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Methodological Issues Related to Radio Measurement and Ratings in Romania: Solutions and Perspectives

Abstract: The aim of this article is to address the issue of measuring radio audience from a methodological perspective. Although our approach is contextualized, the case study of radio audience measurement in Romania is relevant to a large number of EU countries, in which scholars and practitioners use Day-After-Recall technique. Considering the size of the radio advertising market, as well as the number of radio listeners (about 90% in EU), it is crucial for both radio broadcasters and advertisers to measure radio audience with high accuracy. First, we briefly review the main definitions of key concepts used in radio audience evaluation: audience, listener, rating, market share, daily-reach, or time spent listening. Next, we discuss two paradigms of audience and two theoretical models of mass communication used as a framework for measuring radio audience. Further, we briefly approach the issue of potential sources of error in rating data, by focusing on response error. Next, we emphasize the advantages and disadvantages of each quantitative method utilized in radio audience measurement, and present the case study of radio audience measurement in Romania. Based on a methodological critical review, we outline challenges and potential solutions for assessing more accurately radio audience. Finally, we reflect on the future of radio in digital era, and refer to new perspectives of upgrading existing research techniques.

Keywords: audience measurement, quantitative research techniques, error sources, day after recall, radio rating, Romania

1. Introduction

In the last decade, the number of radio companies in Romania has increased exponentially, reaching in November 2017 to 176, with over

620 radio licenses approved by Licensing Office of CAN.[1] Also, in 2017, according to a Media Fact Book report, the total advertising radio market in Romania was about 23 million euros and grew with almost 15% compared to 2016.[2] In this context, it is extremely important for both radio broadcasters and advertisers to measure radio audience with high accuracy.

Broadcast radio remains very popular around the world, due to it is free and easily accessible almost anywhere. In average week, radio reaches more than 90% of the population in many European countries, and it is this enduring popularity that has rooted broadcast radio so firmly in European society.[3]

Radio plays an important role as a mass medium because has radicalized the face of human communication and ultimately become a fixed point in the daily lives of humans whereby people are informed, taught, nurtured, and reformed by way of relaxation, and resuscitation (Kuewumi, 2009). Egbuchulam (2002) considers radio as a mobilizer and a formidable factor in the new world order in economy, technology and politics, and describes it as the cheapest, safest, and the most effective medium of communication available to man.

Frank N. Stanton (1935) explains in his doctoral dissertation that the broadcaster and advertiser are eager to find answers for the following questions: (1) When does the listener use his receiver? (2) For how long a period does he use it? (3) To what station or stations does he listen? (4) Who listens (i.e. sex, age, economic, and educational level)? (5) What does he do while the receiver is in operation? (6) What does he do as a result of the program? (7) What are his program preferences? Webster, Phalen, and Lichty (2006, 93) consider that little has changed, and nowadays the answers to these questions are still crucial for broadcaster and advertiser. For radio to be a successful advertising medium, time buyers had to know who was in the audience (Webster et al. 2006).

Webster et al. (2006) explain that many decision in mass-media and advertising industry are made on the basis of audience data, and that millions of dollars are spent, and millions of lives are affected by the programming and policy decisions that hinge on this information.

Thus, advertising is the major source of revenue for commercial radio stations, and audience measurement allows broadcasters to monetize

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[1]Data is extracted from a CNA report published online. Accessed January 5th, 2018. http://www.cna.ro/IMG/pdf/Situatia_numarului_de_licente_Radio_SITE-3.pdf
[2] A Media Fact Book report. Accessed January 4th, 2018. http://www.mediafactbook.ro
[3]Data available on The European Broadcasting Union (EBU) website. Accessed January 4th, 2018. https://www.ebu.ch/about

their listeners. Moreover, some scholars (Brierley 1995, 79) even consider that one of the most dependent media on advertising is commercial radio (i.e. extra income is generated from the sale of production and merchandising). In this context, radio audience measurement is extremely important for radio industry, but also for advertising industry.

2. Conceptualization of Audience Measurement

Audience measurement refers to regular assessments of the size and composition of media audiences. In this section, we will approach the issue of conceptualization audience measurement by referring to the most important key concepts.

2.1. Audience-as-a-Public vs. Audience-as-a-Market

To better understand de concept of *radio audience*, Ang (1991, 21-26) considers relevant to discuss two important paradigms: *audience-as-a-public* vs. *audience-as-a-market*. We outline some key ideas because they are useful for depicting a broader image of measuring radio audience.

Usually, at radio, programs are broadcasted by commercial stations and contain ads inserted. The advertisers pay large sums of money to the broadcasters in exchange for the airtime they acquire to disseminate the messages (Webster et al. 2006). In this context, measuring radio ratings is indispensable for the economic functioning of the system. The system is interrelated: good ratings results are the agreed-upon signifier of effective communication between advertiser and audience, and the commercial networks must try to achieve those good ratings results – that is, to maximize their audience – through shrewd and attractive programming Ang (1991, 21-26).

