	(3)	1.7
Betacam	(22)	23.2	(73)	40.8
SVHS	(5)	5.3	(9)	5.0
Other	(0)	0.0	(1)	.5
Total	(95)	100.0%	(179)	100.0%

Simple chi-square calculations indicated at a confidence level of .05 or less that significant differences existed with all the video tape formats listed in Table XII except the 3/4-inch format among UHF stations, and significant differences existed with the MII and SVHS formats among the VHF stations.

Some respondents indicated that they used more than one video tape format for ENG, Table XIII indicates the percentage of stations that used more than one video tape format for ENG and the format that they used.

TABLE XIII

PERCENTAGE OF STATIONS BY SECONDARY ENG VIDEO TAPE FORMAT

ENG Video Tape Format	Percentage of Stations Using Secondary Video Tape Format	
None	(237)	86.5%
MII	(6)	2.2
Hi-8	(7)	2.5
Betacam	(13)	4.7
SVHS	(10)	3.7
Other	(1)	.4
Total	(274)	100.0%

Respondents were asked how long their stations have used their current ENG video tape format. Most stations indicated that they have used their current format three years or more. Table XIV indicates the percentage of stations by the length of time ENG video tape format has been used.

TABLE XIV

PERCENTAGE OF STATIONS BY LENGTH OF TIME ENG VIDEO TAPE FORMAT USED

Length of Time Video Tape Format Used		Percentage of Stations
None	(32)	11.7%
1 - 6 months	(3)	1.1
6 mo. - 1 year	(3)	1.1
1 - 2 years	(25)	9.1
2 - 3 years	(27)	9.8
3 - 5 years	(46)	16.8
5-plus years	(138)	50.4
Total	(274)	100.0%

The video tape formats that were used for ENG were used by 75.2 percent of respondent stations for on-air playback

of news stories. Secondary video tape formats were also used by 12.8 percent of these stations for on-air playback of news stories, and 13.5 percent of respondents indicated they did not use the same video tape format for on-air playback of news stories as they did for ENG.

The majority of respondents indicated that their station had used 3/4-inch video tape or 16-millimeter film before switching to their current ENG video tape format. Table XV indicates the percentage of stations by previous ENG format.

TABLE XV

PERCENTAGE OF STATIONS BY PREVIOUS ENG FORMAT

Previous ENG Format	Frequency	Percentage of Stations
None	31	11.3%
16MM Film	75	27.4
3/4-inch	153	55.8
Betacam	8	2.9
Other	7	2.6
Total	274	100.0%

In Table XV, respondents that indicated their station had used Betacam were stations that had signed on-the-air using the Betacam video tape format.

Respondents were asked the reasons why they had switched from their previous to their current video tape format. Given a list from which to choose, the most frequent responses were quality, reliability, convenience, and cost (respondents could select more than one reason). Table XVI indicates the percentage of those responding to this portion of the questionnaire and the reasons for changing ENG video tape formats.

TABLE XVI

PERCENTAGE OF STATIONS BY REASONS FOR CHANGING ENG FORMATS

Reasons for Changing Formats	Percentage of Stations
Compatibility	6.1%
Cost	17.2
Quality	29.9
Reliability	20.7
Convenience	17.4
Corporate/Management Decision	5.8
Other	2.9
Total	100.0%

Survey respondents were asked if they anticipated changing formats in the future. The most frequent response was "no". Table XVII indicates the percentage of stations anticipating a change of ENG formats in the future.

TABLE XVII

PERCENTAGE OF STATIONS ANTICIPATING A CHANGE OF ENG FORMATS

Anticipate Changing Formats	Frequency	Percentage of Stations
No Response	33	12.0%
Yes	100	36.5
No	141	51.5
Total	274	100.0%

Of those 100 respondents who anticipated a change in ENG video tape formats, 33 percent anticipated a change to Betacam, 21 percent to some other (digital) format, 20 percent to SVHS, 19 percent to Hi-8 and 7 percent to MII.

Respondents were asked to indicate (from a list of reasons) why they would change to a new ENG video tape format. The most frequent responses were quality, cost,

convenience, reliability, and compatibility. Table XVIII indicates the percentage of respondents and the reasons for changing to a new ENG video tape format.

