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# The diffusion of satellite radio: A study of earlier adopters and non-adopters

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# THE DIFFUSION OF SATELLITE RADIO: A STUDY OF EARLIER ADOPTERS AND NON-ADOPTERS

by

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ABSTRACT

**The Diffusion of Satellite Radio: A Study of Earlier Adopters and Non-Adopters**

by

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This study examined the current and potential audience of satellite radio by using Roger's diffusion of innovations theory as a theoretical framework (Rogers, 1962, 1971, 1983, 1995, 2003). Survey research was conducted in June of 2006 to discover adopters' and non-adopters' perceptions of satellite radio and competing technologies, their socioeconomic characteristics, demographics, and mass media use.

Results of the survey indicated that the average earlier adopters of satellite radio are nearly 32 years of age, earned an average gross annual income of $40,000 to $50,000, and had more formal education than non-subscribers. The average non-adopter of satellite radio was nearly 26 years of age, averaged $20,000 to $30,000 gross annual income, and had some college education. Additionally, satellite radio subscribers more often than non-subscribers owned video game systems, video cameras, and TiVo.

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# CHAPTER ONE

## INTRODUCTION

In 2001 the medium of radio took a new form after being introduced to the digital era. Audio signals that were once constrained by amplitude modulation (AM) and frequency modulation (FM) wavelengths were now broadcast digitally from satellites above the earth to a small receiver in an automobile or on a desk. Although academic studies have been done over the last several decades about listeners of AM or FM radio (Bailey, 2004; Beville Jr., 1949; Dick & McDowell, 2004; Dunn, 1952; Frankel & Occhiogrosso, 1985), relatively few research studies have been conducted about satellite radio or its users. The current study analyzed the earlier adopters and the non-adopters of this new technology using Roger's diffusion of innovations theory as a theoretical framework (Rogers, 1962, 1971, 1983, 1995, 2003). The study took place in Las Vegas, Nevada, during June of 2006, approximately five years into the diffusion of satellite radio in the United States.

### History of Satellite Radio

The idea of satellite radio is not new, but it was not until 1990 when Noah A. Samara founded a company called WorldSpace that satellite radio was finally actualized (WorldSpace, n.d.a). The original digital satellite radio idea was to

develop an affordable way of transmitting information and radio services to rural and emerging market areas in Africa and Asia. WorldSpace launched its first satellite in 1998 to achieve this goal and reportedly has two satellites broadcasting to more than "14 million square kilometers" over Africa, Asia, and Europe (WorldSpace, n.d.b).

It was only a matter of time before digital satellite radio worked its way over to the United States once WorldSpace was developed. The potential in the United States for such an innovative service existed because of a variety of factors, including the reported "commercialization" of AM/FM radio and the poor analog quality of existing radio (Green, Lowry, Yang, & Kiley, 2005). These factors may have aided in the adoption of this new technology. Samara worked with an emerging company called XM Satellite Radio to develop the digital satellite radio industry in the United States.

Satellite-based digital audio radio service (SDARS) in the United States could not begin until the United States' Federal Communications Commission (FCC) allocated space in the electromagnetic spectrum for the new service and licensed operators for the space. The FCC is responsible for allocating which parts and how much of the electromagnetic spectrum is available to operators of radio, television, and other communication devices in the United States.

Satellite radio operates in a specific area of the electromagnetic spectrum, a range of electromagnetic frequencies used to transmit radio, video, and other data (Mogel, 2004). This spectrum is composed of "naturally occurring vibrations or oscillations of energy arranged by frequency" (Craft, Leigh, & Godfrey, 2001,

p. 285). AM radio occupies the medium frequency from "300 to 3,000" Kilohertz (KHz) and FM radio resides between "88 and 108" Megahertz (MHz) (Craft, Leigh, & Godfrey, 2001, p. 307). The FCC allocated space for SDARS between 2320 and 2345 MHz in the S-Band portion of the spectrum (FCC, 1997a).

In some ways radio is following the path that television took in its technological evolution. In its early days, television operated in the very high frequency (VHF) where channels 2 through 13 reside. Later, technology progressed to allow television to operate in the ultrahigh frequency (UHF) where cable television channels reside, and then to superhigh frequency where commercial television satellites operate in the electromagnetic spectrum (Craft, Leigh, & Godfrey, 2001). Several decades passed in television and radio's history before technology developed that could translate analog television signals to digital, compress data, or send audio and video information to satellites high above the earth, but when the technology became available, it was only a matter of time before the FCC would be asked to further license the newly available electromagnetic spectrum.

The FCC officially licensed the newly allocated space for the emerging satellite radio services in 1997 (FCC, 1997b; Silverstein, 2003a). Before 1997, the FCC received four bids for licenses to operate in the S-Band spectrum by December 1992, the cutoff date for bidding set by the FCC. After the bids were submitted, the FCC offered two licenses for the spectrum space to those bidders by auction. The auction ran from April 1, 1997, to April 2, 1997, and raised over $173.2 million for the U.S. Treasury (FCC, 1997a).

According to the FCC (1997a, 1997b), the winners of that auction were American Mobile Radio Corporation and Satellite CD Radio, Inc., who bid $89,888,888 and $83,346,000, respectively. American Mobile Radio later became XM Satellite Radio, and Satellite CD Radio would go through a name change as well, becoming SIRIUS Satellite Radio (Breen, 2005; Silverstein, 2003a).

The convergence of digital technologies with radio-based services allowed the consumers to access their favorite XM or SIRIUS channels from virtually anywhere inside the United States. Both satellite radio services offer more than 100 channels of music, talk, news, sports, and weather (Pitts, 2004; SIRIUS corporate overview, n.d.a; XM fast facts, n.d.a). Unlike cable television providers, SIRIUS and XM do not offer tiered subscriptions. A subscriber receives all of these channels for one monthly subscription rate. However, XM offers several "premium" channels that a subscriber must pay an additional fee to receive (XM fast facts, n.d.b). SIRIUS and XM run no commercials on their music channels, but do air commercials on some of their other types of programming, such as news or sports. As of October, 2006, subscribers to SIRIUS Satellite Radio and XM Satellite Radio pay $12.95 per month.

## Technology of Satellite Radio

Both satellite radio companies also differ in the methods they employ to actually get their signal to the subscriber. Generally, satellite radio systems work by beaming their programming "in the form of digital channels via terrestrial

uplinks, satellite dishes mounted on the high points of buildings which transmit the information to satellites high above the earth" (Mogel, 2004). In other words, the digital channels are encoded in binary bits of information and sent to satellites above the earth via satellite dishes that are located on the ground. Digital transmissions use binary code that can be transmitted without degrading the signal as long as the original information is intact. This is a major difference between analog and digital data transmissions. Analog AM and FM transmissions degrade over time and tend to pick up static and weaken as they travel through the earth's atmosphere. Digital signals are better able to travel over long distances because binary code, no matter how weak the signal, can be translated back into audio information as long as the receiver gets the transmission.

In 2001, XM launched two powerful Boeing 702 satellites (Mogel, 2004; Silverstein, 2003a; Silverstein, 2003b; XM, 2001). These satellites, named "Rock" and "Roll" by XM, move in geostationary orbit around the earth. Geostationary means that the satellites "move around the Earth at the same speed the planet is rotating" (Silverstein, 2003b). A problem presented by geostationary satellites is that their signals can be blocked if the receiver moves into an area that is 'out of sight' from the satellite (Silverstein, 2003b; XM fast facts, n.d.b). To ensure that the subscriber maintains clear and constant service, XM installed at least 1700 repeaters on the ground (Vivian, 2002). These repeaters are "electronic devices that build up the signal on the ground, then amplify it in 'shadow' areas, such as tunnels and buildings" (Mogel, 2004). All

XM receivers have the capability to receive a signal from either of the two satellites or repeaters on the ground. As long as a receiver maintains contact with at least one of these devices, the subscriber's radio will continue to receive the transmission (XM fast facts, n.d.b).

SIRIUS had already launched all three of its satellites by 2000, one year before XM launched 'Rock' and 'Roll' (Mogel, 2004; Silverstein, 2003a). SIRIUS' three Loral FS1300 satellites move in highly inclined elliptical figure-8 orbits above the earth, "resulting in superior line of sight reception to vehicles" (Silverstein, 2003b; SIRIUS, 2004b). Silverstein stated that this unique orbit helps cut down "on the potential for a listener to be out of range of a satellite signal," thus allowing SIRIUS to use fewer repeaters than XM. The subscribers who do get a signal over the repeater are actually receiving their signal from a geostationary satellite that SIRIUS leases from a traditional satellite operator (Silverstein, 2003b). Each SIRIUS satellite stays over U.S. skies for about 16 hours before they disappear around the earth for 8 hours and then return. Silverstein (2003b) stated that there are always two of SIRIUS' satellites over U.S. airspace at any one time.

## Consumers of Satellite Radio

With only two licenses auctioned for the satellite spectrum, the government created a duopoly in the market. Competition in this new market has proven to be fierce, with huge sums of money on the line. Billions of dollars will have been spent by the two companies before they are predicted to make a profit, which

may not happen until 2008 (Green, Lowry, Yang, & Kiley, 2005; Silverstein, 2003a). Satellite radio is also in competition from terrestrial-based radio entities such as Clear Channel Communications and Infinity Broadcasting who claim much of the present-day commercial radio market (Breen, 2005; Green et. al, 2005). In fall 2005, Arbitron's website reported a total of 297 radio markets (Arbitron.com, 2005). Clear Channel operates approximately 1,200 radio stations "reaching more than 100 million listeners every week across all 50 states" (Clear Channel Radio, 2005, p.1). Infinity Broadcasting (2005) reports that they operate 178 radio stations, "the majority of which are in the nation's top 50 markets" (¶1).

Competition may also come from other relatively new technologies like the iPod and MP3 players. The iPod, marketed by Apple Computers, is a digital portable media player that works by utilizing the bundled software, iTunes. This software allows the user to download music or video on a computer, and then uploads it into the iPod's memory. The user can then play the music or video on the device. MP3 players are very similar to the iPod, however, they use a different type of music compression file than the iPod. Because these are portable music devices, it is easy to see how they could be competition to the newly emerging satellite radio industry.

The task that satellite radio companies like XM and SIRIUS face is to convince people that they should pay for a service that is readily and freely available through the AM or FM bands. At least 200 million listeners per week still tune into commercial radio (Green et. al, 2005; Pitts, 2004). Out of 100

million U.S. households, digital satellite radio has only four percent of the audience (Breen, 2005).

Content is a leading factor in how satellite radio differs from traditional AM/FM radio. Both satellite radio services offer almost two hundred channels that cover an array of listening choices. These include varieties of music formats, news and talk shows, broadcasted sporting events, comedy shows, and many others. Because commercials are not played on the music channels, the listener does not have to sit through several minutes of commercials while listening to their favorite music. There is a resemblance between satellite radio and premium cable television channels like the Home Box Office Network (HBO), in that commercials do not interrupt the program during air. This is an important difference between satellite radio and commercial AM/FM radio, and may be the catalyst that sparks a consumer's interest.

There are several options available to people who want to adopt one of the two satellite radio services. Subscribers who want to add the service to their existing automobile or want the service for inside their home or office must buy a new receiver or a plug-in device for their current radio receiver that accepts one of the satellite radio services. People can buy a new car that comes with the receiver already installed. Both companies, according to Silverstein (2003a) "have relationships with virtually all the major automakers that call for dozens of car models to come equipped with factory- or dealer-installed satellite radio receivers either standard or as an option." These devices are capable of receiving both the AM/FM signal and the satellite radio service. At this time,

neither company has developed a receiver that is both SIRIUS and XM capable, although technology is in the works (XM, 2000).

Four months after this study's survey took place, in October of 2006, XM reported that they had more than 7 million subscribers, compared to SIRIUS who was reporting approximately 5 million (SIRIUS, 2006b, XM, 2006a). As of October of 2006 much of the nationwide audience had not adopted, and both companies continued to compete for those potential subscribers. XM reported that is was predicting between 7.7 and 8.2 million subscribers by the end of 2006 (XM, 2006a). SIRIUS reported an expectation of 6.3 million subscribers at the end of 2006 (SIRIUS, 2006b). The gap between the two companies has closed each year. In February 2005, XM said it was predicting 5.5 million subscribers by the end of 2005 (XM, 2005a). This prediction kept XM on top with XM predicting approximately 3 million subscribers more than SIRIUS by the end of 2005 (Gilroy, 2005; SIRIUS, 2005). However, that gap had closed by more than half in one year.

Although SIRIUS was first to launch its satellites, XM's services were available before SIRIUS'. XM was first to the market in November 2001, with SIRIUS following behind in July 2002 (Breen, 2005; Mogel, 2004). This may partially explain the discrepancy in subscriber numbers. However, most consumers had not yet adopted the satellite radio subscription service offered by either of these two companies by the time of this study in June of 2006, and reasons for this adoption rate have yet to be examined in scholarly research. This particular innovation has often only been tracked in marketing, business,

and technology magazines in recent years (Breen, 2005; Green et. al, 2005; Palenchar, 2005; Gilroy, 2005; Satellite, 2005; Silverstein, 2003a; Silverstein, 2003b).

Because satellite radio relies heavily on subscriber revenue, and not just on commercial revenue, the adopters of satellite radio are critical to the medium's future. The two satellite radio companies must make its service a standard product in the minds of its audiences to achieve its staying power. This type of service comes with its risks, but SIRIUS and XM have been able to sustain themselves for nearly four or five years at the time of this study, respectively.

Scholarly research into the adopters and non-adopters of satellite radio could give an in-depth look at how this new technology is reshaping the medium of radio and its listener's habits and demographics. Every new communication technology has great potential to change culture and society in new ways. It is important to research emerging technology because technology often has the ability to affect people and usage patterns. This study has analyzed digital satellite radio's history, its development, and will examine its subscribers and non-subscribers to build a more complete understanding of the adopters and non-adopters of this new medium, the perceptions of satellite radio's attributes among subscribers and non-subscribers, and ultimately the demography of these people, including socioeconomic characteristics of these audiences.

## Diffusion of Innovations Theory

A long recognized model for the study of the adoption of an innovation such as satellite radio is the diffusion of innovations theory (Rogers, 1962; Rogers, 1983; Rogers, 1995; Rogers, 2003). The theory has been used for several decades to conduct a wide range of information and technology diffusion studies. Everett M. Rogers (2003) describes an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). Scholars have examined the convergence between print and broadcast media inside newsrooms, how fashion and clothing styles are acquired, the implementation of agricultural innovations by farmers, diffusion of AIDS awareness in homosexual communities, and the spread of technological innovations, such as cellular phones and cable television, in communities (Baumgarten, 1975; Davies, 1998; Lapp, 1986; Rogers, 2003; Singer, 2004; Vishwanath & Goldhaber, 2003).

Rogers defines diffusion as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). There are four main elements in the diffusion of innovations theory, according to Rogers (2003): the innovation, communication channels, time, and the social system. The following sections will discuss several of the key variables to the adoption rate of an innovation. Perceived attributes of the innovation is one of those variables. Others that come into play when studying the adoption rate of an innovation are the type of innovation-

decision and types of communication channels (i.e., mass media or interpersonal channels).

Perceived Attributes

Although all five variables discussed previously influence rate of adoption, perceived attributes receives the most attention from scholars today. The prior focus on perceived attributes may be explained by the amount of variance that it explains. This variable tends to be the most important because it explains from "49 to 87 percent" of the variance for adoption rate of an innovation (Rogers, 2003, p.221). The focus of the current study will also be on perceived attributes because of its importance in adoption rate. The perceived attributes variable contains five elements: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003).

1. Relative advantage is the degree in which an innovation is perceived as advantageous over an idea or technology that came before it. "The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be" (Rogers, 2003, p. 15).

2. Compatibility is the degree to which an innovation is perceived as being concordant with existing values, past experiences, and requirements of potential adopters. "An idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is compatible" (Rogers, 2003, p. 15).

3. Complexity is "the degree to which an innovation is perceived as difficult to understand and use.... New ideas that are simpler to understand are adopted

more rapidly than innovations that require the adopter to develop new skills and understandings" (Rogers, 2003, p. 16).

4. Trialability is the degree to which an innovation may be used on a limited basis. "New ideas that can be tried on the installment plan will generally be adopted more quickly than innovations that are not divisible.... An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption, as it is possible to learn by doing" (Rogers, 2003, p. 16).

5. Observability is "the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt" (Rogers, 2003, p. 16).

Innovation-Decision

Another determining factor for rate of adoption, according to Rogers (2003), is the type of innovation-decision. There are three types of innovation-decisions: optional, collective, and authority. The decision to adopt satellite radio would be an optional innovation-decision because the choices to adopt or reject the innovation "are made by an individual independent of the decisions by other members of a system" (Rogers, 2003, p. 403).

Rogers (2003) described the innovation-decision process as having five sequential steps which are influenced by both the characteristics of the innovation and the adopter:

1. An individual (or other decision-making unit) passes from gaining initial knowledge of an innovation,

2. to forming an attitude toward the innovation,

3. to making a decision to adopt or reject,

4. to implementation of the new idea,

5. and to confirmation of this decision (p. 168).

Communication Channels

Communication channels play instrumental roles during each stage of the innovation-decision process described above. Rogers (2003) categorizes communication channels as "interpersonal versus mass media" and "localite versus cosmopolite" (p. 204-205). According to Rogers (2003), these channels can create knowledge about an innovation and/or change a potential adopter's attitude toward an innovation. Communication channels also differ depending on one's level of innovativeness.