Ang (1991, 21-26) argues that in the commercial system, the problem of increasing audience must be viewed from the positioning of audience-as-a-market, in which audience members are defined as potential consumers in a dual sense: not only of radio programmes, but also of the products being advertised through those programmes. In this context, information about market size, ratings, and shares is essential.

In case of public service institutions, McQuail (1987, 219-220) notes that the audience is viewed as *a public*. According to this paradigm, the audience-as-public *consists not of consumers, but of citizens* who must be *served* (i.e. educated, informed, and entertained). Thus, the audience is not viewed as *potential customers*, more as *citizens* (McQuail 1987, 219-220).

Ang (1991, 21-26) considers that the difference between these two paradigms of audience can be clarified by placing them in two diverse theoretical models of mass communication: *the transmission model of communication* and *the attention model of communication*. The audience-as-public fits in *the transmission model of communication* – in which communication is defined by such terms as sending or transmitting messages to others. In this model, audiences are 'receivers' of those messages, and a more or less 'ordered transference of meaning' as the intended consequence of the process as a whole forms its basic rationale (McQuail 1987, 43-46). According to the audience-as-market paradigm, the purposive transfer of meaning is only of secondary importance. The essence of any market is to bring goods and services to the attention of potential consumers, to arouse, and keep their interest (McQuail 1987, 45). McQuail (1987, 45) considers audience-as-market paradigm fits in the *attention model of communication*. Gaining or attracting attention defines this model: communication is considered effective as soon as attention is actually given by audiences, no matter its quality or impact (McQuail 1987, 45). This is the model of communication usually adopted by commercial radio stations and it is inadequate from the institutional perspective of public radio.

McQuail (1987, 221) explains that audience-as-public and audience-as-market paradigms are only relatively conflicting because individuals are, at the same time, public (i.e. citizens) and markets (i.e. consumers of different brands). In this context, radio stations create markets and citizens – and these audiences must be assessed. Gunter (2000, 93) notes that even publicly funded media services will have a significantly reduced probability of continuation if they attract no interest from their targeted consumers. Hence, for establishing their financial, social, cultural, and psychological impact, it is essential to collect evidence about the size and shape of media audiences, and their patterns of media usage (Gunter 2000, 93).

Ang (1991, 25-26) concludes that audience-as-market and audience-as-public are two alternative configurations of audience, each connected with one of the two major institutional arrangements - commercial and public service. Thus, audience can be viewed as *market to be won*, or as a *public to be served with responsibility* (Ang 1991, 26). These two paradigms, audience-as-market and audience-as-public, are important for acquiring the knowledge about the audience within specific radio institutions.

2.2. Active vs. Passive Audience

We continue the previous section regarding audience with another important distinction between *active vs. passive audience*. A distinction between *active vs. passive audience* is necessary because we need to understand what is being measured. Thus, the *audience* concept can be conceptualized by referring to *active and passive audience*.

Webster et al. (2006, 262) explain that *active audience* is a term given to listeners who are highly selective about the programming they choose. Kent (1994) defines *a listener* to a radio programme as anybody claiming to have listened to more than half a programmme (or more than a half of 15-minute time period), or it may be somebody who has indicated any listening in a specified period. According to Webster et al. (2006, 262), *active audiences* are sometimes defined as those who turn a set on only to listen favored programs, and turn the set off when those programs are unavailable. Activity can also mean being goal-directed in media selections, or cognitively engaged with the media.

Passive Audience is a term given to listeners who are unselective about the content they watch (Webster et al. 2006, 276). Passive audiences are thought to listen a radio program out of habit, tuning to almost anything if a preferred show is unavailable (Webster et al. 2006, 276).

2.3. Main Reported Radio Audience Indicators

Radio ratings contain different audience indicators reported by research companies. Ratings analysis 'is the analysis of the audience size and composition data produced by audience measurement firms for use in both the commercial and noncommercial media sectors' (Napoli 2011, 286). Napoli (2011, 286) notes that ratings are used by media owners and advertisers to: (1) determine advertising rates, (2) assess the performance of media content, (3) to develop and evaluate strategies related to the production, and (4) to asses the content placement. Thus, ratings are crucial for media and advertising industries.

In this section we will discuss different rating indicators definitions in order to better understand what is being measured and reported in radio audience.

According to Radio Joint Audience Research (RAJAR)[1], the current definition of *a listener* is *someone who records listening for 5 minutes or*

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[1] Radio Joint Audience Research (RAJAR) is the official body in charge of measuring radio audiences in the UK. Accessed January 4th, 2018. See more details at: www.rajar.co.uk

more. However, RAJAR considers that a future definition could be based on passive exposure (i.e. being present when a radio is nearby) for a short period, as 2 minutes. This difference can be synthesized as *listening* versus *hearing*. As we can easily assume, advertisers are interested by the people how listen (i.e. process) their ads, not only hear them.