TABLE XVIII

PERCENTAGE OF STATIONS BY REASONS FOR CHANGING TO A NEW ENG VIDEO TAPE FORMAT

Reasons for Changing ENG Formats	Frequency	Percentage of Stations
Compatibility	22	10.3%
Cost	43	20.3
Quality	66	31.1
Reliability	36	16.8
Convenience	37	17.3
Corporate/Management	4	1.9
Other	5	2.3
Total	213	100.0%

In this chapter station market size, geographic location, network affiliation, and frequency allocation were the only variables considered in relationship to ENG video tape format usage. This was the primary focus of this study. An interpretation of the findings in this chapter will be presented in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

There are many broadcast quality video tape formats used in electronic news gathering (ENG) at today's television stations. In most cases it is the task of the station's chief engineer to decide which video tape format best suits the station. As a result of the evolution of ENG technology through the 1970s and 1980s, television stations have options in video tape formats. Due to this, multiple video tape formats are in use today in the television industry. However, limited research has been conducted concerning ENG video tape format usage, and for choosing one format over another.

The purpose of this study was to determine the dominant video tape format used for ENG at commercial broadcast television stations in the United States. In addition, this study gathered information pertaining to the length of time a station has used a particular format, which format they used prior to switching to their current format, why they switched to their current format, and which format (if any) they would consider switching to and when.

The independent variables in this study included the station's market size, geographic location, network affiliation, and station's frequency allocation (UHF or VHF). The dependent variables included the type of video tape format used for ENG and the reasons for its use. The reasons considered in this study were cost, compatibility, convenience, quality, reliability, length of time used, amount of news programming per week, and corporate/ management influence.

Methodology

A mail survey of a representative random sample of all chief engineers of commercial television stations in the United States was conducted to determine which video tape format stations used for electronic news gathering (ENG) and the reasons why they used it. A systematic random sample of 400 was drawn from the Broadcasting Yearbook 1990, from a total population of approximately 1,200 commercial stations.

Summary of Findings

The primary hypothesis studied was: There is no relationship between station market size, geographic location, network affiliation, station frequency allocation (UHF, VHF), and ENG video tape format usage. The null hypothesis studied was partially supported and not supported. No significant relationship was determined between station geographic location and video tape format

used for ENG, partially supporting the null hypothesis. Significant relationships were determined however, between station market size, network affiliation, frequency allocation, and video tape format used for ENG, partially rejecting the null hypothesis. The research questions studied sought information on: station market size, geographic location, network affiliation, frequency allocation, local news origination, video tape format used for ENG, length of time video tape format was used for ENG, reasons for choosing one ENG format over another, and anticipated future ENG video tape format.

The findings indicated that 88.7 percent of respondent stations produced locally originated news programs, and 11.3 percent of the stations did not produce locally originated news programs.

Among all stations studied, 3/4-inch video tape was determined to be the most used video tape format for ENG, followed by Betacam, Super-VHS, MII, and Hi-8. The most popular video tape format for ENG with the 1 - 50 ADI market size stations was Betacam and 3/4-inch video tape was the most popular ENG video tape format with the stations in the 51 - 212 ADI market sizes.

Approximately 50 percent of the ABC, CBS, and NBC affiliates indicated they used 3/4-inch video tape for ENG. However, 42.4 percent of the ABC affiliates indicated they used Betacam, as did 36.6 percent of the CBS affiliates, 27.9 percent of the NBC affiliates and 29.6 of the FOX

affiliates. Most stations indicated that they have used their current ENG video tape format for more than three years.

The video tape formats that were used for ENG, were used by 75.2 percent of respondent stations for on-air playback of news stories. Secondary video tape formats were also used by 12.8 percent of these stations for on-air playback of news stories, and 13.5 percent of respondents indicated they did not use the same video tape format for on-air playback of news stories as they did for ENG.

The majority of respondents indicated that their station had used 3/4-inch video tape or 16-millimeter film before switching to their current ENG video tape format. Quality, reliability, convenience, and cost were the most popular reasons respondents indicated for switching to their current ENG format. Most respondents did not anticipate changing ENG formats within the next two years.

Of the 100 respondents who anticipated a change in ENG video tape formats, 33 percent anticipated a change to Betacam, 21 percent to some other (digital) format, 20 percent to SVHS, 19 percent to Hi-8, and seven percent to MII.

Conclusions

From the findings of the study, one could conclude, the larger the market size of a station the more likely it would use Betacam as an ENG video tape format. The smaller the

market size of the station the more likely it would use 3/4-inch as an ENG video tape format. This is because many small market stations could not afford to upgrade to Betacam as quickly as the larger market stations. Many of these small market stations indicated they would be converting to Betacam within the next two years. Some smaller market stations are converting instead to the moderately priced Hi-8 and SVHS video tape formats. About 20 percent of respondent stations indicated they would wait for the much anticipated advent of a digital ENG video tape format. A digital video tape format would offer a picture quality limited only by the pick-up device (the ENG camera).

Recommendations

To Practitioners--Broadcast practitioners could use the results of this study to compare their stations with others of similar market size, geographic location, network affiliation, frequency allocation, and ENG video tape format usage. Broadcast practitioners may also use the results to make educated decisions about trends in video tape format usage and format compatibility with other stations.