Mass media channels transmit messages via radio, television, newspapers, etc., which enable a source to reach a large audience. On the other hand, interpersonal channels often involve a "face-to-face exchange between two or more individuals" (Rogers, 2003, p. 205). Rogers finds the interpersonal channel more effective in persuading individuals "to form or to change a strongly held attitude" (p. 205). Rogers generalizes, "Mass media channels are relatively more important at the knowledge stage, and interpersonal channels are relatively more important at the persuasion stage in the innovation-decision process" (p. 205).

Rogers' (2003) second communication category involves how the channel relates to the individual and social system. Cosmopolite channels "are those linking an individual with sources outside the social system under study" (p.

207). Mass media channels are most often cosmopolite, but interpersonal channels can be either cosmopolite or local, depending on who the source of information is and the source's relationship to the receiver's social system. Some examples of a cosmopolite interpersonal channel include visits outside an individual's local community or outside visitors to the community. Rogers finds that "cosmopolite channels are relatively more important at the knowledge stage, and localite channels are relatively more important at the persuasion stage in the innovation-decision process" (p. 207).

Exploring Factors of Innovativeness

Under the element of time comes the term *innovativeness*. Adopters of an innovation are classified on the basis of innovativeness, "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system" (Rogers, 2003, p. 22). There are five categories that members of a social system may fall under on the basis of innovativeness: innovators, early adopters, early majority, late majority, and laggards. Innovators (2.5%) are the first to adopt a new idea or technology, followed closely by the early adopters (13.5%) who follow the lead of the innovators. The early majority (34%) "adopt new ideas just before the average member of a system" (Rogers, 2003, p. 283). The late majority (34%) make up one-third of the members of a given system, and adopt new ideas just after the average member of that system (Rogers, 2003). The laggards are the last 16 percent to adopt.

These adopter categories are based on the S-shaped curve of adoption. "The adoption of an innovation usually follows a normal, bell-shaped curve when

plotted over time on a frequency basis. If the cumulative number of adopters is plotted, the result is an S-shaped curve" (Rogers, 2003, p. 272).

In the diffusion of innovations theory, rate of adoption, "the relative speed with which an innovation is adopted by members of a social system," is influenced by the characteristics of adopters related to innovativeness: socioeconomic status, personality values, and communication behavior (Rogers, 2003, p. 22-23). Most of the generalizations about characteristics have been positively related to innovativeness, meaning "innovators score higher on these independent variables than do laggards" (Rogers, 2003, p. 292).

Rogers (2003) indicated that there is no consistent evidence linking age with innovativeness. "About half of the many diffusion studies on this subject show no relationship, a few found that earlier adopters are younger, and some indicate they are older" (Rogers, 2003, p. 288). However, several generalizations have been made in regards to earlier adopter characteristics and socioeconomic status. Earlier adopters have more formal education, are more likely to be literate, have higher social status, have a greater degree of upward social mobility, and have larger-sized units (farms, schools, companies, etc.) than do later adopters (Rogers, 2003).

There are several personality variables associated with earlier adopters. Earlier adopters are more likely to have greater empathy, less dogmatism, greater ability to deal with abstractions, greater rationality, more intelligence, and are likely to have a more favorable attitude toward change (Rogers, 2003). Also, they are better able to cope with uncertainty and risk, and they have a more

favorable attitude toward science than later adopters do (Rogers, 2003). Earlier adopters are less fatalistic and have higher aspirations for formal education, occupations, etc. than later adopters (Rogers, 2003).

Communication behavior between adopter categories has also been shown to differ. According to Rogers (2003), earlier adopters interact more often with others, are more cosmopolite (the degree to which an individual is oriented outside a social system), have more contact with change agents, have greater exposure to mass media channels, and have greater interpersonal communication channels exposure.

Prior diffusion research has shed light on many of these variables and characteristics, although personality variables have been widely overlooked because of the degree of difficulty in measuring personality dimensions in diffusion surveys (Rogers, 2003). Certain studies of technological innovations have found support for many of Rogers' diffusion characteristics, although some have found little or no support for certain variables. Li (2004) and Kang (2002) found no support for the variables of age and education in their diffusion studies. Li (2004) also found no support for the variable of perceived complexity. Leung & Wei (1999) found no support for the variable of perceived advantages, but they did find support for age and education variables in their study. Examination of earlier diffusion research may help explain which characteristics and variables might prove useful in the diffusion study of satellite radio.

## Criticisms of Diffusion of Innovations

As with any theory, diffusion of innovations has its shortcomings. McAnany (1984) reviewed criticisms of Rogers' third edition of *Diffusion of Innovations* (1983). Meyer (2004) addressed weaknesses in diffusion methodology and offered suggestions for improvement, such as integrating qualitative methodology to future diffusion studies. Rogers (2003) described several of the theory's weaknesses and offered strategies to minimize them in his fifth edition. The diffusion of innovations theory has several inherent biases, including the pro-innovation bias, the individual-blame bias, and the recall problem bias, all of which should be addressed before conducting a study with Rogers' diffusion framework.

The pro-innovation bias refers to the implication in diffusion research that innovations *should* be adopted by all or any members of a social system. This bias tends to see an innovation from the one-dimensional standpoint that all members of a system should adopt an innovation. It fails to take into consideration the audience's wants or needs.

To counter the pro-innovation bias, Rogers (2003) suggested that researchers should conduct research on innovations that are in the process of being diffused, instead of concentrating on an innovation that has already been successfully diffused. Rogers (2003) also suggested that a comparative analysis of diffusion between a successful innovation and an unsuccessful innovation could be conducted in the same social system and time frame in order to "illuminate the seriousness of the pro-innovation bias" (p. 113). The current study

proposes to conduct research on the diffusion of digital satellite radio, which is already underway in the Las Vegas, Nevada, community. Because satellite radio is still in the process of diffusing in the social system, it as an ideal time to measure its current rate of adoption and to profile the individuals who have already adopted. Information about non-adopters and potential adopters may also be discovered because the technology has only been available since 2001 and has not yet diffused successfully. There is the likelihood that many potential respondents most likely will not have adopted satellite radio at the time of the survey.

There is also a source bias, which refers to the "tendency for diffusion research to side with the change agencies that promote innovations rather than with the individuals who are potential adopters" (Rogers, 2003, p. 118). This source bias inevitably leads to an individual-blame orientation. In other words, "If the shoe doesn't fit, there's something wrong with your foot" (p. 119). This bias blames late adopters and laggards for not quickly adopting an innovation or for failing to adopt an innovation. It fails to take into account the fact that the system that designed the innovation may have made a mistake in the design process or may have designed the innovation without the intended users' needs in mind. Although sometimes this bias can be appropriate in some instances, according to Rogers, it can also lend to the stereotype that later adopters and laggards are "traditional, uneducated, and/or resistant to change" (p. 121). Rogers calls this a self-fulfilling prophecy because change agents who believe this generalization may not contact "later adopters" because they feel their attempts will be futile.

Therefore, these "later adopters" are less likely to adopt if they are not informed about the innovation, thus fulfilling that stereotype.

Rogers (2003) suggested that scholars should avoid using individuals as a unit of analysis in some cases. Especially in the case of social problems, researchers should avoid accepting a change agency's definition of a diffusion problem and conduct necessary exploratory research before placing blame for the diffusion problem. Rogers also suggested that all participants, including people who may not or will not adopt an innovation, should be involved in defining the diffusion problem.

Rogers (2003) also described the recall problem in diffusion research, which refers to the problem of obtaining reliable time of adoption data from study participants. Since diffusion research often relies on self-reported data, the degree of accuracy in this type of information is debatable. However, Rogers (2003) cites a study from 1990 that "found that individuals could accurately recall data about the *Challenger* disaster for at least several weeks after the event" (p. 127). Rogers (2003) also describes a weakness in the methodology of most diffusion studies. Survey research is a convenient way to gather information for the researcher, but it only allows for a "snapshot" of the diffusion process, a process that can take place over a long period of time. The time variable is put into question, according to Rogers (2003): "If data about a diffusion process are only gathered at one point in time, the investigator can only measure time through respondents' recall, a possibly weak reed on which to base the measurement of such an important variable" (p. 127).

Rogers (2003) suggested that conducting a study on an innovation that has recently diffused rapidly may help minimize the recall of time problem. However, Rogers cautions that this may also increase the possibility of a pro-innovation bias. A researcher can also help minimize this problem by carefully pre-testing the survey questions and by using well-trained interviewers.

To minimize the possibility of the recall problem, the current study conducted a pre-test of the survey instrument before going through with the data collection that was used in the results. Also, the current research was conducted about the currently diffusing technology of satellite radio, and therefore, participants may have found this particular topic to be salient, minimizing the problem of self-reported recall data. Non-adopters will also be incorporated into this diffusion study, not just adopters of satellite radio.

## Perceived Attributes of Satellite Radio

Digital satellite radio can be examined from a diffusion standpoint using Rogers' (2003) five perceived attributes of an innovation. Satellite radio's relative advantage over commercial radio is its ability to be picked up by a subscriber almost anywhere in the United States. "Listeners no longer have to tune in at a certain time, and within range of a signal to catch a show or game" (Green et. al, 2005, ¶3). Another distinct advantage that satellite radio has over AM/FM radio is the lack of commercials on its music channels. Green et. al (2005) reported that for commercial radio "the average listening time per person has dropped by

more than three hours, to just under 20 hours a week since 1993" because of the numerous advertisements being run on the airwaves (¶11).

Satellite radio also meets Rogers' second characteristic of compatibility. The satellite radio companies, from the beginning, have set out to make their product and service highly compatible with existing technologies such as personal computers and automobiles (Breen, 2005; Green et. al, 2005; SIRIUS FAQs, n.d.b). XM Satellite Radio has deals with General Motors, Honda, Acura, and several other companies in the automotive industry (XM highlights, n.d.b). This original equipment manufacturer (OEM) deal places their satellite radio product in more than 100 new car models made by the auto companies. SIRIUS has a similar partnership with BMW, Ford, and Chrysler (Breen, 2005; SIRIUS FAQs, n.d.b).

In terms of complexity, satellite radio is similar in function and design to existing AM and FM radios. Therefore, it may be no more complex than a conventional radio receiver. However, people not familiar with satellite radio may perceive it to be more complex than traditional AM/FM radio.

Trialability for satellite radio can relate back to the OEM deal with certain car manufacturers. Consumers who buy certain automobiles with the existing satellite radio technology already installed have the option to use the product on a promotional basis. Gilroy (2005) reported that six out of ten XM Satellite Radio promotional subscribers "convert to self-paying when the promotion ends" (p.10).

Satellite radio is highly observable and accessible to the consumer because many stores, including electronics stores like Circuit City or Best Buy, offer

satellite radio products. New automobiles are often marketed with satellite radio as a feature in television advertisements. In 2004, satellite radio became even more highly observable when it was announced that shock jock Howard Stern was to be added to SIRIUS' programming in 2006 (SIRIUS, 2004a). In a January, 2006, interview Stern described SIRIUS as "the future for all broadcasters" (MSNBC.com, 2006). XM Satellite Radio also made headlines with the company's primetime appearance on NBC's *The Apprentice* on November 17, 2005 (XM, 2005b). The audience that satellite radio is vying for may or may not agree with Stern about satellite radio's importance in broadcasting's future.

## Summary and Thesis Organization

This chapter has provided the reader with a foundation of the history of satellite radio in the United States, its technology, and what is currently known about satellite radio's consumers. Application of the diffusion model (Rogers, 2003) to satellite radio subscribership could provide some insight into the diffusion of this new radio service. Because satellite radio is still in its early stages, it is important to examine who the current adopters and non-adopters are and how they may differ from one another. Study of the adoption of satellite radio using the diffusion model may help predict future trends in satellite radio subscribership and may illustrate non-adopters characteristics and why non-adoption occurs for some consumers. This information could be very useful in future studies of satellite radio and other emerging technologies because future

studies could use this information to compare with future adopters' audience characteristics.

The following generalizations are noted regarding the diffusion of innovations theory and its five variables that determine the rate of adoption. The variable of perceived attributes (relative advantage, compatibility, complexity, trialability, and observability) explains approximately "49 to 87 percent" of variance in diffusion studies (Rogers, 2003, p. 221). Adoption of an innovation is positively related to an individual's perceptions of relative advantage, compatibility, trialability, and observability. Adoption is negatively related to an individual's perception that an innovation is complex.

The type of innovation-decision is the second variable in the diffusion process. There are three types of innovation-decisions: optional, collective, and authority. The decision type that best describes the choice of whether or not to adopt satellite radio is the optional innovation-decision. There are five steps in the process of making a decision about an innovation, according to Rogers (2003). First, "an individual (or other decision-making unit) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (p. 168).

The type of communication channel that provides information or persuasion for or against the innovation during the decision-making process is a factor of the innovation's adoption. There are two categories of communication channels: mass media versus interpersonal and cosmopolite versus localite. Rogers

(2003) generalizes, "Mass media channels are relatively more important at the knowledge stage, and interpersonal channels are relatively more important at the persuasion stage in the innovation-decision process" (p. 205). Another generalization is that "cosmopolite channels are relatively more important at the knowledge stage, and localite channels are relatively more important at the persuasion stage in the innovation-decision process" (p. 207).

The diffusion variables discussed in this chapter are examined further in the next chapter with accompanying research. Chapter 2 addresses previous diffusion literature involving emerging technologies, summarizes research and findings, and provides a brief overview of proposed research into studying early adopters of satellite radio. Chapter 3 discusses the research questions and methodology utilized in this study. Chapter 4 follows with the results of the study. Finally, Chapter 5 concludes with a discussion of results, findings, and implications this study has for future research.

# CHAPTER TWO

## LITERATURE REVIEW

The literature review in this chapter expands on the examination of variables and terms discussed in Chapter 1. Research regarding the theory of diffusion of innovations is reviewed, followed by a review of literature which details the studies of adoption rates concerning emerging technologies. The conclusion of the chapter contains a summary of findings, strengths and weaknesses of the theory, and implications of the current study.

### Emerging Technologies Studies

#### Diffusion of Personal Computers

During the 1980s, personal computers were becoming more widely available. A diffusion study by Danko and MacLachlan (1983) examined the differences between early adopters and possible late adopters in the adoption of this innovation. Implications of the article addressed how to best market personal computers to the early adopter.

The dependent variable in the study was actual ownership of a personal computer. The independent variables of general attitudes, demographics, and

socioeconomic data were self-reported by the respondent. The original sample consisted of 1,669 in-home interviews. Danko and MacLachlan (1983) excluded the women sampled in the survey because only five were classified as early adopters. "Therefore, the sets used in the analysis include 207 male 'early adopters' and 729 male 'possible later adopters'" (Danko & MacLachlan, 1983, p. 40).

Over fifteen variables were found to be significant at the .05 level. Findings indicated that the early adopter had little free time for playing sports and watching sports or television. The findings also indicated that the early adopter was approximately 30 years old, educated, enjoyed intellectual challenges, and owned other technologies such as a microwave oven, tape-deck equipment, and video games.

This study provides a glimpse into how early adopter characteristics were assessed in diffusion's earlier days. However, because the information is so dated, many pieces of data are too old to be applied to current diffusion research. On the other hand, the basic form of questions could be applied and updated to new research in regards to implications that early adopter characteristics have on advertising.

Diffusion of Cable and Digital Television

An interesting piece of research to note is Lapp's (1986) study of the diffusion of cable television subscribers in Las Vegas, Nevada. Lapp's study also utilized the Las Vegas community, as does the current study, to examine the diffusion of an emerging technology. The study used the diffusion of innovation theory to

examine the similarity between characteristics of the earliest Las Vegas, Nevada, cable television subscribers and innovators described by the diffusion of innovation theory (Rogers, 1983). Lapp (1986) posed two research questions. The first question asked "How will the characteristics of early subscribers to cablevision in Las Vegas compare to those of innovators as described by Rogers?" (p. 14). The second question was "How will the characteristics of Las Vegas cablevision viewers who subscribe to the highest levels of service compare to those of innovators described by Rogers?" (p. 16). Subscribers were examined on the basis of how soon they subscribed once they learned of the service, on their subscription level of service, and Lapp (1986) also examined subscriber's responses regarding "viewing behaviors and reasons for purchase of cable television" (p. 23).

To ensure a randomly selected sample, Lapp (1986) determined that subscriber information from the local cable television company would be "most practical, probably more precise and undoubtedly more cost efficient than from any other source" (p. 17). Upon request, a local cable television company provided a computer generated list of 4,536 subscribers. Lapp eliminated names of former subscribers and subscribers with incomplete information. This resulted in 1,444 subscribers who were valid for study. Out of that total, Lapp and trained telephone interviewers successfully conducted telephone surveys of 404 cable subscribers within the Las Vegas community.

For the first research question, Lapp (1986) found that immediacy of subscribership was significantly related to VCR ownership. There was also a

significant relationship between "the number of minutes per week spent reading magazines and the time of subscription" (p. 25). In other words, those who read the most also were more likely to buy cable television immediately once learning of the service. Lapp also found that immediacy of subscription was significantly related to length of subscription. People who claimed to be immediate subscribers also reported to have had the service for at least two years at the time of the survey. Those who subscribed approximately a month after learning of the service reported to have had cable television between six months and one year. Lapp (1986) also found that credit was significantly related to immediacy of subscribership. Seventy-four percent of immediate subscribers claimed bankcard ownership. The percentage decreases for people who subscribed after a week or two (64 percent), after a month (51 percent), and after several months of learning about the service (58 percent). However, the percentage increased substantially to sixty-nine percent for people who subscribed "much later" (p. 27). Lapp (1986) reported no significant relationships between "time of subscription and variables in the areas of social participation or education" (p. 28).

The second research question examined the relationship between characteristics of people who subscribed to the highest levels of cable television service and the characteristics of Rogers' (1983) innovators. Lapp (1986) found that a significant relationship existed between subscription level and income of subscribers. The higher the income of the subscriber, the more likely the subscriber would have a higher level of cable service. It was also noted that subscribers with higher levels of cable service were more likely to have more

television sets connected to cable. Subscription level was also significantly related to the quantity of radios in a household, the frequency of dining out, and newspaper readership. Lapp (1986) found no statistical significance between level of cable service and "any of the items regarding social participation, education, or credit" (p. 33).