Webster et al. (2006, 264-284) note some key definition of the main audience indicators reported by research companies, such as: (1) rating (i.e. the percentage of persons or households tuned to a station, program, or day part out of the total market population), (2) reach (i.e. the total number of unduplicated persons or households included in the audience of a station or a commercial campaign over some specified period of time), (3) time spent listening (i.e. a cumulative measure of the average amount of time an audience spends listening to a station within a day part), (4) average audience rating (i.e. rating of a station or program during an average time interval over a specified period of time - allows reports of audience size during an average minute of a television or of a radio program), or (5) average quarter hour (i.e. the standard unit of time for reporting average audience estimates within specified day part).

We restate Webster et al. (2006) position that before discussing different measurement techniques of radio audience, we first must answer to the following question: 'What are you trying to measure?' The answer to this question could shed light on the most appropriate research design in assessing audience. Knowing only that audience members have turned on a particular radio station, it doesn't mean that they are paying attention to the content. Hence, there is a difference between *hearing* and *listening a radio station*.

3. Sources of Error in Radio Audience Measurement

According Webster et al. (2006, 118), scholars and practitioners involved in radio audience measurement need to manage *four sources of error* in ratings data: (1) *sampling error, (2) non-response error, (3) response error, and (4) processing error*. In this section, we will briefly discuss each of these sources, but in our case study we focus mainly on *response error* involved in measurement process.

3.1. Sampling Error

Sampling error 'is a statistical concept that is common to all survey research, also in radio audience measurement' (Webster et al. 2006, 117),

and it's generated due to studying something less than the entire population. When we conduct a quantitative study, although we use randomly extracted samples, it is possible that they will not be representative for the studied population. Webster et al. (2006, 118) explain that this is inherent in the process of sampling. Thus, using the laws of probability, we can make statements regarding radio audience and how likely we are to get accurate results. Usually, in quantitative studies, researchers operate with 95%, or 99% *confidence level -* they assume that in 95 or 99 cases from 100, the population value is the estimated. However, this means that in 5 cases from 100, or 1 case from 100 (i.e. depending on the *confidence level* used) the estimated value is different than the true population value (i.e. the sample we use is not representative).

In radio audience measurement, researchers know the size and shape of the population that is being studied, and they can use probability sampling to obtain estimates of ratings. Also, in estimating radio audience, scholars use a *confidence interval* - which is a range of values (e.g. ±1, 2 or 3) with a high probability of encompassing the true population value. The size of the studied population and of the sample we use determines the *confidence level* and *confidence interval* of data.

Webster et al. (2006, 119-123) argue that it is critically important to reduce *sampling error* to an acceptable level. Three factors affect the size of that error: (1) population complexity, (2) sample size, and (3) sample design. In their view, researchers can control only the sample size and sample design because managing population complexity it is beyond their control.

Studying some populations is quite complicated due to variability or heterogeneity in the population. Webster et al. (2006, 119-123) argue that media audiences are not homogeneous and are getting more heterogeneous all the time. Thus, the other two factors that affect the size of sampling error, sample size and sample design, can be managed. Statisticians know that larger samples reduce the magnitude of sampling error. The sample size and error do not have a one-to-one relationship: doubling the size of the sample does not cut the standard error in half; researchers must quadruple the sample size (Webster et al. 2006, 119-123). Webster et al. (2006, 119-123) explain that, although it is always possible to improve the accuracy of the ratings by increasing the size of the samples on which they are based, very quickly they reach a point of diminishing returns. Thus, researchers, broadcasters, and advertisers need to find a balance between the cost and accuracy of audience data.

In radio audience studies, usually are used large samples from a complex population to obtain a reasonable level of sampling error (e.g.

radio stations fragment the audience). Using *design of the sample,* researchers can reduce sampling error because certain kinds of probability samples (e.g. stratified samples) are more accurate than others (Webster et al. 2006, 119-123). In measuring radio audience, this sampling strategy is often used, but also has limits.

3.2. Nonresponse Error

When they conduct a study, scholars face with *another source of error: nonresponses*. In radio audience measurement, some respondents will not cooperate or fail to provide complete information – thus, affecting the information needed (Webster et al. 2006, 124-126). To minimize and control the nonresponse error, we can use two strategies: (1) to improve the representativeness of the in-tab sample and (2) to make adjustments in the sample after data collection (Webster et al. 2006, 124-126). Usually, in audience studies, both strategies are used because the population or universe is known (i.e. demographics). Sometimes scholars (e.g. Wimmer and Dominick 2011, 125) recommend additional sampling to increase the under-represented groups (i.e. buffer samples).

In radio audience, Webster et al. (2006, 124-126) explain that researchers also use a statistical procedure that gives the responses of certain kinds of people more influence over the ratings estimates than their numbers in the sample would suggest (i.e. sample weighting). However, in their opinion, these procedures do not eliminate nonresponse error (e.g. respondents from buffer samples count more than once an might still be systematically different from those who did not co-operate).