To Educators--Broadcast educators could use the results of this study to inform students about current video tape format usage in the television industry.

For Further Research--Due to the rapid evolution and development of digital video technology, much of this research and its subsequent findings will be obsolete within

a few years. A digital ENG video tape format will be available to stations soon. Over ten years have passed since the last empirical research study was conducted on this subject. Similar studies should be conducted periodically to more accurately monitor ENG video tape formats and format usage by television stations.

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APPENDIX

QUESTIONNAIRE AND COVER LETTERS

OKLAHOMA STATE UNIVERSITY
School of Journalism and Broadcasting
Stillwater, OK 74078
(405) 744-6354/5960

November 19, 1991

Dear Chief Engineer:

I need your help in completing a nationwide study of video tape format usage for electronic news gathering (ENG) purposes. This questionnaire is a vital portion of my research and essential to a valid statistical analysis concerning this topic. I would appreciate it if you could take five minutes from your busy schedule and fill out the enclosed questionnaire and drop it in the enclosed addressed, stamped envelope and return it to me by **December 6, 1991.**

If it is more appropriate for the News Director, ENG coordinator, or another person at your station to complete this questionnaire, please pass it along to him or her with these instructions.

The number which appears in the upper right-hand corner of the questionnaire has been randomly assigned, solely for the purpose of identifying non-respondents. This number will not be used to match stations with responses. All sources of information will strictly confidential, and all information will be kept anonymous.

As an incentive to those who complete the questionnaire, I will provide a copy of the summary of results. This data will allow you to see nationwide trends in video formats for ENG, and you can compare your station with others of similar size, affiliation, etc. If you desire one of these summaries, please complete the enclosed mailing label and return it with the questionnaire.

If you have any questions pertaining to this questionnaire, please contact me. My work phone is (405) 744-5960 and home number is (405) 372-9408.

The success of this study is dependent on your response to this questionnaire. Thank you for your time and help.

Cordially,

Kendall C. Durfey
Masters Candidate
Oklahoma State University

Attachments

OKLAHOMA STATE UNIVERSITY
School of Journalism and Broadcasting
Stillwater, Oklahoma, 74078
(405) 744-6354/5960

INSTRUCTIONS: This questionnaire has been designed to require only a few minutes of your time. In most cases only a check mark in the appropriate box is required.

Thank you for your time. Please return the questionnaire (and the address label if you so choose) in the postage-paid addressed envelope provided by December 6, 1991. If you have any questions pertaining to this questionnaire please contact Kendall Durfey.
Work phone (405) 744-5960 • Home phone (405) 372-9408.

I. EQUIPMENT AND PROGRAMMING INFORMATION

1. Does your station produce any locally originated news programs? ☐ yes ☐ no

   If no: please continue to Section II (on back).

   If yes:

   a. About how many hours of news programming does your station produce during a normal news week?

   ☐ 1-5 hrs.
   ☐ 6-11 hrs.
   ☐ 12-16 hrs.
   ☐ 17-21 hrs.
   ☐ 22-25 hrs.
   ☐ 26+ hrs.

2. Which video tape format do you use for ENG (to shoot news)?

   ☐ 3/4"
   ☐ MII
   ☐ HI 8
   ☐ VHS
   ☐ Betacam
   ☐ SVHS (SUPER VHS)
   ☐ 1"
   ☐ other _____

3. How long has your station used this video tape format for ENG?

   ☐ 1-6 months
   ☐ 1-2 years
   ☐ 6 mo.- 1 year
   ☐ 2-3 years
   ☐ 3-5 years
   ☐ 5+ years

4. Does your station use the same video tape format to shoot news as it does for on-air playback?

   ☐ yes ☐ no

   If no:

   a. What video tape format does your station use for on-air playback of news stories?

   ☐ 3/4"
   ☐ MII
   ☐ HI 8
   ☐ VHS
   ☐ Betacam
   ☐ SVHS (SUPER VHS)
   ☐ 1"
   ☐ other _____

5. Which video tape format did your station use for ENG before switching to its current format?

   ☐ 3/4"
   ☐ MII
   ☐ HI 8
   ☐ VHS
   ☐ none (film)
   ☐ Betacam
   ☐ SVHS (SUPER VHS)
   ☐ 1"
   ☐ 8 mm
   ☐ other _____

(OVER)

6. Why did your station make the switch from your previous to your current format of video tape for ENG? (you may check more than one)

- ☐ Compatibility
- ☐ Cost
- ☐ Quality
- ☐ Reliability
- ☐ Convenience
- ☐ Corporate/Management decision
- ☐ Other_____

7. Do you anticipate changing ENG video tape formats in the future? ☐ yes ☐ no

If you answered yes to question #7 please continue to parts a., b. and c.

a. If you plan on changing formats, how soon?