Lapp's (1986) secondary findings examined "areas of subscriber viewing behaviors and the subscriber's reasons for purchase of cable television" (p. 34). Program selection was found to be the most important to all subscribers. Subscribers who bought cable television "immediately" or "much later" reported "more sports" to be the most important reason for purchasing the service (p. 34). People who subscribed after one month stated that both more movies and program selection were equally important reasons to purchase cable television. Lapp also found that people who purchased cable television had little interest in "better reception, more news and information, and specialized programming" (p. 34).

Limitations of the study, conducted in 1986, could be traced back to the evolving nature of the Las Vegas community at that time and the late introduction of cable service to the area. Lapp (1986) found that 15 percent of subscribers could be labeled under the innovator category, whereas Rogers (1983) described only 2.5 percent of a social system falling under that category. Lapp described the population of Las Vegas, Nevada, as "transient" in nature because of the constant turnover in the gaming workforce that was prevalent in the area (p. 50). Lapp suggested that subscribers may have already decided to

use the service before it was available in Las Vegas because they most likely had been exposed to it someplace else previously. This factor may have skewed results. Lapp stated that it may take decades before the Las Vegas community resembles "a typically representative American city" (p. 51). The motive for profit in diffusion theory also could be a limitation to the study. "Cable television lacks a profit motive, e.g., the capacity to enrich a viewer's pocketbook" (Lapp, 1986, p. 51). Lapp also suggested that using diffusion theory to examine cable viewers who subscribe for occasional information or enjoyment, as opposed to using the theory to examine the diffusion of hybrid corn among Iowa farmers who have the potential to make a profit is patently different. Using diffusion theory to study such a service that provides little or no profit to the adopter may be an unfair use of the theory. However, diffusion theory has been used quite often in the study of emerging technologies and services with statistically significant findings in some areas.

Adoption of cable television has also been explored in social systems outside the United States, such as Taiwan. Li (2004) modeled her project after Rogers' (2003) diffusion of innovation theory to examine the factors that influenced people in Taiwan to adopt interactive cable television services.

Li (2004) tested six hypotheses. Five of the hypotheses tested the "intention to adopt" dependent variable against many diffusion factors such as "perceived relative advantage, compatibility, observability," etc. that were based on the author's literature review (p. 468).

Before Li (2004) tested the diffusion factors, she first conducted a pilot study, using snowball sampling, in order to construct a questionnaire for the later telephone interviews. Snowball sampling involves acquiring more participants through an initial pool of participants. A participant may be asked to refer someone they know who may have relevant information to provide about the subject being studied. A snowball sample like the one utilized in Li's study will also be used in the current satellite radio study to acquire more participants who may own satellite radio. There is no information available to contact people who own satellite radio, so the current study will utilize this method to obtain more participants for the study.

The author stated that this pilot study was done because there were no relevant questionnaires available "regarding how people perceive the attributes" of interactive cable television services (p. 471). The pilot study helped the author develop 23 questions regarding these perceived attributes for the telephone interviews.

Using information from the literature review, Li (2004) constructed the study's key independent variables: demographics, media use, perceived attributes (advantage, disadvantage, complexity, overuse), and ownership of technology. Intention to adopt was the dependent variable measured.

In the methods section Li indicated that the "most recent telephone books for every city and county in Taiwan were used for systematic random sampling" (p. 472). Research assistants trained to conduct the telephone surveys obtained 1,012 valid questionnaires out of 1,806 calls. After factors were analyzed, the

incompatibility factor was found to be unreliable and was deleted because of a low Alpha level.

Li (2004) conducted a hierarchical multiple regression analysis to examine the effects that the five sets of variables "innovation attributes, technology ownership, innovativeness, demographics, and mass media use" had on intention to adopt (p. 474). Several One-Way ANOVAs were performed between the five sets of variables and the five types of adopters. The first ANOVA was performed between the types of adopters (early adopters, laggards, etc.) and the two innovation attributes (relative advantage and relative disadvantage). The F value for relative advantage was found significant at 34.14, $p = .000$. However, according to the author, the F value for relative disadvantage only approached significance at 2.30, $p = .058$, and therefore was not found significant.

Two hypotheses were supported in the study, with all other hypotheses only being "partially supported," (i.e., not supported). Li (2004) found that intention to adopt was positively related to the perceived relative advantage, compatibility, observability, and trialability of interactive cable television services. This finding is congruent with prior studies of diffusion (Rogers, 2003). However, perceived complexity was not found to be negatively related to the intention to adopt. Also, Li's (2004) hypothesis that adoption intention was positively related to ownership of other media technologies was not supported, and the hypothesis that positively related adoption intention to mass media use was also found unsupported. Socioeconomic variables such as age, more education, and more affluence were not found to be significant in this study. A possible limitation in

the study may be that the number of actual adopters (21) of cable television services in the study was too small to create a statistically significant t-test.

Li's research was intended to enhance knowledge about adopters of cable television in order to help policy makers and cable operators market these services so accelerated diffusion of digital television could occur in Taiwan. Diffusion theory has often become a tool for marketing purposes, and the obvious implications of diffusion research on marketing and advertising is undeniable.

Digital cable has also been a source of study in diffusion research. Kang (2002) sought to identify a profile of early adopters of digital cable using Rogers' diffusion of innovation theory as a theoretical framework. The author sought to understand the factors associated with early adoption of digital cable service to predict adoption likelihood among analog consumers. Two research questions and seven hypotheses were posed in the study. The study sought to advance past research in the diffusion of innovation field. Kang (2002) found that "digital cable subscribers are more likely to watch television, subscribe to premium services, perceive their cable operator to be technologically progressive, and express greater satisfaction with current cable service compared to analog-only subscribers" (p. 193).

Data collection for the study was conducted by paid undergraduate students who were trained to conduct the survey. A telephone survey was performed "in a single Michigan cable market where digital cable service has been available since early 1998" (Kang, 2002, p. 198). Lists of digital and analog subscribers

were provided by the local telephone company. The lists had 800 computer-generated random phone numbers, 400 for digital and 400 for analog subscribers. After ineligible phone numbers and non-contacted phone numbers were eliminated, 333 participants had completed the survey (181 digital and 152 nondigital subscribers).

Dependent variables consisted of early adopters and adoptive innovativeness. Digital cable had only penetrated 14 percent when this study was conducted, so the individuals in this study fell into the early adopter category. Kang's (2002) adoptive innovativeness variable measured "the speed of consumer adoption with respect to digital cable" (p. 199).

Independent variables included demographics (age, income, level of education, and number of children), media use (television viewing time), technology ownership (ownership of a video camera, a VCR, a video game system, etc.), innovative attitudes (beliefs about the innovativeness of themselves and their cable company), and satisfaction (Likert scale measured cable service satisfaction).

A discriminant analysis was performed on digital cable subscribers versus non-subscribers using the independent variables. Hypothesis one was not supported because "no demographic variables were found to have a significant impact on whether respondents chose to subscribe to digital cable" (Kang, 2002, p. 201). Hypothesis two, in respect to media use, was only partially supported because early digital subscribers were found to spend "significantly more time watching television than non-subscribers" but other media use variables such as

radio listening revealed no significant differences between digital and analog subscribers (p. 202). However, hypothesis three was supported because more digital users were subscribing to premium channels than analog subscribers. On the other hand, hypothesis four was not supported because there were no significant differences in the amounts of technological devices owned by digital versus analog subscribers. Hypothesis five and six were supported because digital cable subscribers believed that both they and their cable company were technologically progressive. Finally, hypothesis seven was supported because results indicated that digital cable subscribers, rather than analog subscribers, were more likely to be satisfied with their current cable service.

The fact that demographics played no significant role in this study surprised the researcher. The finding that demographics have not been found significant in some studies of cable and digital television adoption raise interesting questions. Perhaps demographics are only significant with certain types of technologies. An analysis of this variable across different technology innovation studies would prove useful in this query.

Diffusion of DVD Home Theater Systems

Kim and Lee's (2003) scholarly article sought to examine "the growing DVD home theater phenomenon by exploring the characteristics of DVD home theater adopters and their attitude toward DVD technology and products" (p. 268). The authors posed a research question instead of a hypothesis to explore this area of study. Kim and Lee (2003) sought to discover the motives and gratifications of the adopters, the components of the home theater system that these adopters

valued, and the possible patterns of displacement of other leisure activities, especially in relation to the videocassette tape recorder (VCR).

Kim and Lee (2003) used a "Q methodology" to explore, both quantitatively and qualitatively, the answers of the participants (p. 274). Forty-six statements were narrowed down from a list of 200 for the study. Thirty-eight people completed the survey, out of 51 respondents who agreed to participate.

The Q-factor analysis yielded three attitudinal factors that differentiated participants. Kim and Lee (2003) labeled these factors "Audiophiles (Factor 1), Technophiles (Factor 2), and Recreation Seekers (Factor 3)" (p.276). Most of the respondents agreed with 23 statements in the survey. Answers to the other statements separated respondents into the three categories.

"Audiophiles were represented by 9 respondents who valued the superior sound quality produced by the DVD home entertainment system" (Kim & Lee, 2003, p. 278). The second factor of Technophiles revealed similar characteristics to early adopters in diffusions of innovation literature. Fifteen people made up this category of respondents "who purchased DVD players because they were attracted by new technologies" (p. 280). The third factor, called Recreation Seekers, consisted of fourteen participants who used DVD home theater systems "mainly for enjoyment and escape" (p. 282). Kim and Lee described this group as not being "trendsetters or early adopters of new DVD technology" (p. 282). However, Recreation Seekers were described as being ranked second in intention, after Technophiles, to purchase HDTV.

Kim and Lee (2003) found little support for functional displacement among the sample, "contrary to studies that suggest VCR use displaces other leisure activities" (p. 278). In regards to uses and gratifications, all respondents reported that they used their home theater systems for "a kind of relaxation" (p. 278). The authors cautiously suggested that the three factors might "portray some of the characteristics of DVD home theater adopters in the United States" (p. 287).

Limitations for the Kim and Lee (2003) study center around their sample. The authors' results may be biased or skewed because the sample was obtained from members of an online discussion group about home entertainment systems. These particular participants were already highly motivated about the subject. In addition, all participants were male. Another limitation to the study is that it did not support or disprove a hypothesis, although it did provide some new information on this area of study.

Diffusion of Mobile and Cellular Phones

Cellular and mobile phones are relatively new innovations that have been studied in the United States and abroad. Leung and Wei (1999) examined what factors hindered the diffusion of mobile phones in Hong Kong. Based on the diffusion of innovations paradigm, Leung and Wei (1999) posed five sets of hypotheses and two research questions that examined the non-adoption factors of this relatively new communication innovation.

A pilot study was conducted before the telephone survey because hardly any literature existed at the time on cellular mobile phones and their perceived attributes and properties. Nineteen items were drawn from the pilot study. "In the

survey, respondents were asked to rate these 19 pre-tested items on a 5-point Likert scale, where '1' = strongly disagree, and '5' = strongly agree" (Leung & Wei, 1999, p. 215). The current study of satellite radio also utilized a 5-point Likert scale. This scale examined the five perceived attributes of satellite radio.

The first set of hypotheses studied the socioeconomic variables associated with the mobile phone have-nots. In this study the socioeconomic variables were found significant, meaning that "income, education, age, and even family size have discriminating effects in adoption" (Leung & Wei, 1999, p. 219). Older females with a lower monthly income, less education, and a smaller family size were more likely not to have a mobile phone.

The second hypothesis addressed ownership of functionally-similar technologies. Have-nots who owned fewer functionally-similar technologies were less likely to own a mobile phone. This hypothesis was also supported, suggesting a wider technological and economical gap between adopters and non-adopters of innovative technologies.

Perceived benefits was another factor examined. Leung and Wei (1999) stated, "When a technology is perceived to have advantages and offer benefits that are compatible with people's existing values and meet their needs, it is likely to be adopted" (p. 213). The hypotheses that posed that perceived compatibility, perceived non-complexity, and perceived benefits were positively related with possible adoption were supported. However, the variable of perceived advantages was not supported.

The fourth set of hypotheses addressed contacts as change agents that help convert non-adopters to adopters. Talking to salespeople and friends about mobile phones was found to have a significant effect. This set of hypotheses was supported, which shows congruency with prior diffusion studies (Rogers, 2003).

Mass media exposure was another variable addressed in the study. Leung and Wei (1999) hypothesized that the more television, radio, newspapers, and magazines the have-nots consume, the more likely they will adopt a mobile phone. All hypotheses about mass media exposure were rejected.

This particular study was useful because it illustrates how a new technology can be assessed through the diffusion of innovations paradigm. This study is also interesting because it does not support the role of mass media use as an influence in the adoption factor. However, Leung's and Wei's (1999) study has its limitations in the lack of examination of personality traits that Rogers (2003) specifies as a contributing factor in adoption of an innovation.

The authors in another scholarly article addressing cellular phone adoption, this time in the United States, integrated the theoretical backgrounds of the Technology Adoption Model (TAM) and diffusion theory to examine "the relative influence of beliefs, attitudes, and external variables" that are believed to influence people to adopt an innovation (Vishwanath & Goldhaber, 2003, p. 547). This article contained the results of a survey conducted to predict potential adoption by late adopters of cellular phones.

Vishwanath and Goldhaber (2003) first hypothesized that attitude toward the adoption decision "will mediate the relationship between beliefs about the innovation, and behavioral intent" (p. 556). Secondly, they also hypothesized "perceived complexity, relative disadvantage, incompatibility, and lack of observability, will have a significant direct affect on attitude towards technology" (p. 556). Thirdly, they stated media use, media ownership, and contact with change agents "will have a significant direct effect on perceived use, perceived compatibility, perceived observable benefits, and perceived usefulness" (p. 556). Lastly, the authors believed that these three variables (media use, etc.) would mediate the relationship between sociodemographic variables.

A telephone survey was conducted after a probability random sample of 1000 telephone numbers was drawn. After non-eligible respondents were excluded, 611 respondents completed the survey. Of this number of participants, 225 did not own a cellular phone. Measures were designed to investigate the reasons these 225 participants did not own a cellular phone. Likert-type scales ranging from "strongly disagree to strongly agree" measured the negative perceptions that non-adopters attributed to cellular phones (Vishwanath & Goldhaber, 2003, p. 557). The sample was checked against prior research and census data "to ensure adequate and valid representation" (p.558). The authors also assessed the measurement model for reliability and construct validity. Because evidence of misspecification stood out for two associations of variables, the model was re-estimated by constraining these two relationships. This newly revised model was called the "revised structural model" (p. 564).

Vishwanath and Goldhaber (2003) found that "the attitude to intention link was significant" for hypothesis one (p. 565). This hypothesis was supported. Hypothesis two was only partially supported (i.e., not supported) because two variables out of four in the revised structural model were found significant. Hypothesis three was also partially supported because the revised model found only significant impact of media use on perceived observability. Hypothesis four was also partially supported in the revised structural model. "Media ownership significantly mediated age, income, and occupation" (p. 566).

The authors found that their results confirmed "the general structure of the model, and demonstrate that beliefs have an indirect impact on intentions by influencing attitude" (Vishwanath & Goldhaber, 2003, p. 566). They concluded that the attitude variable should be included in future diffusion research. In the discussion, the authors discuss ideas for future research, including extending study into other adopter categories, such as laggards, to more innovations.

## Summary and Implications of Literature Review

Findings from various diffusion studies of innovative technologies show mixed results for certain factors, such as socioeconomic and communication behavior. However, reasons for these discrepancies may be a result of the targeted consumer audience of these innovations. Certain technologies are directly marketed to very particular segments of the consumer market. Some studies have yet to address this possibility, which may be skewing results of various diffusion studies.

Likert-type scales were common in the diffusion studies examined and one was utilized for the current study to measure the five perceived attributes of satellite radio: relative advantage, compatibility, complexity, trialability, and observability. Demographic and socioeconomic survey items from the previous studies were also drawn from for use in this study to examine adopter and non-adopter characteristics. A combination of snowball sampling, as used in Li's (2004) study, and of convenience sampling was chosen for this study to obtain participants.

The Las Vegas, Nevada, community, as researched by Lapp (1986), is an interesting community to study because of its evolving nature. It is the host of many conventions that showcase emerging technologies and information sharing. People from all over the world come to the community all year long to meet and distribute information. The annual convention of the National Association of Broadcasters takes place in Las Vegas, Nevada, as well as the conventions for the Broadcast Education Association and Consumer Electronics Association. Satellite radio is most likely not an unfamiliar medium to people in the community, not only because of the advertisements aired on television, but also because of the new technology brought and showcased in the area every year.

The application of diffusion theory to the emergence of satellite radio in Las Vegas, Nevada, would further scholarly knowledge of the relationship between the early adopter characteristics of Rogers' (2003) theory and the early subscribers of satellite radio. Because satellite radio has recently emerged on

the market, it is an opportune time to study its diffusion amongst consumers in the Las Vegas, Nevada, social system.

In Chapter 3, the research questions to be tested and the underlying rationale behind them are presented. The method of data collection and examination is also described.

# CHAPTER THREE

## METHOD

Because satellite radio has yet to be addressed by diffusion scholars, two research questions and ten hypotheses are proposed for study. This chapter details the rationale and for these research questions and hypotheses and explains the data collection and analysis process.

The current study continues the examination of new technology in a similar scope as the previous research described in the review of literature and tries to uncover the relevance of diffusion variables affecting satellite radio adoption. The following variables will be studied: adoption of satellite radio; amount of time that adopters have had satellite radio service; demographics and socioeconomic characteristics; communication behavior; and perceived attributes (relative advantage, compatibility, complexity, trialability, and observability) of satellite radio.