3.3. Measurement Error

In radio audience rating, the used methods are essential and can be a serious source of error. Measurement consists of rules for assigning symbols to objects to numerically represent quantities of attributes (Netemeyer, Bearden, and Sharma 2003, 2). Netemeyer et al. (2003, 2) explain that *measurement* includes evaluating number such that they reflect the different degrees of attribute being assessed. In their view, in the social sciences, most of the time the 'objects' are people, 'rules' involve the explicitly stated assignment of numbers, and the 'attributes' are particular features of the object being measured. As such, it is important to note that 'objects' (e.g. people) are not measured; their attributes are measured (e.g. radio listening) (Netemeyer et al 2003, 2).

The 'numbers' simply quantify the characteristics or behaviors that we wish to study. This kind of quantification makes it easier to manage the relevant information, and to summarize the various attributes of the sample (Webster et al. 2006, 126-129).

In validating a measurement instrument, scholars take into consideration two concepts: *reliability* and *validity*. *Reliability* is the extent to which a measurement procedure will produce consistent results in repeated applications (Webster et al. 2006, 126-129). *Validity* is the extent to which a measure actually quantifies the characteristic it is supposed to quantify (Webster et al. 2006, 126-129). Scholars must use only reliable and valid measurement instruments in assessing radio audience.

3.4. Processing Error

The last source of errors involved in radio audience measurement that needs to be managed is the *processing errors*.

Webster et al. (2006, 144) note that audience measurement involves data that must be summarized and turned into a useful product. In this process, errors may occur due to lack of accuracy, logical inconsistencies, and omissions (Webster et al. 2006, 144). Furthermore, the process of getting clean, accurate, complete data, ready to be processed is called *editing*. It can be a very laborious activity, and despite serious efforts at quality control, it is here that processing error is most likely to occur (Webster et al. 2006, 144). Processing errors are generated by a series of automated and manual activities that can be potentially source of errors: data coding, data capture, editing, and imputation. Therefore, all these potential source of error must be managed by researchers in order to reduce biases.

4. Radio Audience Measurement Techniques

Measuring radio audience is a challenge for scholars because radio presents some specific media characteristics. In *Measuring audience to radio*, Tony Tmyman (1994, 88) explains these features of radio which are interrelated:

- because of the way memory works, recall of radio listening tends to be more difficult than for other media;

- it is a medium considered to be a companion to other concurrent activities with which attention is shared;

- listeners tend to be mobile, so a lot of listening takes place outside the home, often on radio not owned by or tuned in by the listener;

- unlike television, radio programmes content tends to flow continuously, rather than being a series of unique broadcasts;

- radio is a highly fragmented and rapidly expanding medium. In some countries, hundred of stations are available, with over 20 in the same area;

- the number of regional stations impacts on sample size and frequency.

Gunter (2000, 113) refers to Tmyman (1994, 88) factors that are important inconvenience for measuring radio audience, and explains that they affect recall of radio listening experiences:

> "Many of these factors work together to affect recall of radio listening experiences. Listeners have to remember when they were listening by remembering where they were listening. If they were moving around at the time of listening, this may prove difficult. The large number of radio stations can also render memory for the particular station listened to at a certain time very difficult."

In this section, we will review the main used techniques in radio audience measurement, focusing on advantages and disadvantages, and emphasizing the potential sources of error.

Webster et al. (2006 126-129) argue that response error includes inaccuracies contained in the responses generated by the measurement procedure. Thus, is extremely important to understand potential biases sources and to discuss each method. In measuring radio audience, research companies use two types of methods: (1) declarative methods (i.e. Day-After-Recall or dairies) and (2) passive methods (i.e. electronic technology).

We will refer to these two categories of methods and explain how we can overcome the problems of response error.

4.1. Declarative Methods of Measuring Radio Audience

4.1.1. Diaries

According to Webster et al. (2006, 129-130), diaries (i.e. diaries on paper or online) are one of the most widely used of all measurement techniques in radio audience. *A diary* is a small paper booklet in which the diary keeper is supposed to record his or her media use for a 1-week period (Webster et al. 2006, 130). In radio audiences' measurement, respondents must carry these diaries and record listening a radio station that

occurs outside the home. Respondent only notes his listening and location, not if other people listen the same radio station (Webster et al. 2006, 130).

Diary technique involves selecting participants from a sample and, after their approval, creating a paid panel of respondents. They receive diaries (e.g. delivered to the home in person by field personnel) and are trained to note the radio station they listen during a week. At the end of this period, they return it the research company, or data is collected via telephone (Webster et al. 2006, 130).

Using diaries for measuring radio audience is popular due to some important advantages (Webster et al. 2006, 130-133): (1) cost effective (i.e. relatively inexpensive method of data collection), (2) wealth of information, (3) report which people were actually in the audience, (4) it is suitable for measuring radio audience on local markets, (5) allows a detailed picture of listener behavior, (6) researchers can calculate more precisely cumulative weekly reach, frequency, time spend length, and (7) data reported by the same person during a week generates a more reliable picture of audience.