- ☐ 1-6 months
- ☐ 6 mo.- 1 year
- ☐ 1-2 years
- ☐ 2+ years

b. Which format would you switch to?

- ☐ 3/4"
- ☐ Betacam
- ☐ MII
- ☐ SVHS (SUPER VHS)
- ☐ HI 8
- ☐ 1"
- ☐ VHS
- ☐ other _____

c. Why would you switch formats?

- ☐ Compatibility
- ☐ Cost
- ☐ Quality
- ☐ Reliability
- ☐ Convenience
- ☐ Corporate/Management decision
- ☐ Other_____

II. STATION INFORMATION

1. Please select the market-size category which your station falls into (based upon ADI's in Broadcasting Yearbook, 1990):

- ☐ ADI 1-10
- ☐ ADI 11-50
- ☐ ADI 51-100
- ☐ ADI 101-150
- ☐ ADI 151-212
- ☐ Undesignated

2. Select the geographic area of the country in which your station is located:

- ☐ NORTHEAST (ME, NH, VT, NY, MA, RI, CT, PA)
- ☐ MID-ATLANTIC (NJ, DE, MD, DC, VA, NC, SC, WV)
- ☐ SOUTH (GA, FL, AL, MS, AR, LA, KY, TN)
- ☐ NORTH CENTRAL (WI, MI, IL, IN, OH)
- ☐ MIDWEST (ND, SD, NE, KS, IA, MN, MO)
- ☐ NORTHWEST (WA, OR, ID, MT, WY, UT, CO, AK)
- ☐ SOUTHWEST (AZ, NM, TX, OK, NV, CA, HI)

3. Select the appropriate affiliation for your station:

- ☐ ABC
- ☐ CBS
- ☐ FOX
- ☐ NBC
- ☐ INDEPENDENT

4. Is your station: ☐ UHF ☐ VHF

OKLAHOMA STATE UNIVERSITY
School of Journalism and Broadcasting
Stillwater, OK 74078
(405) 744-6354/5960

January 2, 1992

Dear Chief Engineer:

Happy New Year! About a month ago, you should have received a copy of this letter and questionnaire. If by chance it was lost or mis-directed, or you didn't have time to fill it out, I would appreciate it if you could take five minutes from your busy schedule to complete the enclosed questionnaire.

I need your help in completing a nationwide study of video tape format usage for electronic news gathering (ENG) purposes. This questionnaire is a vital portion of my research and essential to a valid statistical analysis concerning this topic. All sources of information will be strictly confidential and kept anonymous. When you have completed the questionnaire, please drop it in the enclosed addressed, stamped envelope and return it to me by **January 31, 1992.**

If it is more appropriate for the News Director, ENG coordinator, or another person at your station to complete this questionnaire, please pass it along to him or her with these instructions.

As an incentive to those who complete the questionnaire, I will provide a copy of the summary of results. This data will allow you to see nationwide trends in video formats for ENG, and you can compare your station with others of similar size, affiliation, etc. If you desire one of these summaries, please complete the enclosed mailing label and return it with the questionnaire.

If you have any questions pertaining to this questionnaire, please contact me. My work phone is (405) 744-5960 and home number is (405) 372-9408.

The success of this study is dependent on your response to this questionnaire. Thank you for your time and help.

Cordially,

Kendall C. Durfey
Masters Candidate
Oklahoma State University

Attachments

VITA

Kendall C. Durfey

Candidate for the Degree of

Master of Science

Thesis: AN ANALYSIS OF ELECTRONIC NEWS GATHERING VIDEO TAPE FORMAT USAGE BY COMMERCIAL TELEVISION STATIONS IN THE UNITED STATES

Major Field: Mass Communications

Biographical:

Personal Data: Born in Poughkeepsie, New York, August 1, 1962, the son of Thomas C. and Ellen Durfey.

Education: Graduated from Coweta High School, Coweta, Oklahoma, May 1980; received Bachelor of Science Degree in Telecommunications from Oral Roberts University, Tulsa, OK in April, 1984; completed requirements for the Master of Science degree at Oklahoma State University in May, 1992.

Professional Experience: Adjunct Lecturer, School of Journalism and Broadcasting, Oklahoma State University, 1990 to present; Television Engineer, Educational Television Services, Oklahoma State University, 1989 to present; Partner, dB Productions, 1984 to present; Public Relations Director, Sunmark Hotels, Inc., 1988-1989; Station Manager, KTCR AM, Wagoner, Oklahoma, 1987; Program Director, KTCR AM, Wagoner, Oklahoma, 1984-1987; General Manager, Program Director, Production Director, KUTA FM, Campus Radio, Oral Roberts University, 1980-1984.