According to Rogers (2003), innovators (2.5% of a social system) are the first to adopt a new idea or technology, followed closely by the early adopters (13.5% of a social system) who follow the lead of the innovators. Because satellite radio has only been available for approximately four and a half years at the time of this study, this innovation is fairly new in its diffusion. As of January 4, 2006, XM

Satellite Radio (2006) announced just over 6 million subscribers. SIRIUS (2006b) reported 3.3 million subscribers by the end of 2005. The U. S. Census Bureau (2002) reported the total U. S. population in 2000 to be 281,421,906. Near the end of 2006, the U.S. population was reported at 3 billion people. As of January 2006, before the survey for this study took place, the approximate diffusion rate of satellite radio would be 3.5% of the total U. S. population. Therefore, most current subscribers would fall under the category of innovator or early adopter, depending upon length of adoption.

## Rationale

### Reliability of Perceived Attribute Variables

Because the validity of diffusion of innovations has been debated in previous research concerning a technology study (Lapp, 1986), a research question has been posed that addresses this subject.

RQ1: Are the perceived attribute variables of diffusion of innovations reliable for the study of the diffusion of satellite radio?

### Demographics and Socioeconomic Characteristics

Previous research has been inconsistent in indicating whether or not relationships exist between Rogers' generalizations about earlier adopter characteristics and actual adopter characteristics. Leung and Wei (1999) found that the socioeconomic variables of income, education, and family size had a significant relationship with adoption of cellular phones. Leung and Wei also found that age has a significant relationship with the adoption of cellular phones.

However, several researchers have found these variables insignificant in their studies (Kang, 2002; Li, 2004). The following research question and hypotheses have been posed to determine if Rogers' generalizations about demographics and socioeconomic characteristics of earlier adopters are consistent with current satellite radio subscribers.

RQ2: Is age a factor in the adoption of satellite radio?

H1: Adopters of satellite radio will have higher incomes than non-adopters of satellite radio.

H2: Adopters of satellite radio will have higher education levels than non-adopters of satellite radio.

H3: Adopters of satellite radio will own more technologies than non-adopters of satellite radio.

Communication Behavior

Rogers notes that mass media exposure is higher for innovators, compared to later adopters. Also, earlier adopters often know more about an innovation than do later adopters. The current study will focus on mass media exposure as a measurement of communication behavior. The following hypothesis follows previous diffusion research (Kang, 2002) in stating that current adopters of satellite radio will have more mass media exposure compared to non-adopters of satellite radio.

H4: Adopters of satellite radio will have higher mass media exposure than non-adopters.

Perceived Attributes

The perception of attributes variables have been fairly significant in past diffusion studies (Leung & Wei, 1999; Li, 2004; Vishwanath & Goldhaber, 2003) and should be studied further in respect to satellite radio adoption. Rogers (2003) generalizes that adoption of an innovation is positively related to an individual's perceptions of relative advantage, compatibility, trialability, and observability of the innovation. Adoption is negatively related to an individual's perception that an innovation is complex. The following hypotheses support Roger's generalizations about adopters and perceived attributes of an innovation.

H5: Satellite radio adopters will have greater perceived relative advantage of satellite radio than non-adopters.

H6: Satellite radio adopters will have greater perceived compatibility of satellite radio than non-adopters.

H7: Satellite radio adopters will perceive satellite radio to be less complex than non-adopters.

H8: Satellite radio adopters will have greater perceived trialability of satellite radio than non-adopters.

H9: Satellite radio adopters will have greater perceived observability of satellite radio than non-adopters.

H10: There will be a significant difference between satellite radio adopters and non-adopters in terms of overall perceived relative advantage, perceived

compatibility, perceived complexity, perceived trialability, and perceived observability of satellite radio.

## Method

Data were collected utilizing a survey instrument. Survey research has several advantages and weaknesses, according to Baxter and Babbie (2004). Surveys are useful for obtaining large samples and let the researcher develop operational definitions from actual responses. Also, Baxter and Babbie state, "Surveys are particularly useful in describing the characteristics of a large population" (p. 199). On the other hand, standardized items sometimes only measure the lowest common denominator in regards to people's beliefs, attitudes, and experiences. The standardization of surveys only allows for certain topics to be covered and important information may be missed. However, this standardization can also be seen as a strength because the same questions are asked in the same manner to all participants.

This study used a self-administered survey (see APPENDIX II). An informational document with the purpose of the survey, directions to take the survey, and contact information was distributed in place of informed consent to each participant along with the actual survey. The first section of the survey determined if the participant was a current satellite radio subscriber, a former satellite radio subscriber, or a non-subscriber of satellite radio. The first section also determined, with a contingency question, how long the current subscriber had the service. The second section measured perceived attributes of satellite

radio with a matrix question format. The third section measured communication behavior in the form of participants' mass media exposure. The fourth section measured demographic and socioeconomic variables.

Adoption of Satellite Radio

The survey instrument included one key independent variable: adoption of satellite radio. Adoption of satellite radio was coded as a one and non-adoption of satellite radio was coded as a two. This question was a contingency question that asked the non-adopter to answer several more questions about any prior adoption of satellite radio and a question that asked if the participant intended to buy a satellite radio subscription in the future.

Demographics & Socioeconomic Characteristics

Participant characteristics were measured in Part IV of the survey instrument (see APPENDIX II). To determine this information, participants were asked about their age, gender, level of education completed, household income, and technology ownership.

Communication Behavior

To determine mass media exposure, participants were asked about how often they read the newspaper, how much they used the Internet, their television viewing habits, AM/FM radio use, and satellite radio use. These measures appear in Part II of the survey instrument.

Perceived Attributes

Part III of the survey instrument measured perceived attributes related to satellite radio use on a 5-point Likert-type index that is common in the diffusion

research reviewed in Chapter 2. Perceived attributes were measured on a 5-point continuum from strongly agree to strongly disagree. The five attributes that made up perceived attributes include relative advantage, compatibility, complexity, trialability, and observability.

By using Moore and Benbasat's (1991) research on the development of an instrument to measure perceived characteristics of an innovation, the five constructs were conceptualized for the questionnaire. Items that measured the perceived attributes negatively were included in the survey to prevent participants from answering all items in the same way and to check for construct reliability. Examples of such items are as follows: "I would never pay for satellite radio," "I think that a satellite radio would be difficult to use," "I have never seen anyone use a satellite radio."

Relative advantage was conceptualized into seven statements on the questionnaire. Rogers (2003) describes relative advantage as the degree to which an innovation is perceived as advantageous over an idea or technology that came before it. Therefore, use of satellite radio was compared and contrasted to the use of AM/FM radio, the medium that satellite radio has been compared with since its inception, and MP3 players and the iPod, two competing technologies. Statements for the current study's survey were developed from Moore and Benbasat's (1991) construct statements, which were developed to study perceived characteristics of personal workstations. The statements were altered to study the relative advantages of satellite radio.

Compatibility was described by Rogers (2003) as the degree to which an innovation is perceived as being concordant with existing values, past experiences, and requirements of potential adopters. However, this particular definition of the construct creates problems because it seems to overlap with relative advantage when it addresses the needs or requirements of the potential adopters. Moore and Benbasat (1991) stated that "there can be no advantage to an innovation that does not reflect an adopter's needs" (p. 199). Therefore, reference to any needs or requirements of potential adopters was eliminated from the study. Four statements were developed from Moore and Benbasat's survey statements that measured compatibility and were included in the study to measure the variable.

Complexity refers to "the degree to which an innovation is perceived as difficult to understand and use" (Rogers, 2003, p. 16). Moore and Benbasat (1991) constructed this variable as "ease of use," from the Technology Acceptance Model. Moore and Benbasat reported that this model was similar to Rogers' (2003) diffusion of innovation theory (p. 199). Moore and Benbasat defined perceived ease of use as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (p. 197). The constructs of complexity and ease of use are very similar in nature. Using Moore and Benbasat's survey items for "ease of use" and Rogers' construct of complexity, five survey items were created to measure perceived complexity of satellite radio.

Rogers (2003) describes trialability as the degree to which an innovation may be used on a limited basis. The current study utilized Moore and Benbasat's (1991) survey items for trialability to create statements to measure perceptions of trialability for satellite radio. Five items were constructed for the current questionnaire.

Observability was described as "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 16). Moore and Benbasat (1991) split this construct into two constructs that measured different aspects of observability. "One dimension concentrated on the **tangibility** of the results of using the innovation, including their **Observability** and **Communicability,** and was labelled [sic] **Result Demonstrability**" [boldface in original] (p. 203). The other construct measured the actual "visibility" of the innovation (p. 203). In Moore and Benbasat's study, the survey instrument was constructed to "measure users' perceptions of adopting an information technology (IT) innovation" (p. 193).

The current study assumed that both non-adopters and adopters of satellite radio would be surveyed, and not only users of the innovation. Therefore, the current study did not utilize the result demonstrability construct to measure the observability of satellite radio. Also, because satellite radio is a technology that relies not only on visibility, but also on consumers to listen to the service, the current study utilized survey items that asked participants whether or not they had listened to satellite radio programming, in addition to actually seeing the

technology. Six items were created to measure the observability of satellite radio.

## Pre-Test Sample

The researcher and the researcher's faculty advisor determined that a pre-test should be conducted because many of the survey items had been newly made after a review of past diffusion studies analyzing adopters of several different technologies. Therefore, a pre-test was conducted to better determine how the survey and its structure would be interpreted by potential participants. The researcher had already determined that the full scale study would utilize a college student population, thus the pre-test sample utilized an undergraduate college student population at the University of Nevada, Las Vegas. The measures and format for the initial survey were tested by approximately 35 undergraduate students in a communications class at the university. The pre-test sample was selected by the researcher's faculty advisor.

## Survey Pre-Test

Pre-test was conducted by the researcher and the researcher's faculty advisor to obtain feedback from the undergraduate pre-test participants about the survey instrument. The researcher announced the general nature of the pre-test to the participants then administered the survey. The researcher and faculty advisor then obtained feedback from participants for each survey question on the survey instrument, going through each question individually, step-by-step,

until the entire survey instrument had been critiqued. Elements such as the introduction and the wording of the introduction, the first section and its wording, and every other part of the survey instrument were analyzed by participants and related back to the researcher.

Several typographical errors were discovered by the pre-test sample. Also, two new items were added to the survey after discussion by the participants during the pre-test analysis shed light on several other potential variables. One potential variable was "intention to adopt satellite radio," meaning that some participants who do not currently have satellite radio may have the intention to adopt a satellite radio in the future. This question was given three possible answer choices: yes, undecided, and no. Another item that was added asked the participant who did not currently have satellite radio if they had ever previously subscribed to the service. This question had a yes or no answer choice.

## Sampling Method for Full Scale Study

Like the pre-test, the full scale study also utilized a convenience sample of undergraduate students to obtain participants. The researcher or the researcher's faculty advisor distributed surveys inside envelopes to several different communications classes at the university. Self-sealing envelopes were used to aid in keeping the data on the surveys secure from everyone but the participant and researcher. Two surveys, each with the informational sheet describing the survey process and contact information for the researcher, accompanied each envelope. One survey was for the participant who had the

survey distributed to him or her by the researcher or researcher's faculty advisor, and the second survey was for a second participant chosen by the participant from the convenience sample. A way of acquiring other participants outside of the convenience sample is often referred to as a snowball sample. Participants in the convenience sample were asked to distribute the survey and envelope to someone outside of their classroom who preferably had satellite radio. Participants acquired through this snowball method were instructed, per the informational sheet, to deposit the completed survey in the envelope, seal it, and return it to the person who had given them the survey. Participants then were expected to return the envelopes with the survey sealed inside to the researcher who visited the classrooms one week after the survey distribution to collect the surveys.

Spoken instructions were given to the participants of the convenience sample to complete only one survey. This was to prevent multiple surveys from being taken by one person. Written instructions with the same warning accompanied each survey. Participation in the study was optional.

## Analysis Plan

After administering the survey, item analysis was performed to measure the internal consistency of scale measures for each of the perceived attribute variables (i.e., relative advantage, compatibility, complexity, trialability, and observability). Item analysis provided information on how each scale item related to other items within the same attribute. A .40 coefficient *a priori* criterion level

was used to determine item membership for any attribute (Spector, 1992) and internal consistency was established via Coefficient Alpha at .70 (Cronbach, 1951). Items were deleted if they failed to meet these criteria.

The first research question was examined via tests of internal consistency. The second research question and hypotheses one, two, and four through ten were examined via t-tests. Hypothesis three was examined via Chi Square.

The next chapter presents and examines the results of the collected surveys. Chapter 5 discusses the findings and reviews the implications of this study in future research.

# CHAPTER FOUR

## RESULTS

### Overview: Respondent Characteristics

There were 366 surveys distributed with a 50.5% return rate. One hundred eighty-five surveys were collected from participants. Results showed that 31.4% of respondents subscribed to at least one satellite radio service. Ages of respondents ranged from 18 to 69 years with a median age of approximately 28 years. Sixty-two percent of respondents were 25 years of age or less. Female respondents made up 58.4% of the sample with male respondents making up the remaining 41.6%.

Half of the respondents reported a gross personal income of $30,000 or less. Approximately 63% of respondents reported themselves as students enrolled at the University of Nevada, Las Vegas, and approximately 66% of respondents reported completing some college education. The majority of respondents, 94.6%, were residents of Clark County, Nevada.

Participants were asked to report their ownership of several electronic devices. Approximately 99% of the sample owned a cellular phone. A large majority of respondents, approximately 97%, owned a personal computer (PC),

and 93.5% of respondents owned a DVD player. Results also indicated that 88.6% of respondents owned a compact disc (CD) player, nearly 75% owned a video cassette recorder (VCR), 74.6% owned a digital camera, and 60% of participants owned a video game system. Ownership of AM/FM radios was measured by asking how many AM/FM receivers were personally owned in the household or automobile by the participant. Three or four AM/FM radios were owned by 37.3%, one or two AM/FM radios were owned by 30.3% of respondents, and more than four AM/FM radios were owned by 29.7%. A small percentage of respondents (2.7%) answered that they owned no AM/FM radios in either their household or automobile. There was a difference of 2.7% between the respondents who reported they subscribed to a satellite radio service (31.4%) and respondents who reported that they owned a satellite radio (34.1%). Reasons for this discrepancy will be discussed in Chapter 5.

Mass Media Exposure

A profile of media usage was also part of the survey. Almost 60% of respondents reported spending less than three hours daily on the Internet. Nearly 59% of respondents watched television three hours or less a day. Newspaper readership was also measured. The majority of respondents at 33.5% reported spending 16 to 30 minutes reading a newspaper either online or in print.

Satellite Radio Ownership & Listening Habits

Respondents also reported the number of satellite radio receivers in their household. The presence of no satellite radio receivers in the household was

reported by 61.1% of respondents. One satellite radio in the respondent's household or automobile was reported by 22.2%, two satellite radios were reported by 10.8%, and three satellite radios were reported by 4.9%. Only 1% had four or five satellite radios. Approximately 66% of respondents reported spending no time listening to satellite radio during a day, compared to the 61.1% which reported no satellite radio receiver in their household or automobile. This finding indicates that the presence of satellite radio in the household may not mean that someone will necessarily listen to it.

Respondents who owned satellite radio were asked to pick the source of information that most influenced their decision to buy their satellite radio service. Eighty-six percent of self-reported satellite radio subscribers answered this question, and out of those respondents, 24% picked the "other" category, followed closely at 20% by "satellite radio channels." The "advertisements" and "on-air personality" choices were each picked 14% of the time. Many of the respondents' answers to this item had to be discarded, and this problem will be addressed in Chapter 5.

## Analysis

Item analysis was performed after the administration of the survey to determine the internal consistency of the scale measures for perceived attributes (e.g. relative advantage, compatibility, complexity, trialability, observability). Internal-consistency reliability analysis provided information on how scale items in the same construct intercorrelated with one another. A .40 coefficient criterion

level was used to determine *a priori* (Spector, 1992). The internal consistency *a priori* level of alpha was established via Coefficient Alpha at .70 (Cronbach, 1951).

Two items in the perceived relative advantage scale were dropped. The first item was "Listening to satellite radio offers more advantages than listening to an iPod." The second item was "Listening to an MP3 player offers more advantages than listening to satellite radio." One item was dropped from the perceived complexity scale. The item was "If I had problems with a satellite radio, I think I could get help to fix the problem." Two items were dropped from the perceived observability scale. The first item was "I have seen and/or heard advertisements for satellite radio." The second item was "I have heard satellite radio talked about in the news." These items were deleted from subsequent analysis.

Perceived Attributes' Reliability

For research question one, a reliability analysis was performed on the perceived attributes variables (relative advantage, compatibility, complexity, trialability, observability). It was found that all five perceived attributes variables' scale items were reliable. Therefore, when items in each perceived attribute construct were measured against other items in the same construct, the items were answered consistently. The scale item reliability analysis for relative advantage resulted in a Cronbach's Alpha of .865, compatibility received a Cronbach's Alpha of .832, complexity received a Cronbach's Alpha of .872,

trialability received a Cronbach's Alpha of .859, and observability received a Cronbach's Alpha of .782.

Age as a Factor in Satellite Radio Subscribership

For research question two, a t-test was performed to determine if age is a factor in the adoption of satellite radio. Age was highly significant in the adoption of satellite radio ($t(185)=3.74$, $p = .000$). Adopters were almost 32 years old (M = 31.91, *SD* =11.49), compared to the non-adopters who were nearly 26 years old (M = 25.60, *SD* = 8.46).