Scholars that use diaries must consider some important disadvantages (Webster et al. 2006, 134-134) and potential sources of errors: (1) low response rates (i.e. potential source of nonresponse error), (2) difficulties in convincing specific respondents to participate (e.g. young males, people with higher income), or overrepresentation of a segment (i.e. potential sampling and nonresponse errors). To this potential sources of errors we also add some measurement errors caused by using diary data: (3) errors of memory (i.e. due to effort involved, sometimes respondents do not fill out diary and try to remember it at the end of the day or week), (4) 'diary fatigue' determines under-reported data (e.g. artificially depress listening levels in weekend, late night, in bed-rooms). Webster et al. (2006, 130-133) argue that these are significant sources of response error. However, they outline that, in some cases, (5) respondents may deliberately distort reports of their listening behavior: they consider it an opportunity to 'vote' for deserving programs, whether they are actually in the audience or not.

4.1.2. Day-After-Recall

Another declarative method of measuring radio audience is *Day-After-Recall*. Day-After-Recall measurement is based on the 'yesterday' (DAR) method and can be conducted using different approaches: Computer Assisted Telephone Interview (CATI), Computer Assisted Self Interviews (CASI), Computer Assisted Interviews (CAI), Computer

Assisted Web Interviewing (CAWI), Computer Assisted Personal Interview (CAPI), Paper and Pen Interviewing (PAPI), or Paper and Pen Assisted Telephone Interviewing (PATI).

In this method, a representative and adequate number of respondents are drawn from among radio listeners and are asked to recall the previous day activities in connection with their radio listening. An operator records respondents' answers using 15-minutes slots. In order to facilitate a more accurate recall, operators may even use a list with possible radio station or programs listened. Using a fixed ordered list can generate biases – of course, researchers can use randomization or rotation of station mentioned.

Using Day-After-Recall method has certain advantages: (1) cost effective (i.e. relatively inexpensive method of data collection), (2) involves less work for respondent (i.e. as in diaries), (3) reaches to specific and narrow target audience, (4) suitable for measuring radio audience on local markets, (5) allows a higher control over standards and consistency of data collection, (6) generates higher general reach figures compared to diary, and (7) allows using bigger sample size.

Day-After-Recall method involves important disadvantages and potential sources of error: (1) memory errors, (2) problems with the number of station (i.e., CATI), (3) relative errors as different individuals report data for different days of the week, and (4) lower reach figures for Average Quarter Hour (AQH) compared to diary. We will discuss some of these important potential sources of error in our case study.

4.2. Passive Methods of Measuring Radio Audience

In this section we will refer to different passive methods of measuring radio audience, such as *people meters* and *portable people meters*.

People Meters (PM) and Portable People Meters (PPM)

An important media research company, Nielsen[1], developed an alterative method to measure ratings: people meter (i.e. audiometer - a metering device for radio). Initially, Nielsen's audiometer recorded radio

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[1] Nielsen Media Research is located in SUA, and is a subsidiary of The Nielsen Company. The Nielsen Company is the world's largest market research company, and was founded in 1945. Accessed January 4th, 2018. More information available at: www.nielsen.com.

listening with a device places in respondents home (Webster et al. 2006, 135). The recorded material is retrieved by telephone or by research company representative. Next, researchers analyze the recorded tuning of radio.

According to Webster et al. (2006) this initial method: (1) failed to capture mobile listeners (i.e. a lot of listening takes place outside the home) and (2) many potential respondents refused to accept that research companies would install devices in their home. These two issues can be considered potential sources of nonresponse and response error (Webster et al. 2006). Additional potential sources of error in using audiometers involve: (3) difficulties in convincing specific respondents to participate (e.g. children), overrepresentation of a segment (potential sampling and nonresponse errors), and (4) the need for technological literacy of respondents (Webster et al. 2006).

Arbitron improved people meters and developed *portable people meters*. This new technology aimed to be a solution for measuring radio audience and to overcome some of the limits of household bound meters (Webster et al. 2006, 136). The system depends on broadcaster's cooperation because they need to insert a watermark (i.e. inaudible code in the audio portion of their signals). Respondents wear a pager-sized device that is capable of detecting the code. When a person listens a radio station, the meter registers the station based on inserted code. The information are sent via telephone or wireless networks to research company. The ratings are estimated based on this information, and respondents' demographic profile (i.e. data collected in advance when the panel is created) can be presented to clients (Webster et al. 2006).

Using *portable people meters* for measuring radio audience is a better solution than people meters due to following advantages (Webster et al. 2006, 136): (1) they require no button pushing for data recording, (2) automatically records any media content, not only radio (i.e. pre-recorded materials), (3) are cheaper than people meters. The main disadvantage of *portable people meters* consists in high costs due to technology used (Webster et al. 2006, 136).

Webster et al. (2006, 136) explain that the latest development in measurement technology is *passive peoplemeter*. In their view, this device (1) requires no effort on the part of sample respondents, (2) is unobtrusive, and (3) capable to identifying exactly which people were in the audience (i.e. using computerized 'image recognition' system).

4.3. Mixed Methods for Measuring Radio Audience

Many research companies use nowadays mixed methods for measuring radio audience. In this section we will briefly discuss them, and note key advantages and disadvantages.

4.3.1. Questionnaires

Traditionally, *questionnaires* were used for collecting data in order to measure radio audience. There is a vast literature regarding designing questionnaire, but we review a series of notes made by Webster et al. (2006, 138) about their strengths and weakness.

As we already discussed, Day-After-Recall method of measuring audience can be conducted via phone interviews, using questionnaires. Webster et al. (2006, 136) explain that the most important weakness of telephone interviews is that respondents must remember the listen radio station. In their view, two factors influence the quality of recalled information: (1) the 'memory error' (i.e. listening is a past event) and (2) the salience of the behavior in question. However, Webster et al. (2006, 136) note that due to people's radio listening tends to be regular and involves only a few stations, the medium is more amenable than some to measurement with telephone recall techniques.

Webster et al. (2006, 136) outline important disadvantages of telephone recall: (1) week-long patterns of audience accumulation inferred from mathematical models, (2) error caused by operators (i.e. interviewers can make inappropriate comments or other errors that bias results), and (3) the entire method relies on respondent's memory (i.e. there is no guarantee that they can accurately remember yesterday's listening).

Another approach of using questionnaires is via *telephone coincidentals* (Webster et al. 2006, 136). In this case, researchers can overcome memory problems, the main disadvantage of Day-After-Recall technique, because operators ask respondents to report what they are listening to at the moment of the call (i.e. fatigue are eliminated). Although this technique has certain advantages, Webster and his colleagues (2006, 136) note that no major media research company conducts telephone coincidental research.

According to Webster et al. (2006, 136), the main disadvantages of this method are: (1) only captures a photography at a certain moment of radio listening, (2) sacrifices quantity of information for quality, (3) requires large numbers of people to estimate hourly audience, (4) it is very expensive proposition, and (5) involves problems regarding when calls can

be made. Webster et al. (2006, 138-139) conclude the coincidental telephone method is no longer used for any regular rating service.

Occasionally, *questionnaires in paper-and-pencil forma* can be utilized to collect data for measuring radio audience. Many times research companies conduct omnibus research with a section regarding radio ratings. New technologies allow using questionnaires for collecting data in real time. For example, some researches used *personal digital assistants* (PDAs) with pre-loaded questionnaires (Webster et al. 2006, 139). Nowadays, scholars can utilize *online questionnaires* and ask people to fill out what radio station they listen on their smartphones.

4.3.2. PC Meter, Smartphone Meter, Wearable Meter, and Smartphones Audiomatching

Considering the impact of new technologies on media, additional techniques are used to capture radio audience. Audiences are more fragmented, and advertisers search narrowly defined markets to broadcast commercial messages. For example, Arbitron and comScore use *PC Meter* to measure Internet radio audiences. Webster et al. (2006, 141) discuss some advantages of PC Meters: (1) relatively inexpensive because it uses respondent's computers, (2) provides continuous record of Internet (or Web) activity, and (3) allows using very large samples. The main two disadvantages in using PC Meter are: (1) potential sample bias due to privacy concerns and (2) awareness of metering may alter respondents' behavior (Webster et. al. 2006, 141).

In a Nielsen/Admosphere Report[1] (2006) we find some important considerations about the state of art in measuring radio audience. In this section we will briefly discuss it because of its relevance for our paper. First, we notice that research companies use nowadays new techniques in measuring radio audience, such as (Nielsen/Admosphere Report, 2006):

- Portable People Meter (i.e. Switzerland, USA, Canada, Iceland, Denmark, Sweden, Norway, France, Italy, and Netherlands);
- smartphone software applications (i.e. Finland, UK, and Czech Republic);
- a combination of electronic systems and declarative data (i.e. Denmark, Norway, Iceland, Sweden, Canada, and USA);
- smartphone meters with Android app and Electronic Mobile Measurement platform (i.e. USA);

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[1] A Nielsen/Admosphere report. Accessed January 4th, 2018. http://www.nielsen-admosphere.bg/files/2016/03/Radio-Audience-Measurement.pdf

- wearable and virtual meters, such as: bracelets, pins, and smartwatches (i.e. USA);

- audiomatching using new smartphones and Android application. With this technology, sounds can be distinguished based on audiomatching. Also, audiomatching can work on many types of mobile devices and offer a continuous optimization application to extend the battery life (i.e. USA).