Income & Education in Satellite Radio Subscribership

For hypothesis one, income was significant in the adoption of satellite radio ($t(182)=4.22$, $p = .000$). Subscribers averaged $40,000 to $50,000 (M = 5.23, *SD* =2.62) compared to non-subscribers who averaged $20,000 to $30,000 (M = 3.52, *SD* =2.29).

For hypothesis two, education was found to be significant in the adoption of satellite radio ($t(185)=2.12$, $p = .03$). Subscribers had some college education or were college graduates (M = 3.50, *SD* =.90) as opposed to non-subscribers who more often had some college education (M = 3.20, *SD* = .89). The minimal difference in means (.30) indicates that levels of education are close among subscribers and non-subscribers, but are significantly different nonetheless.

Technology Ownership in Satellite Radio Subscribership

Hypothesis three was partially supported. Three technologies were found to be owned more often by satellite radio adopters, with one additional technology approaching significance. Approximately 74% of subscribers owned a video

game system, compared to nearly 55% of non-subscribers $\chi^2(1, N=185) = 6.059$, $p<.05$. Nearly 70% of satellite radio subscribers owned video cameras, compared to nearly 50% of non-subscribers $\chi^2(1, N=185) = 6.683$, $p<.05$. TiVo was owned by more subscribers (39.7%) than non-subscribers (25.2%) of satellite radio $\chi^2(1, N=185) = 3.984$, $p<.05$. The technology ownership item that approached significance was ownership of high definition television. More subscribers (48.3%) of satellite radio potentially owned high definition television more often when compared to 35.4% of non-subscribers $\chi^2(1, N=185) = 2.749$, $p = .068$.

Mass Media Exposure and Satellite Radio Subscribership

Hypothesis four was also partially supported. The amount of time per day spent reading a newspaper online or in print was found to be significantly different between subscribers and non-subscribers of satellite radio ($t(185)=2.56$, $p = .012$). Satellite radio subscribers read on average nearly 16 to 30 minutes per day (M = 2.95, *SD* =1.13) compared to non-subscribers who read on average less than 15 minutes per day (M = 2.50, *SD* =1.06). The number of AM/FM radios owned by subscribers and non-subscribers approached significant difference ($t(185)=1.87$, $p = .063$). Subscribers potentially owned three or four AM/FM radios (M = 3.10, *SD* =.76) compared to nearly three or four AM/FM radios potentially owned by non-subscribers of satellite radio (M = 2.87, *SD* = .86). There were no significant differences found between the subscriber and non-subscriber groups for hours of television watched per day, hours a day listening to AM/FM radio, or hours per day spent on the Internet.

Subscribers' Perceived Attributes

The perceived attributes hypotheses were examined via *t*-tests. Hypotheses five, eight, nine, and ten were supported and hypotheses six and seven were unsupported. Significant differences were found between the subscriber and non-subscriber groups for perceived relative advantage, perceived trialability, perceived observability, and overall perceived attributes of satellite radio.

For hypothesis five, perceived relative advantage was found to be significantly different between subscribers and non-subscribers ($t(184)= -12.69$, $p = .000$). Subscribers of satellite radio strongly agreed (M = 1.48, *SD* = .51) with the relative advantage of satellite radio. Non-subscribers did not agree as strongly and were found to be split between agreement and undecidedness in respect to relative advantage of satellite radio (M = 2.61, *SD* =.65).

Hypothesis six was unsupported with no significant difference between subscribers and non-subscribers of satellite radio for perceived compatibility of satellite radio ($t(184)= -.45$, $p = .649$). Subscribers of satellite radio had a mean of 2.91 (*SD* =.33). Non-subscribers were found to have a mean of 2.93 (*SD* =.37).

Hypothesis seven was also unsupported. No significant difference was found between the two groups for perceived complexity of satellite radio ($t(184)= -1.23$, $p = .222$). Subscribers (M = 2.91, *SD* =40) and non-subscribers (M = 2.98, *SD* = .24) were very close in means for the perceived complexity factor.

A significant difference was found between subscribers and non-subscribers for hypothesis eight, and therefore the hypothesis for perceived trialability was

supported ($t$(184)= -12.30, $p$ = .000). Subscribers of satellite radio were found to agree with the perceived trialability of satellite radio (M = 2.03, *SD* = .39) more strongly than non-subscribers (M = 2.97, *SD* =.62).

Hypothesis nine was also supported. A significant difference was found between the two groups for perceived observability ($t$(184)= -7.71, $p$ = .000). Subscribers of satellite radio were found to agree (M = 2.39, *SD* =.31) with the perceived observability of satellite radio more strongly than non-subscribers (M = 2.87, *SD* =.52).

Hypothesis ten was also supported. A significant difference was found between satellite radio subscribers and non-subscribers for all five attributes combined ($t$(184)= -13.16, $p$ = .000). Subscribers more strongly agreed (M = 2.29, *SD* =.24) with the overall perceived attributes of satellite radio (e.g. relative advantage, compatibility, complexity, trialability, observability) compared to the non-subscribers (M = 2.87, *SD* =.33).

In the next and final chapter, these findings are discussed. Also, an additional analysis performed on non-adopters' perceived attributes of satellite radio is included in the following chapter. Chapter 5 also reviews the strengths and limitations of this study and the implications of this research in future studies.

# CHAPTER FIVE

# DISCUSSION

In this chapter, the results are discussed and analyzed. The strengths and weaknesses of the study are also presented, as well as the implications for future research.

## General Discussion

This section discusses the analysis of diffusion variables affecting satellite radio adoption that were found in this study.

### Characteristics of Subscribers

Rogers (2003) generalized that earlier adopters and later adopters are not significantly different in ages, and other diffusion studies have found inconsistent data on the age variable as it relates to adoption of an innovation. Danko and MacLachlan (1983) discovered that early adopters of personal computers were approximately 30 years of age. Li (2004) and Kang (2002) found no significance in the age of the early adopters of cable television and digital cable, respectively. On the other hand, Leung and Wei (1999) found that age was a factor in the non-adoption of mobile phones. They found that older females were less likely to have mobile phones. However, the current study did find a significant age difference between satellite radio adopters and non-adopters. This study found

subscribers of satellite radio services were nearly 32 years of age, compared to nearly 26 years of age for non-subscribers. This finding does not mirror Rogers' (2003) generalizations about the insignificance of age. In this study of satellite radio subscribers, satellite radio tends to have a subscriber base that is in its early 30s. Non-subscribers are younger than subscribers in this technology's case.

Income was also studied because it was often a variable included in previous diffusion studies (Lapp, 1986; Leung & Wei, 1999; Li, 2004; Kang, 2002) and Rogers (2003) generalized in his research that social status (income, possession of wealth, etc) is often positively related to innovativeness, the degree to which an individual or group is relatively earlier in adopting an innovation. Both Li (2004) and Kang (2002) found that income had no significance in the adoption of the technologies they studied. On the other hand, Leung and Wei (1999) found that if a respondent had a lower average monthly income, they were more likely not to have a cellular phone. Lapp (1986) also found that income played a crucial role in the study of cable television subscribers. Lapp found that respondents with a higher income had a higher cable subscription level and often had more televisions connected to cable in their home than subscribers with a lower income. Income was also found to be significant in the adoption of satellite radio. Subscribers to satellite radio averaged $40,000 to $50,000. Non-subscribers to satellite radio averaged $20,000 to $30,000. The finding that subscribers have a higher income than non-subscribers again does not come as

a surprise to the current researcher, but this finding is helpful in obtaining a snapshot in time of the present satellite radio adopter.

Another element of income is technology ownership. Rogers (2003) found that wealth often is positively related to innovativeness. Technology ownership was measured in this study, and although the hypothesis that adopters of satellite radio will own more technologies than non-adopters was not fully supported, there were some interesting findings. Notably, three technologies were found to be owned more often by the satellite radio adopters: video game systems, video cameras, and TiVo. No technologies were found to be significantly owned more in favor of the non-subscribers. Satellite radio subscribers also potentially owned more high-definition television than non-subscribers. Subscribers potentially owned three or four AM/FM radios compared to just under that number for non-subscribers.

Newer competing technologies like the MP3 player and iPod discussed earlier in this study were not found to be preferred over satellite radio by non-subscribers. One could suggest that the type of service that satellite radio companies offer are not being replaced by any of the newer technologies examined in this study. Satellite radio does not seem to have gained such a foothold in the American market like other forms of media have, namely television, AM/FM radio, and the Internet. Satellite radio is still seen as a specialty item, comparable to TiVo, a technology that finds and records television shows at the discretion or interests of its owner. TiVo, launched in 1999, like satellite radio also comes with a subscription, either paid monthly or

prepaid for up to several years. The finding that satellite radio subscribers more often are owners of TiVo, is an interesting finding considering the subscription similarity between the two technologies. It is not known whether subscribers of satellite radio first owned TiVo or vice versa, but future research could explore the possibility that once a person begins subscribing to one media service, he or she may continue to subscribe to other media-related services as well.

Education was also studied because it has often been found in previous diffusion studies (Leung & Wei, 1999; Li, 2004; Kang, 2002; Rogers, 2003). Leung and Wei (1999) found that respondents with a lower education were less likely than higher educated respondents to have a cellular phone. Both Li (2004) and Kang (2002) again did not find any significance in education level in their studies. However, in the study of satellite radio subscribers and non-subscribers, education levels of subscribers compared to non-subscribers were found to be significantly different from one another. Subscribers of satellite radio were found to have more formal education than non-subscribers. Although the difference was minimal, subscribers were more likely to be college graduates than the non-subscribers. This finding echoes earlier findings by Rogers (2003) because education level does seem to be positively related to a person's innovativeness.

These findings may not come as a surprise to some people because products are marketed to a particular group or demographic. However, this is still an important finding, considering that satellite radio is still fairly new in its inception, and the companies have been forecasted to fail if the companies do not get enough subscribers to sign up for the service. Who subscribes to the

service and who does not will determine the fledgling technologies' future. The two satellite radio companies may need to rethink their current and potential audience's needs in order to stay in operation.

Subscribers' Mass Media Exposure

This study found the hypothesis about mass media exposure to be unsupported. Only the amount of time per day spent reading a newspaper either online or in print was found to be significantly different between subscribers and non-subscribers of satellite radio. The satellite radio adopters read newspapers (online or print) more often than their counterparts. There were no significant differences found between the two groups concerning hours of television watched per day, hours a day listening to AM/FM radio, or hours per day spent on the Internet. Therefore, mass media exposure was not found to be significantly different between the adopters and non-adopters, and Rogers' (2003) generalizations about mass media exposure do not seem to play a significant part in this study of satellite radio adoption.

## Subscribers' Perceived Attributes

Individually, three of the five perceived attributes variables were found to be significantly different between satellite radio subscribers and non-subscribers: *perceived relative advantage, perceived trialability, and perceived observability.* However, when the five variables were combined, the overall perceptions of the innovation attributes were found to be significantly different between both groups.

Rogers (2003) noted that innovations will be more rapidly adopted if an individual perceives an innovation as having greater relative advantage, trialability, compatibility, observability, and less complexity than other innovations. In this study, adopters more often than non-adopters perceived satellite radio to be greater in relative advantage, trialability, and observability. These four findings concur with Rogers' (2003) generalizations about adopters of an innovation. However, those data do not say whether the adopters perceived satellite radio in these ways before or after they adopted the technology.

Although the individual variables of perceived compatibility and perceived complexity were not found to be significantly different between the two groups in this study, when they were combined with the other perceived attributes, the overall perceived attributes variable was found to be significantly different between subscribers and non-subscribers. Therefore, the two unsupported variables still may play a factor when all five are combined, but individually may not be significant factors for adopters or non-adopters of satellite radio.

## Non-Subscribers' Perceived Attributes

A post hoc one-way ANOVA analysis was performed after the data was analyzed to determine if three groups of non-subscribers agreed differently about the perceived attributes of satellite radio. One hundred twenty-six respondents responded to the item: "If you do **not** have a current subscription to satellite radio, do you intend to buy a satellite radio subscription?" (see

APPENDIX II). Thirteen respondents reported "yes," 64 reported "no," and 49 reported "undecided."

Relative Advantage

The 13 respondents who reported "yes" to this item agreed with the perceived relative advantage of satellite radio (M = 2.10, *SD* = .71). The respondents who reported "no" to this item were more undecided with the relative advantage of satellite radio than the previous "yes" group (M = 2.92, *SD* = .59). The 49 respondents who reported "undecided" agreed less than the "yes" group but agreed more than the "no" group of non-subscribers (M = 2.35, *SD* = .49) (see Figure 1). The difference between groups was highly significant, $F(2,123) = 19.63$, $p = .000$.

This pattern of means for these three groups echoes the diffusion of innovations' generalizations about the adoption of an innovation and the individual's perception of the innovation's attributes. Those who perceive an innovation to have relative advantage are more likely to adopt that innovation. The people who do not perceive relative advantage of an innovation are not likely to adopt that innovation. The "undecided" individuals do not agree with the perceived relative advantage of satellite radio as strongly as the group who intends to adopt, but the "undecided" group also does not disagree as strongly as the people who do not intend to adopt the technology. These "undecided" individuals fall between these two groups who have made the decision. These findings confirm what diffusion of innovations theory suggests about perceived attributes and the adoption of an innovation.

Compatibility

The 13 respondents who reported an intention to buy a satellite radio subscription were undecided about the perceived compatibility of satellite radio (M = 3.23, *SD* = .44). Respondents with no reported intention to purchase satellite radio agreed slightly more on the compatibility of satellite radio than the "yes" group (M = 2.89, *SD* = 2.89). The undecided group fell between the previous two groups with a mean of 2.93 (*SD* = 2.92) (see Figure 2).

Interestingly, not one of the three groups of non-subscribers agreed strongly with this perceived attribute of satellite radio. What is even more surprising is that the respondents with no intent to purchase satellite radio and the respondents who were undecided about purchasing satellite radio were in more agreement with this perceived attribute than the respondents with an intention to adopt. This finding does not illustrate what diffusion of innovations theory suggests about perceived attributes and the adoption of an innovation. However, the difference between groups was significant, $F(2,123) = 4.91$, $p = .009$. Note that hypothesis six was not found significant in this study.

Complexity

No significant difference was found between the three groups in terms of perceived complexity, $F(2,123) = .97$, $p = .382$. Non-subscribers with an intention to subscribe had a mean of 2.92 (*SD* = .71); non-subscribers with no intention to subscribe had a mean of 2.97 (*SD* = .27); non-subscribers who were undecided on their intention to adopt had a mean of 3.02 (*SD* = .22) (see Figure 3). Again, note that hypothesis 7 also was unsupported with no significant difference

between the subscriber and non-subscriber group in terms of perceived complexity.

Trialability

A highly significant difference was found between the three groups in terms of perceived trialability, $F(2,123) = 6.15$, $p = .003$. Non-subscribers with an intention to subscribe to satellite radio had a mean of 2.52 ($SD = .59$); non-subscribers with no intention to subscribe had a mean of 3.12 ($SD = .55$); non-subscribers who were undecided on this item had a mean of 2.88 ($SD = .66$) (see Figure 4). Therefore, these three groups fell in line with expectations set forth in the diffusion of innovations theory. Those non-subscribers who agreed more with the perceived trialability of satellite radio were also the subscribers who intended to subscribe to the service. The non-subscribers who had no intention to adopt satellite radio were more undecided than the group that intended to subscribe. The group that was undecided about their intention to obtain a satellite radio subscription fell between the other two groups on their perception of the trialability of satellite radio.

Observability

A significant difference was also found between the three non-subscriber group's means in regards to the perceived observability of satellite radio, $F(2,123) = 5.12$, $p = .007$. Non-subscribers with an intention to subscribe to satellite radio had a mean of 2.55 ($SD = .35$); non-subscribers with no intention to subscribe had a mean of 3.00 ($SD = .56$); non-subscribers who were undecided on this item had a mean of 2.79 ($SD = .46$) (see Figure 5). These

findings further confirm the generalizations made about adoption of an innovation and perceived attributes in the diffusion of innovations theory.

All Perceived Attribute Variables

A highly significant difference was also found between the three non-subscriber group's means when all items for the five variables of perceived attributes were combined, $F(2,123) = 10.31$, $p = .000$. Non-subscribers with an intention to subscribe to satellite radio had a mean of 2.63 ($SD = .33$); non-subscribers with no intention to subscribe had a mean of 2.98 ($SD = .31$); non-subscribers who were undecided on this item had a mean of 2.78 ($SD = .29$) (see Figure 6).

These findings suggest that non-subscribers of satellite radio with an intention to adopt agree with the items that make up the five perceived attribute variables of satellite radio. Non-subscribers with no intention to adopt tend to disagree with these items more than the group that intends to adopt and the group who is undecided. The undecided group tends to fall between the group with an intention to adopt and the group with no intention to adopt, illustrating a true undecidedness on the perceived attributes of this innovation.

## Strengths of Current Study

One strength of this study was the pre-test. The pre-test showed the researcher weaknesses of the survey and gave fresh insight into the study before the full scale study occurred. The pre-test allowed the researcher to fix possible points of confusion in the survey instrument and to get much needed

feedback about the survey. This valuable early insight minimized problems for future respondents and the researcher.

Methodologically, the study worked well because data were collected over a short period of time and quickly compiled. The surveys were administered and collected within the course of a one week period, unlike other research which may occur over several weeks. Additionally, many of the survey items were constructed from previous research instruments and consistent with previous studies from the literature review. The perceived attribute variables in the survey were found to be reliable after an internal-consistency reliability analysis was performed. Although all hypotheses were not supported, this study provided insight into who the adopters and non-adopters of satellite radio are and how satellite radio is perceived by those groups.

Most importantly, a major and exciting strength of this study was its ability to utilize previous diffusion studies and constructs that examined adopters of many different technologies and discover new information about adopters of satellite radio. The constructs for diffusion of innovations were, in the most part, found to be applicable to the study of adopters of this relatively new technology. Profiles of both adopters and non-adopters of satellite radio were able to be constructed utilizing previous research that had never before measured this particular technology. Therefore, this study, despite a few limitations noted below, was able to achieve what other studies utilizing diffusion of innovations theory have been able to do in previous research. This illustrates the theory's applicability throughout many different technologies and sets of adopters.

## Limitations

An obvious limitation of this study is the use of college students as participants. Most research using the diffusion of innovations often employs random sampling using telephone questionnaires with trained data collectors. However, because of this researcher's lack of funding and facilities, a more cost effective sampling method had to be employed. This factor tends to make the study less applicable to all adopters of satellite radio. On the other hand, the researcher utilized an additional method of obtaining participants outside of the convenience sample to help overcome that limitation. To obtain a broader sample outside of the convenience sample, the researcher additionally employed a snowball sampling technique described in Chapter 3. This allowed the researcher to obtain participants from outside the convenience sample to analyze. However, an additional limitation involving the communications students in the sample would be the fact that they may be in those classes because they have an interest in mass communication. This, too, could cause a limitation that may not have been seen if a random sampling method had been utilized.

The participants found through the convenience sample handed out the same surveys to adults outside of the communications classes sampled, thus broadening the sample studied to include participants whom may not have been included if only students from those classes at the university had been utilized. Approximately 63% of respondents reported themselves to be students at University of Nevada, Las Vegas at the time of the survey. Because the median

age of respondents was approximately 28 years of age, the additional method of sampling seemed to have helped boost the age of respondents to a higher than typical age of students at University of Nevada, Las Vegas. According to a report released by the university in the fall of 2005, approximately 17,034 students were 24 years of age or under, compared to 11,070 students 25 years of age or more (University of Nevada Las Vegas, 2005).

Several problems were discovered with the survey layout and wording of the questions that went undiscovered during the pre-testing. There was a difference of 2.7% between respondents reporting they subscribed a satellite radio service and reporting that they owned a satellite radio. Originally, the questions were put in the survey to confirm the amount of satellite radio subscribers in two separate areas of the survey. However, there was a difference, and perhaps respondents confused the idea of actually physically possessing a satellite radio in the household with also owning the technology. More respondents reported owning a satellite radio, but not subscribing to the service. It is possible to have a satellite radio in the household but not be the one subscribing to the service. One example of this could be that another member of the household may own and subscribe to the service. Also, one could buy a car with the satellite radio receiver and not activate it. Ownership and subscription are two different terms that could have been understood differently among respondents. Changing the wording of these items to make them clearer to respondents would be a plausible way to correct this problem.

Another example of limitations to the survey involved question 7 in Part IV (see APPENDIX II). Many of the respondents' answers to this item had to be discarded because a large number of respondents answered the question incorrectly. Respondents were supposed to indicate how many of each item listed in the survey question they owned. Instead of numerical amounts, many respondents checked the line to indicate that they owned the technology, but gave no indication as to how many of that particular technology they owned. Although this problem was not foreseen in the pre-test, it was found in the full scale study. Because of this problem, the researcher had to discard the original plan of reporting that data, and interpreted the data as a "yes or no" ownership item. The problem described may be simply resolved by using an ink color other than black or a bold font. The survey for this study was printed in black ink, but perhaps a bright red ink would have been adequate for this purpose. If the respondents' attention were better drawn to the specifics of the question, there may have been a better outcome.

Another limitation to the survey was some of the items themselves. Because no previous diffusion of innovations research on satellite radio had been published before the study began, no time-tested survey items or questionnaires to study adopters of this technology were available to adapt to this study. Previous research studying several different technologies were utilized and drawn from to create a suitable method for this study, and there were several questions discarded from the perceived attributes section of the survey that caused the number of items measuring each construct to be cut down. In the

future, pre-testing each item in a construct before it is utilized in a full scale study would aid to minimize any effects this occurrence may have on results.

## Recommendations for Future Research

One area of future research that looks promising is extending this idea of satellite radio diffusion research into how adopters and non-adopters of this technology shape the medium itself. This study has not informed the reader of how the adopter is using the technology. The adoption of a technology is an important event because people have the ability to reshape its uses and the technology can affect its audience's behaviors in turn. The SCOT (Social Construction of Technology) theory helps explain how technology is shaped by not just the people who create the technology but by the people who use it (Bijker, Hughes, & Pinch, 1987). This theory gives a multi-faceted approach to how technology is adopted and ultimately considers the adopter as an integral part of the technology's creation and existence.

Another interesting aspect of this study is that two of the five perceived attributes, perceived compatibility and perceived complexity, were not found significant in this study. Although non-subscribers and subscribers of satellite radio may actually perceive these two variables the same way, the items that make up these constructs still should be looked into for future studies. Perhaps future research should consider pre-testing the items of these constructs before applying them in a study so there is less likelihood that items will be discarded because of a low construct reliability analysis. Moore and Benbasat's (1991)

study involved developing an instrument to measure perceptions of an information technology innovation. Although Moore and Benbasat's study was utilized by the current researcher to create an instrument to study satellite radio, there were still a few items for the current study that were discarded after reliability analysis. A future study could seek out to also develop an instrument to assess perceptions of satellite radio adopters and perceptions of adopters of other emerging technologies. This would aid in developing a more updated and relevant instrument utilizing the diffusion of innovations theory as a framework.

Another interesting area would be to go in more depth with satellite radio non-adopters to find out what reasons are behind their non-adoption of the technology. This study has just grazed the surface behind these reasons, but a future study could primarily focus on the particular attributes of satellite radio that are found unappealing to this large group.

As of October, 2006, satellite radio has seemed to lose momentum in gaining additional subscribers. Satellite radio has yet to turn a profit, and by many expectations, none is foreseen in the near future. Without a solid and growing subscription base, both satellite radio companies will continue to hemorrhage assets. Perhaps satellite radio has become too comfortable in its current niche and needs to branch out to accommodate the needs and wants of other consumers. Perhaps there is a fatal flaw in the technology or subscription plan that uninterests other consumers. Whatever the reasons behind the non-adoption of the technology, they are important as the reasons that adopters give for adopting this new technology.

## Conclusion

A broad goal of this study was to determine who had adopted and who had not adopted satellite radio. Coupled with this goal, this study also produced findings on the non-adopters of satellite radio. In June of 2006 the average non-adopter of satellite radio was nearly 26 years of age, averaged $20,000 to $30,000 gross annual income, and had some college education. A later analysis of three groups of non-adopters found that those who had an intention to adopt satellite radio agreed more with the perceived attributes of satellite radio than the group with no intention to adopt or the group who was undecided on the intention to adopt satellite radio.

Results suggest that the earlier adopters of satellite radio are nearly 32 years of age, college educated, with an average income of $40,000 to $50,000. These earlier adopters are more likely than non-adopters to own three other technologies: video game systems, video cameras, and TiVo. The amount of time per day spent reading a newspaper either online or in print was found to be significantly different between subscribers and non-subscribers of satellite radio. Three out of five perceived attributes were found to be significantly different between adopters and non-adopters: perceived relative advantage, perceived trialability, and perceived observability. When all five perceived attributes were combined, adopters and non-adopters were found to differ significantly, which seems to suggest that perceived compatibility and perceived complexity may still have some type of relevance in adopters' and non-adopters' perceptions of satellite radio.

It is clear that despite the limitations of diffusion of innovations research, valuable information can be ascertained through its use. Satellite radio is still in its infancy and a snapshot in time of adopters and non-adopters at this point in its progress may prove useful to scholars looking back at the early adopters and non-adopters of satellite radio. The perceived attributes of satellite radio seem to be critically important in the adoption of satellite radio. If one piece of this puzzle is taken away, it could have dire consequences in the future of this technology.

As of October 24, 2006, the National Association of Broadcaster's president David Rehr accused both satellite radio companies of circumventing numerous FCC regulations and documented these accusations in a letter addressed to the FCC (FMQB.com, 2006; Yorke, 2006). Rehr alleged that both XM Satellite Radio and SIRIUS Satellite Radio were operating terrestrial repeaters outside of the FCC's approved regulations and should be investigated by the FCC. Rehr also stated that both satellite radio companies should be censored like AM/FM radio broadcasters because the satellite radio companies are allowing everyone, including non-subscribers, to use their services.

Yorke (2006) stated that Rehr objected to the marketing practices of both satellite radio companies because they were letting the public have free access to their broadcasts. On October 16, 2006, SIRIUS announced that Howard Stern's uncensored shows would be available via the Internet for two days (SIRIUS, 2006a). Rehr's objections reportedly stem from the ability of children to access these uncensored broadcasts and the fact that non-subscribers could easily and freely access these broadcasts which could have "sexually explicit

and profane" content (Yorke, 2006). Rehr also reportedly objected to the satellite radio companies giving away complimentary subscriptions on a trial basis to non-subscribers.

These allegations came at an inopportune time for the satellite radio companies. If trialability is taken away from satellite radio companies as a method to attract subscribers, XM and SIRIUS could lose many potential subscribers. The current study has shown that trialability, relative advantage, and a few other perceived attributes are important elements in having an individual adopt satellite radio. The findings in this study even point to the importance of many of these perceived attributes as being significant parts of non-adopters' intentions to adopt the service. This study could very well yield relevant information about the future adopters and non-adopters of satellite radio as these issues are discussed and decided upon in the coming years.

# APPENDIX I

RESEARCH APPROVAL

UNLV
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# Social/Behavioral IRB – Expedited Review Approval Notice

***NOTICE TO ALL RESEARCHERS:***
*Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.*

**DATE:** April 24, 2006

**TO:** **Dr. Paul Traudt**, Journalism and Media Studies

**FROM:** Office for the Protection of Research Subjects

**RE:** Notification of IRB Action by Dr. Michael Stitt, Chair JMSICE
Protocol Title: **The Diffusion of Satellite Radio: A Profile of Earlier Adopters**
Protocol #: 0604-1948

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This memorandum is notification that the project referenced above has been reviewed by the UNLV Social/Behavioral Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is April 18, 2007. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

**PLEASE NOTE:**
Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond April 18, 2007, it would be necessary to submit a **Continuing Review Request Form** *60 days* before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at OPRSHumanSubjects@unlv.edu or call 895-2794.

# APPENDIX II

INFORMATIONAL LETTER

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

**INFORMATIONAL LETTER**

**Department of Journalism & Media Studies**


**TITLE OF STUDY: The Diffusion of Satellite Radio: A Profile of Earlier Adopters**

**INVESTIGATOR(S): Dr. Paul Traudt & Jasmine S. Crighton**

**CONTACT PHONE NUMBER: (702) 895 - 3647**

## Please Read Before Starting Survey

You are invited to participate in a research study. The purpose of this study is to gain knowledge about people who use satellite radio and do not use satellite radio to build a better understanding of this new technology and its audience. You are being asked to participate in the study because you are an adult, 18 years or older.

If you volunteer to participate in this study, you will be asked to do the following: Participate in answering a survey about your opinions of satellite radio and other media. You will also be asked to provide information about yourself. There may not be direct benefits to you as a participant in this study. However, we hope to learn about people's opinions of satellite radio and its potential in the Las Vegas community.

There are risks involved in all research studies. This study may include only minimal risks. Although the level of anticipated risks is quite minimal, you may become uncomfortable when answering some questions.

There will not be financial cost to you to participate in this study. The study will take 20 minutes during one day of your time. You will not be compensated for your time. *The University of Nevada, Las Vegas may not provide compensation or free medical care for an unanticipated injury sustained as a result of participating in this research study.*

If you have any questions or concerns about the study, you may contact Dr. Paul Traudt at **(702) 895-3647.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-2794.**

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be destroyed.

By returning the attached survey, you are agreeing that you have read the previous information and agree to participate in this study. You must be at least 18 years of age to participate.

SURVEY INSTRUMENT

If you have already completed this survey at some other time, please do not complete it again. Thank you.

**PART I**

**Please circle or fill in the appropriate answer to the question where necessary.**

1. Are you a current subscriber to a satellite radio service, such as XM Satellite Radio or SIRIUS Satellite Radio?

Yes No

↓

If you answered no, please move on to question 3.

2. If you answered yes to question one, please give the approximate month and year that you subscribed to the service(s). If you don't remember the exact month, just indicate the year.

(a) Satellite Service #1: Month: _____ Year: _____

(b) Satellite Service #2: Month: _____ Year:_____

**If you answered yes to question one above, then please leave question three and four blank and move on to Part II of the survey.**

3. If you do **not** have a current subscription to satellite radio, have you ever had a subscription to a satellite radio service?

Yes No

4. If you do **not** have a current subscription to satellite radio, do you intend to buy a satellite radio subscription?

Yes Undecided No

**Please continue to the next page.**

## PART II

**The following questions will ask you about your use of mass media (television, AM/FM radio, satellite radio, etc.). Please answer each question. Place an "X" by the appropriate answer for each question. Please be sure to mark only one answer per question.**

1. ***Approximately*** how many hours each day do you watch television?

___ Never ___ Less than three hours ___ Three to five hours ___ More than five hours

2. How many AM/FM radios do you have in your household, including in your automobile?

___ None ___ One or two ___ Three or four ___ More than four

3. On the average, how many hours a day do you listen to AM/FM radio?

___ None ___ Less than one hour ___ One to two hours ___ Two to three hours ___ More than three hours

4. How much time per day do you spend reading a newspaper, either online or in print?

___ None ___ Less than 15 minutes ___ 16 to 30 minutes ___ 31 minutes to 1 hour ___ More than 1 hour

5. On the average, how much time per day do you spend on the Internet?

___ None ___ Less than three hours ___ Three to six hours ___ More than six hours

**Please continue to the next page.**

6. How many satellite radio receivers do you have in your household, including in your automobile? **Please circle the appropriate answer.**

None 1 2 3 4 5 6 or more

7. On the average, how much time per day do you spend listening to a satellite radio service?

___ None ___ Less than one hour ___ One to two hours ___ Two to three hours ___ More than three hours

8. If you do not own satellite radio, please skip this question and go to Part III. If you currently own satellite radio, please answer the following question: What one source of information <u>most</u> influenced your decision to buy your current satellite radio service(s)? **Please place an "X" by one answer.**

____ Friend ____ Family Member ____ Salesperson ____ Satellite Radio channel(s)

____ Website ____ News ____ Advertisement(s) ____ On-Air Personality

____ Other (Please write in your response):_____

**Please continue to the next page.**

## PART III

**In this section, we would like to know your opinions on satellite radio and other media, whether you subscribe or do not subscribe to satellite radio. Please indicate whether you Strongly Agree (SA), Agree (A), are Undecided (U), Disagree (D), or Strongly Disagree (SD) with these statements by placing an "X" in the appropriate box.**

| | SA | A | U | D | SD |
|---|---|---|---|---|---|
| 1. Satellite radio offers better programming than AM/FM radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 2. Satellite radio is worth the subscription costs..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 3. I think that a satellite radio would be difficult to use..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 4. I have had many opportunities to listen to satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 5. I have seen at least one person use a satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 6. There is a lot of information available about satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 7. Listening to satellite radio offers more advantages than listening to AM/FM radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 8. I would never pay for satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |

**Please continue to the next page.**

**Please indicate whether you Strongly Agree (SA), Agree (A), are Undecided (U), Disagree (D), or Strongly Disagree (SD) with these statements by placing an "X" in the appropriate box.**

| | SA | A | U | D | SD |
|---|---|---|---|---|---|
| 9. I believe that a satellite radio would be easy to use..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 10. I know where I can go to try out a satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 11. I have never seen anyone use satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 12. Listening to satellite radio offers more advantages than listening to an iPod..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 13. I think satellite radio can be easily incorporated into my lifestyle..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 14. Learning to use a satellite radio would be difficult for me..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 15. I have been able to try out a satellite radio long enough to know what I can listen to..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 16. I have seen and/or heard advertisements for satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 17. Listening to an MP3 player offers more advantages than listening to satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |

**Please continue to the next page.**

**Please indicate whether you Strongly Agree (SA), Agree (A), are Undecided (U), Disagree (D), or Strongly Disagree (SD) with these statements by placing an "X" in the appropriate box.**

| | SA | A | U | D | SD |
|---|---|---|---|---|---|
| 18. Listening to satellite radio improves the quality of my radio listening experience..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 19. I think that satellite radio is a passing fad..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 20. If I had problems with a satellite radio, I think I could get help to fix the problem..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 21. I do not have adequate opportunities to try out satellite radio..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 22. I have listened to satellite radio programming..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 23. Listening to satellite radio gives me greater control over my listening choices..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 24. A satellite radio seems easy to operate..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 25. A proper tryout of satellite radio is possible for me..... | ( ) | ( ) | ( ) | ( ) | ( ) |

**Please continue to the next page.**

**Please indicate whether you Strongly Agree (SA), Agree (A), are Undecided (U), Disagree (D), or Strongly Disagree (SD) with these statements by placing an "X" in the appropriate box.**

| | SA | A | U | D | SD |
|---|---|---|---|---|---|
| 26. I have heard satellite radio talked about in the news..... | ( ) | ( ) | ( ) | ( ) | ( ) |
| 27. Using satellite radio makes it easier for me to enjoy radio programming..... | ( ) | ( ) | ( ) | ( ) | ( ) |

## PART IV

**Please answer the following questions. Where necessary, please mark an "X" by the appropriate answer. Please be sure to mark only one answer, unless otherwise specified.**

1. What is your age? _____

2. Gender: ___ Male ___ Female

3. Are you currently enrolled as a student at UNLV? ___ Yes ___ No

4. Do you currently live within Clark County, Nevada? ___ Yes ___ No

5. Which category best describes the highest level of education you have completed?

___ completed some high school
___ high school graduate
___ completed some college
___ college graduate
___ completed some graduate school
___ completed graduate school

**Please continue to the next page.**

6. Which of the following figures best describes your gross (before taxes) personal income per year?

___ less than $10,000 ___ $30,001 to $40,000 ___ $60,001 to $70,000

___ $10,001 to $20,000 ___ $40,001 to $50,000 ___ $70,001 to $80,000

___ $20,001 to $30,000 ___ $50,001 to $60,000 ___ $80,001 or more

7. Please indicate how many of the following electronic devices you own by filling in the number next to the device. If you do not own a device, please leave the line blank.