Second, according to the same Nielsen/Admosphere Report (2006), switching from declaration to electronic measurement involves some changes in radio stations ratings: (1) reach for individual stations tends to be higher, (2) time spend length (TSL) is generally lower (i.e. people overestimate the time they are listening to favorite station), (3) smaller stations increased their share, (4) less popular day parts increased in importance, and (5) problems with some ethic minority-owned broadcasters over under-reporting. New technology can improve radio measurement (Nielsen/Admosphere Report, 2006) because: (1) can bring common currency to TV and radio planning, and buying, (2) collects minute-by-minute (second-by-second) data, (3) allows better optimization of radio programme and campaign planning, and (4) the watermarking technology can report different platforms.

In the Nielsen/Admosphere Report (2006), Magida Sukkari notes the main disadvantages of electronic measurement: (1) lack of support among industry actors, (2) measures only proximity to radio signal (i.e. even when respondent is not aware of it), (3) higher costs, (4) problems with panel recruiting and administration, (5) difficulties in distinguishing between stations broadcasting the same content (audio matching), (6) problems with all occasion and high noise situations (watermarking), (7) lower TSL, and (8) difficulties with small stations reporting.

We conclude in this section that no research method is perfect and without potential sources of error. However, some techniques provide more accurate data than other. From a methodological perspective, we consider important to understand advantages and disadvantages of each method, potential biases source, and solutions to minimize their effect.

5. Case Study: Measuring Radio Audience in Romania

In this section of our paper we will discuss some methodological issues related to radio measurement and ratings in Romania. Although our case study regards a specific country, we intend to approach a broader problem: the methodological challenges of assessing radio audience using Day-After-Recall method.

First of all, based on public available information, we briefly present the background of audience measurement procedure used in Romania, outlining the methodological relevant aspects. Secondly, we discuss the latest radio audience report and note some possible issues in ratings. Third, we formulate some critics regarding Day-After-Recall method and potential sources of error in use it, based on our previous literature review. Fourth, we outline possible methodological solution and formulate some recommendation.

5.1. Background

In Romania, radio audience measurement reports are public through Radio Audience Survey (SAR), which is a syndicated research program in co-operation with the Radio Audience Association (ARA).[1] According to Radio Audience Association website, the main objectives of this survey are: (1) to measure Romania's radio audience, (2) to deliver a unique set of data regarding radio listeners approved by the media industry (radio stations, media agencies – ARA members), and (3) to answer to members commercial and editorial needs. Regarding the research design, SAR uses the methodological and professional standards for radio audience measurement recommended by European Broadcasting Union in 1997. SAR consists of three surveys (waves) per year, conducted by IMAS Marketing and Polls, and Mercury Research. The stated objective of SAR is to measure only the Romanian radio audience (i.e. public and private broadcasting stations). Therefore, ARA indicates to the researchers the list of radio stations, usually members[2] (radio station and advertising agencies) to be included in SAR.

5.2. Audience Measurement Procedure

Research universe
According to Radio Audience Association (ARA) website[3], the research covers urban and rural population, 11+ years old, living in urban and rural areas of Romania, who do not work in the radio domain.

The study universe size is 17,808,907 persons (i.e. official statistics provided by National Institute of Statistics).

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[1] Radio Audience Measurement Survey (SAR). Accessed January 4th, 2018. http://www.audienta-radio.ro/default.aspx?id=6

[2] See Members section. Accessed January 4th, 2018. http://www.audienta-radio.ro/default.aspx?id=4

[3] Accessed January 4th, 2018. http://www.audienta-radio.ro

Sample size, sample structure, and sampling procedure

The scheduled sample size for SAR 2017 is about 30,300 respondents (10,100 interviews per wave, 3 waves per years). For each wave (10,100 interviews/ wave), the sample structure is design according to three locality types: (1) Bucharest, (2) urban without Bucharest, (3) rural. Also, researchers use a telephonic subsample (8,750 interviews/ wave) as a second stratification criterion by telephone number type (fixed line or mobile). Randomly generated telephone numbers (fixed line and mobile) are utilized.

The face-to-face subsample (1,350 interviews/wave) has the next stratification design: 18 social-historical micro-regions (relatively homogeneous areas identified through a multifactorial cluster analysis), and 2 categories of rural localities (i.e. according to their size).

Finally, describing the sample structure, researchers explain that a randomly selection of the interviewees (aged 11+) is made from a database provided by The Directorate for Persons Record and Databases Management. For each locality of the sample, a list of addresses or the identification marks for the selected persons (i.e. age and gender) are extracted.

Data collection procedure

In order to collect data, SAR uses Computer Assisted Telephone Interviews (CATI) and Computer Assisted Personal Interview (CAPI) (i.e. in home face-to-face interviews). The average duration of an interview is 20 minutes.

Audience measurement method

According to SAR report, the radio audience method used in Romania is Day-After-Recall. As we already discussed, in other countries scholars use alternative methods for rating radio audience (e. g. Switzerland, USA, Canada, Iceland, Denmark, Sweden, Norway, France, Italy, Netherlands). However, in Romania, Day-After-Recall method is still an option for media research companies.