___ Video camera ___ Compact Disc (CD) player

___ VCR ___ Personal computer

___ Video game system(s) ___ TiVo (television recording device)

___ MP3 player ___ iPod

___ Cellular phone ___ Digital camera

___ DVD player ___ High definition television (HDTV)

___ Satellite Radio(s) ___ Mini Disc Player

___ Other (Please list a technology you own that is not listed above):_____

_____

Thank you very much for participating in the study. Your responses will be very valuable in examining the ownership and potential ownership for satellite radio and related media in the Las Vegas community.

Please return this survey to the person who gave it to you. If you received this survey with a self-sealing envelope, please place this survey inside the envelope and seal it closed before returning it.

Thank you for again for your help in completing this research. We welcome your comments and suggestions, so please feel free to contact us at anytime.

FIGURES

Figure 1

Perceived Relative Advantage of Satellite Radio by Non-Subscriber Groups

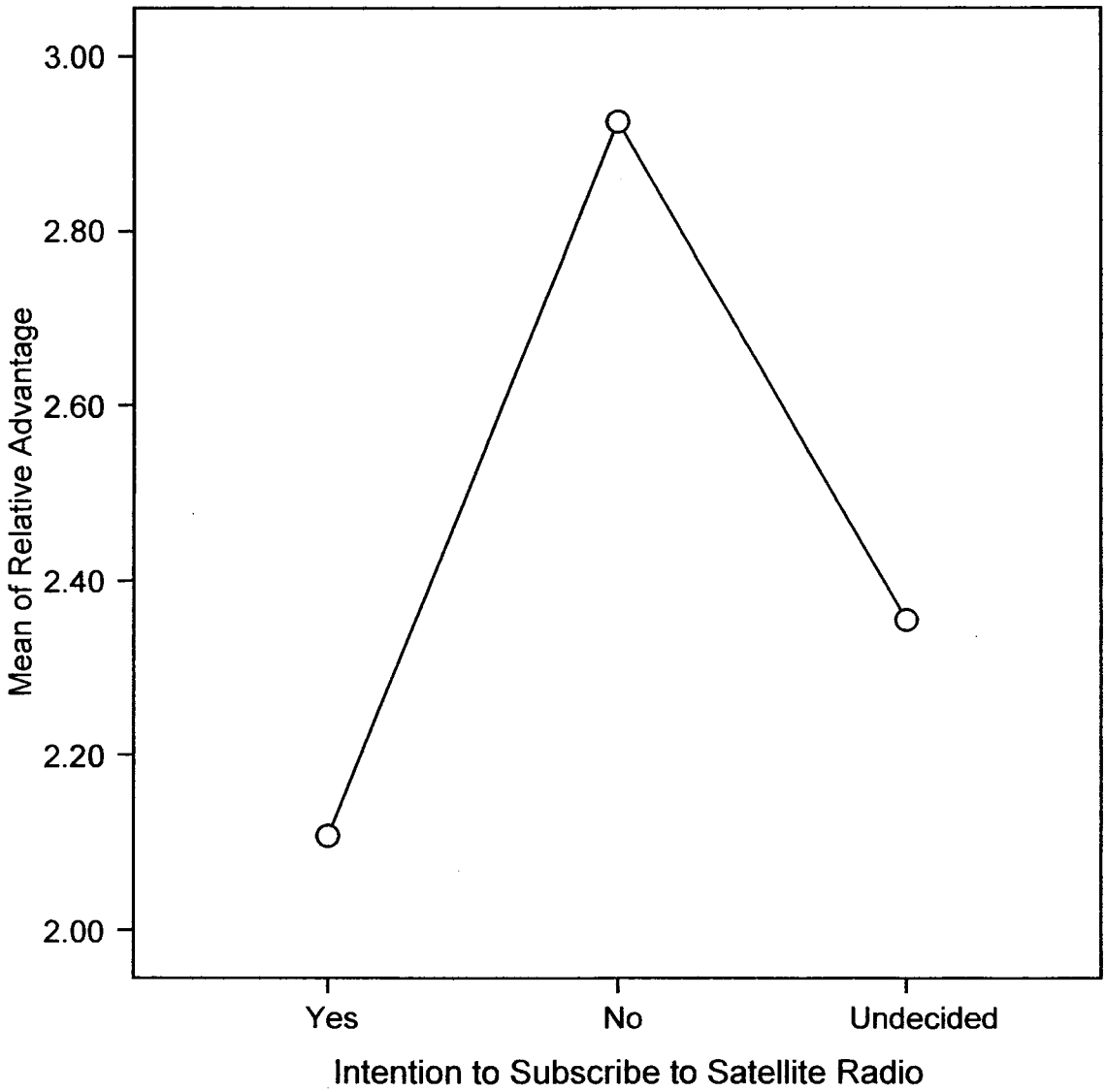


Figure 2

Perceived Compatibility of Satellite Radio by Non-Subscriber Groups

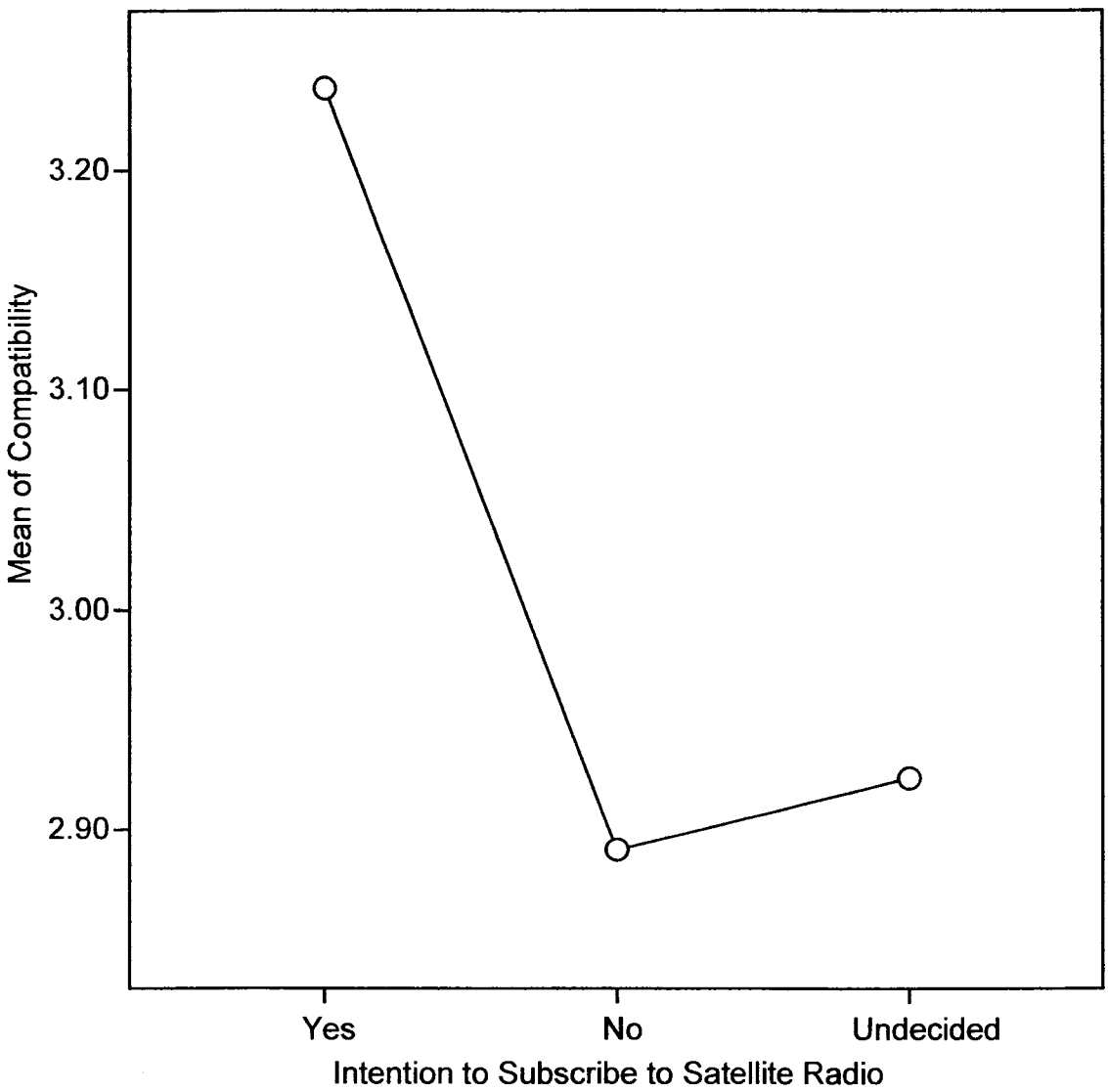


Figure 3

Perceived Complexity of Satellite Radio by Non-Subscriber Groups

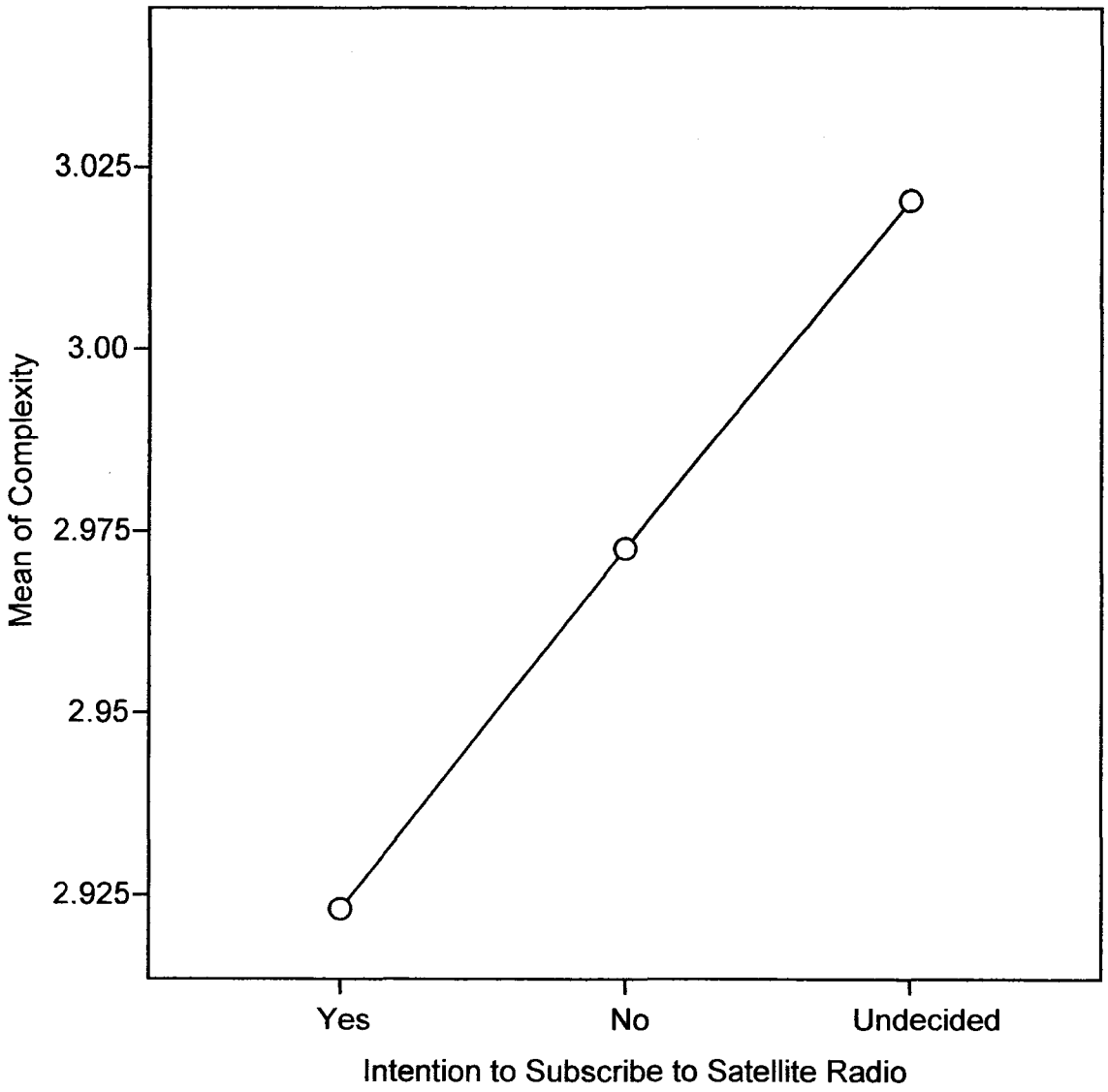


Figure 4

Perceived Trialability of Satellite Radio by Non-Subscriber Groups

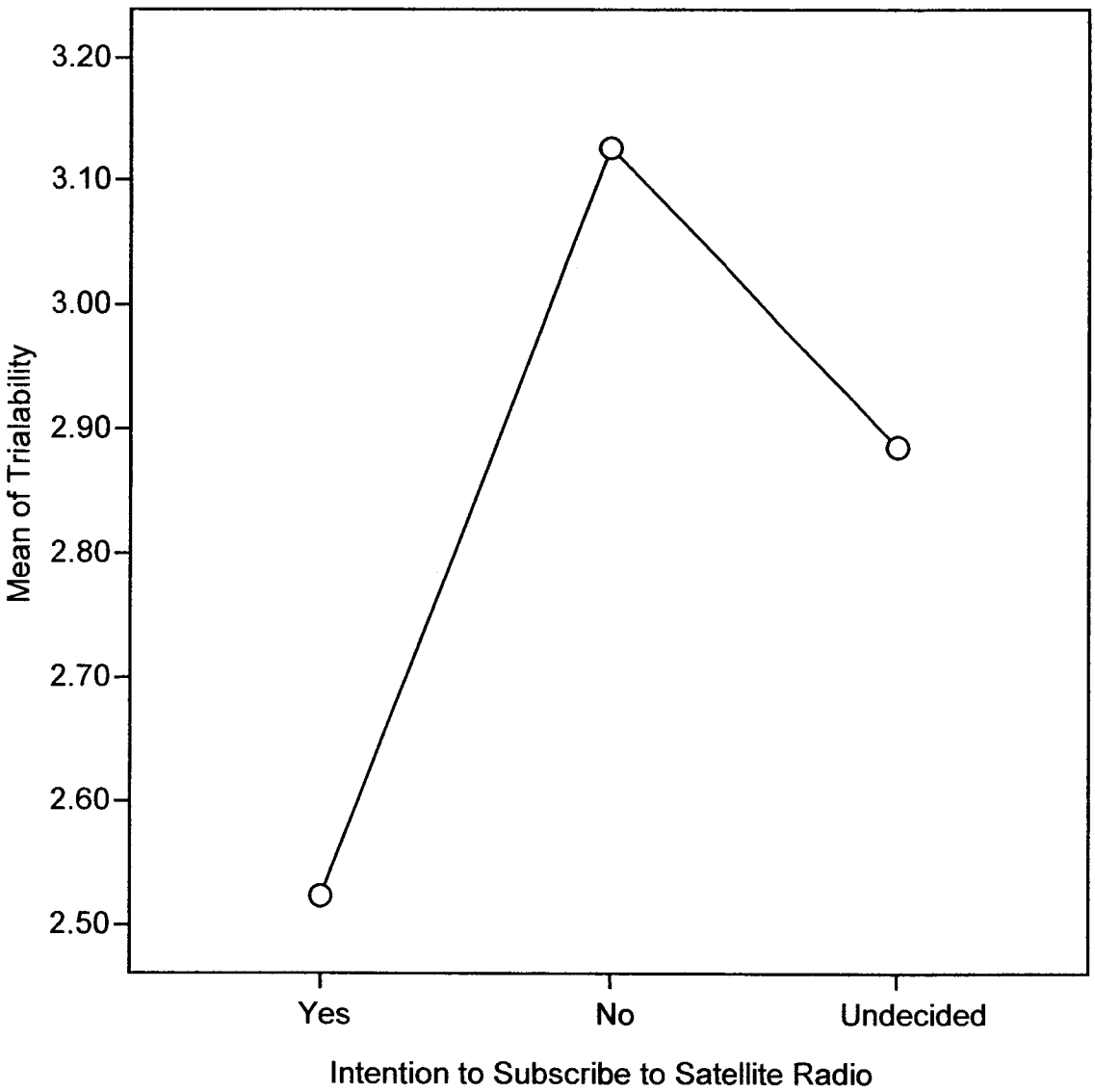


Figure 5

Perceived Observability of Satellite Radio by Non-Subscriber Groups

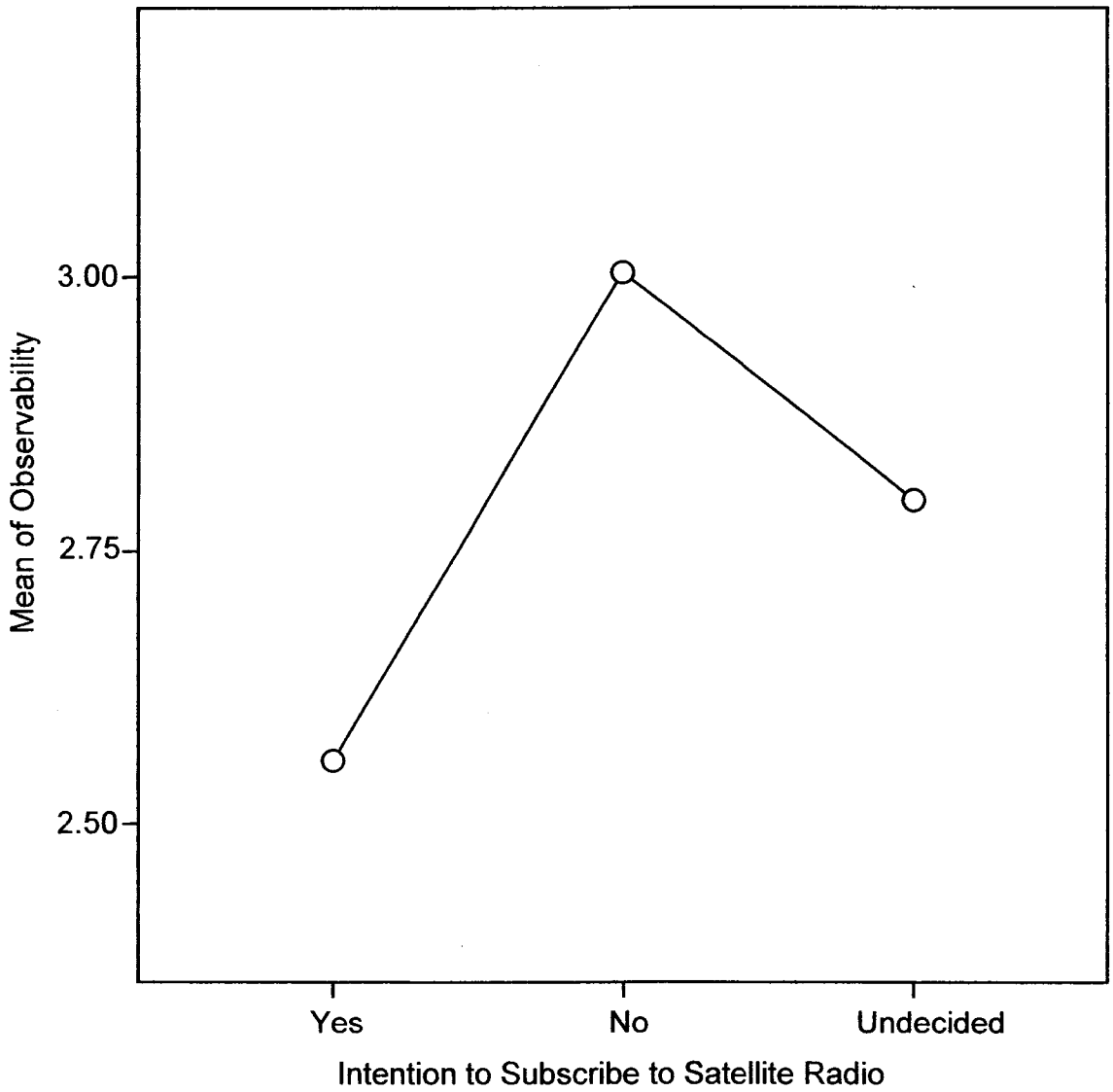
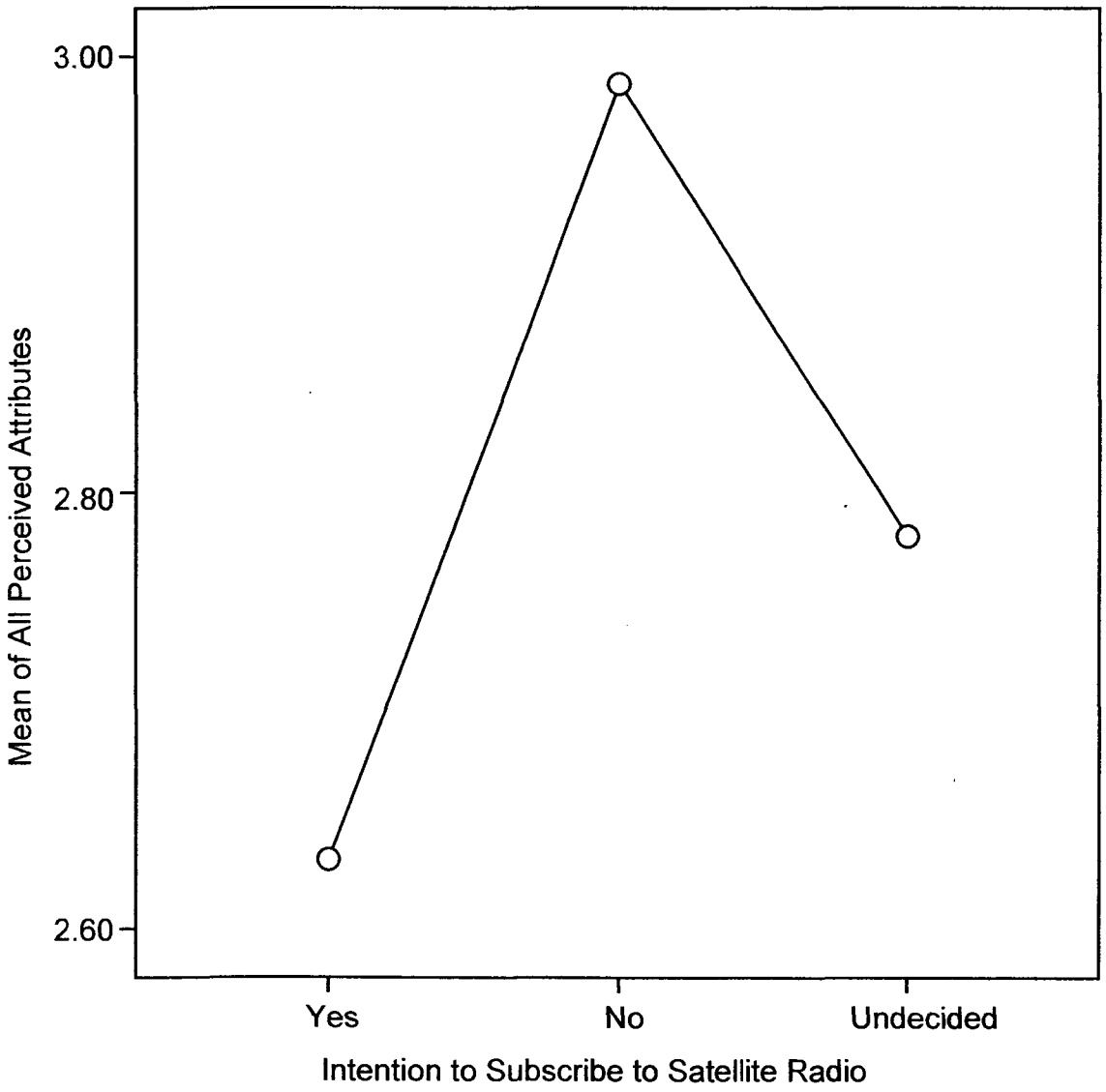


Figure 6

All Perceived Attributes of Satellite Radio by Non-Subscriber Groups



## REFERENCES


Arbitron.com. (2005). Arbitron radio market rankings: Fall 2005. Retrieved November 2, 2005, from http://www.arbitron.com/radio_stations/home.htm

Baumgarten, S. A. (1975). The innovative communicator in the diffusion process. *Journal of Marketing Research*, *12*, 12-18.

Bailey, G. (2004). Free riders, givers, and heavy users: Predicting listener support for public radio. *Journal of Broadcasting & Electronic Media*, *48*, 607-619.

Baxter, L. A. & Babbie, E. (2004). *The Basics of Communication Research*. Belmont,CA: Wadsworth.

Beville Jr., H. M. (1949). Surveying radio listeners by use of a probability sample. [Electronic version]. *Journal of Marketing*, *14*, 373-378.

Bijker, W. E., Hughes, T. P., & Pinch, T. (1987). *The Social Construction of Technological Systems: New Directions in Sociology and History of Technology*. Cambridge: MIT Press.

Breen, B. (2005, February). Written in the stars. [Electronic version]. *Fast Company*, pp. 54+. Retrieved March 14, 2005, from Business Source Premier.

Craft, J. E., Leigh, F. A., & Godfrey, D. G. (2001). *Electronic Media*. Belmont, CA: Wadsworth.

Clear Channel Radio. (n.d.) Clear Channel Radio fact sheet. Retrieved October 22, 2005, from http://www.clearchannel.com/fact_sheets/radio_ factsheet.pdf

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. Psychometricka, 16, 297-334.

Danko, W. D., & MacLachlan, J. M. (1983). Research to accelerate the diffusion of a new invention: The case of personal computers. *Journal of Advertising Research, 23* (3), 39-43.

Davies, J. L. G. (1998). *Cable access television and the Las Vegas community: A study of Clark County viewers.* Unpublished master's thesis, University of Nevada, Las Vegas.

Dick, S. J., & McDowell, W. (2004). Estimating relative audience loyalty among radio stations using standard Arbitron ratings. *Journal of Radio Studies, 11*, 26-39.

Dunn, S. W. (1952). Overlapping of listening among radio audiences. [Electronic version]. *Journal of Marketing, 16*, 315-321.

Federal Communications Commission. (1997a). 63rd FCC annual report [FY97]. Washington, D.C.: FCC.

Federal Communications Commission. (1997b, April 2). FCC announces auction winners for digital audio radio service [Public Notice DA 97-656]. Washington, D.C.: FCC.

FMQB.com. (2006, October 24). NAB calls for probe into satcasters. Retrieved October 25, 2006, from http://www.fmqb.com/Article.asp?id=293885

Frankel, M. R., & Occhiogrosso, M. G. (1985). Radio audience accumulation over multiple weeks. *Journal of Advertising Research*, *25* (3), 23-30.

Gilroy, A. (2005, February 21). XM sees subs hitting 5.5m by year's end. *Twice*, pp. 1, 10.

Green, H., Lowry, T., Yang, C., & Kiley, D. (2005. March 14). The new radio revolution. [Electronic version]. *Business Week*, 3924, pp. 32+. Retrieved March 14, 2005, from Business Source Premier.

Infinity Broadcasting Corporation. (2005). Company profile. Retrieved November 2, 2005, from http://infinitybroadcasting.com/about/index.php

Kang, M. (2002). Digital cable: Exploring factors associated with early adoption. *Journal of Media Economics*, *15*, 193-207.

Kim, H. S., & Lee, S. T. (2003). Exploring the characteristics of DVD home theater system adopters. *Mass Communication & Society*, *6*, 267-290.

Lapp, J. R. (1986). *An application of diffusion theory to Las Vegas cable television viewers*. Unpublished master's thesis, University of Nevada, Las Vegas.

Leung, L., & Wei, R. (1999). Who are the mobile phone have-nots? Influences and consequences. *New Media & Society, 1*, 209-226.

Li, S. (2004). Exploring the factors influencing the adoption of interactive cable television services in Taiwan. *Journal of Broadcasting & Electronic Media, 48,* 466-483.

McAnany, E. G. (1984). The diffusion of innovation: Why does it endure? *Critical Studies in Mass Communication, 1*, 439-442.

Meyer, G. (2004). Diffusion methodology: Time to innovate? *Journal of Health Communication, 9* (Suppl. 1), 59-69.

Mogel, L. (2004). *This Business of Broadcasting*. New York: Billboard Books.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*, 192-222.

MSNBC.com. (2006, January 10). Howard Stern begins satellite broadcasts: Shock jock now has the freedom to swear at will. Retrieved January 24, 2006, from http://www.msnbc.msn.com/id/10789718/

Palenchar, J. (2005, February 21). Karmazin: Content key to satellite radio. *Twice*, 1.

Pitts, G. (2004). Radio broadcasting. In A. E. Grant, & H. Meadows (Eds.), *Communication Technology Update* (pp. 138-151). Burlington, MA: Focal Press.

Rogers, E. M. (1962). *Diffusion of Innovations*. New York: Free Press.

Rogers, E. M. (1971). *Diffusion of Innovations* (2nd ed.). New York: Free Press.

Rogers, E. M. (1983). *Diffusion of Innovations* (3rd ed.). New York: Free Press.

Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.

Satellite battles. [Electronic version]. (2005, January 24). *Marketing Magazine, 110 (3)*, Retrieved March 14, 2005, from Business Source Premier.

Silverstein, S. (2003a). Satellite radio: Business is booming. Space.com. Retrieved November 2, 2005, from http://www.space.com/businesstechnology/technology/satcom_radio_industry_031112.html

Silverstein, S. (2003b). Satellite radio: How it works. Space.com. Retrieved November 2, 2005, from http://www.space.com/businesstechnology/technology/satcom_radio_operations_031112.html

Singer, J. B. (2004). Strange bedfellows? The diffusion of convergence in four news organizations. *Journalism Studies, 5*, 3-18.

SIRIUS Satellite Radio. (n.d.a). *Corporate overview*. Retrieved May 5, 2005, from http://sirius.com/servlet/ContentServer?pagename=Sirius/CachedPage&c=Pa ge&cid=1029348274177

SIRIUS Satellite Radio. (n.d.b). *FAQs.* Retrieved May 5, 2005, from http://www.sirius.com/servlet/ContentServer?pagename=Sirius/CachedPage&c=Page&cid=10182029032792

Spector, P. E. (1992). Summated rating scale construction: An introduction. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-082. Beverly Hills, CA: Sage.

University of Nevada Las Vegas. (2005). University student profile. Retrieved October 10, 2006, from http://ir.unlv.edu/reports/profile_reports/student_profiles.htm

U. S. Census Bureau. (2002, July). Census summary: 2000 [C2KPROF/00-US]. Washington, D.C.: U.S. Census Bureau.

Vishwanath, A., & Goldhaber, G. M. (2003). An examination of the factors contributing to adoption decisions among late-diffused technology products. *New Media & Society*, *5*, 547-572.

Vivian, J. (2002). *The Media of Mass Communication* (6th ed.). Boston: Allyn & Bacon.

WorldSpace. (n.d.a) *About WorldSpace*. Retrieved January 6, 2006, from http://www.worldspace.com/about/index.html

WorldSpace. (n.d.b). *What is Satellite Radio?* Retrieved January 6, 2006, from http://www.worldspace.com/whatisit/overview.html

XM Satellite Radio. (n.d.a). *Fast facts*. Retrieved May 5, 2005, from http://www.xmradio.com/corporate_info/fast_facts.html

XM Satellite Radio. (n.d.b). *Highlights*. Retrieved May 5, 2005, from http://www.xmradio.com/corporate_info/fast_facts_highlights.html

SIRIUS Satellite Radio. (2004a). Howard Stern and SIRIUS announce the most important deal in radio history. *Company press release*. Retrieved January 2, 2006, from http://www.shareholder.com/sirius/ReleaseDetail.cfm?ReleaseID=151947&cat=Programming%20Announcements&newsroom=

SIRIUS Satellite Radio. (2004b). SIRIUS introduces interior glass mounted satellite radio antenna for vehicles. *Company press release*. Retrieved November 2, 2005, from http://www.shareholder.com/sirius/ReleaseDetail.cfm?ReleaseID=152884&cat=&newsroom=

SIRIUS Satellite Radio. (2005). SIRIUS reports strong subscriber and revenue growth in first quarter of 2005. *Company press release*. Retrieved May 5, 2005, from http://www.shareholder.com/Sirius/releaseprint.cfm?releaseid=161720

SIRIUS Satellite Radio. (2006a). Howard Stern two-day, free worldwide event to launch SIRIUS Internet Radio. *Company press release*. Retrieved October 25, 2006, from http://investor.sirius.com/ReleaseDetail.cfm?ReleaseID= 214623&cat=&newsroom=

SIRIUS Satellite Radio. (2006b). SIRIUS Satellite Radio passes 5.1 million subscribers. *Company press release*. Retrieved October 23, 2006, from http://investor.sirius.com/ReleaseDetail.cfm?ReleaseID=213347&cat=newsroom=

XM Satellite Radio. (2000). SIRIUS Radio and XM Radio form alliance to develop unified standard for satellite radios. *Company press release.* Retrieved November 2, 2005, from http://www.xmradio.com/newsroom/screen/press_release_2000_02_16.html

XM Satellite Radio. (2001, May 16). XM Satellite "Rock" begins broadcasting; "Roll" in terrific health after May 8 launch. *Company press release.* Retrieved October 22, 2005, from http://www.xmradio.com/newsroom/screen/press_release_2001_05_16.html

XM Satellite Radio. (2005a). XM Satellite Radio holdings inc. announces first quarter 2005 results. *Company press release.* Retrieved May 5, 2005, from http://www.xmsatelliteradio.com/newsroom/print/pr_2005_04_27.html

XM Satellite Radio. (2005b). XM Satellite Radio takes center stage on Donald Trumps's "The Apprentice" on NBC Thursday, November 17, 9pm – 10pm EST/PST. *Company press release.* Retrieved January 2, 2006, from http://www.xmradio.com/newsroom/screen/pr_2005_11_09.html

XM Satellite Radio. (2006a). XM Satellite Radio announces subscriber additions for the third quarter 2006. *Company press release.* Retrieved October 23, 2006, from http://xmradio.mediaroom.com/index.php?s=press_Release&item=362

XM Satellite Radio. (2006b). XM Satellite Radio tops six million subscribers. *Company press release.* Retrieved February 12, 2006, from http://www.xmradio.com/newsroom/screen/pr_2006_01_05a.html

Yorke, J. (2006, October 24). NAB leans on FCC for satellite radio investigations. RadioandRecords.com. Retrieved October 25, 2006, from http://www.radioandrecords.com/radiomonitor/news/business/digital/article_display.jsp?vnu_content_id=1003287524

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