The questionnaire contains 3 sections: (1) radio audience section (i.e. recording radio stations spontaneous and prompted awareness; extended audience - radio listening frequency through a month, and radio listening frequency by the following time intervals, during a month; recent audience), (2) Internet, mobile phone, personal car usage, and (3) personal socio-demographics data/household endowments.

Data processing and analyses

SAR report includes 20 radio stations for the National database, and 23 radio stations for the Bucharest database - broadcasting stations agreed by ARA. Considering the large number of radio companies in Romania (i.e. 176, with over 620 radio licenses approved by Licensing Office of CNA), we conclude that ARA agrees only a part of them. Therefore, some radio companies' managers consider that The Radio Audience Association (ARA) represents only the common interests of founders (i.e. broadcasters, advertisers, and media agencies) in the process of audience measurement, and it is not representative for all radio stations in Romania. Consequently, many local and regional radio stations from Romania do not recognize the audience report published by ARA. We will discuss these issues later when we formulate possible solutions for improving radio ratings.

For processing and analyzing collected data, research companies use a specially designed software (i.e. MasoR9) that automatically calculates the following audience indicators: market share, daily reach, average quarter rating, weekly reach, and average time spent (in minutes). Also, the extended research report contains the listeners' socio-demographic profile (i.e. age, gender, education occupational status, region of residence, locality type, and ESOMAR Social Status) for every radio station. This data allows complex audience segmentation.

5.3. Results of the Radio Audience Survey at National Level Romania 2017

In this section we depict some extracted data from the latest radio audience report available (i.e. *Radio audience report - 3rd Wave, for 28.08.2017 - 17.12.2017*) published on ARA website[1]. We will briefly discuss only section A: radio ratings for total population 11+.

Analyzing Table 1, we notice that two significant audience indicators, Daily Reach (000) and Market Share (%), are reported. From a methodological perspective, we consider relevant to outline reported data about *Unidentified radio station*: *2576.3 – Daily Reach (000)*, and *13.4% - Market Share*. This data is an evidence for potential sources of error in measuring radio audience using Day-After-Recall method. As researchers note, there are people who remember listening to the radio, but they do not know what radio station they are listening to. Their number is

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[1] Full report is available on ARA website. Accessed January 4th, 2018. http://www.audienta-radio.ro/default.aspx?id=7

significant: 13 radio listeners from 100 don't recall the station they listen yesterday. This means a 13.4% Market Share.

Daily Average of Radio Audience	Daily Reach (000)	Market Share (%)
TOTAL	**11570.7**	**100.0**
Radio Antena Satelor	673.6	5.8
Radio Digi FM	670.7	3.5
Radio Europa FM	1345.6	7.4
Radio Kiss FM	2389.8	11.4
Radio Magic FM	692.2	3.4
Radio Naţional FM	226.6	1.2
Radio Pro FM	950.2	4.2
Radio Rock FM	282.7	1.2
Radio România Actualităţi	1819.4	12.7
Radio România Bucureşti FM	108.5	0.6
Radio România Cluj	113.9	0.8
Radio România Constanţa	45.0	0.3
Radio România Cultural	243.0	0.9
Radio România Iaşi	421.4	2.8
Radio România Oltenia Craiova	435.5	2.6
Radio România Reşiţa	177.4	1.0
Radio România Târgu Mureş	124.4	0.7
Radio România Timişoara	223.6	1.1
Radio ZU	1886.7	8.2
Virgin Radio (ex Radio 21)	517.2	2.0
Other radio station	2492.8	14.8
Unidentified radio station*	*2576.3*	*13.4*

Table 1. Results of the Radio Audience Survey at national level: A. Total population 11+

*Researchers note: there are people who remember listening to the radio, but they do not know what radio station they are listening to.

Radio România Actualităţi, the leader, has 1819.4 - Daily Reach (000) and 12.7 - Market Share - less than the number of people who remember listening to the radio, but they do not know what radio station they are listening to.

In this context, we should reflect on *Unidentified radio station* reported data and outline possible issues of Day-After-Recall technique.

5.4. Methodological Critics to Day-After-Recall Technique

Issues in measuring listener memory

As we already discussed in this paper, Day-After-Recall method involves some potential sources of error: memory errors, small number of station reported (i.e. CATI), relative errors as different individuals report data for different days of the week, and lower reach figures for Average Quarter Hour compared to diary method.

In this section, we approach *the issue of memory errors* from a psychological perspective.

Bagozzi and Silk (1983), in a classic paper about "Recall, Recognition, and the Measurement of Memory for Print Advertisements", discuss some problems of using this method in advertising. They explain that *recall* is 'the mental reproduction of some target item experienced or learned earlier, while *recognition* is 'the awareness of having previously experienced that stimuli' (Bagozzi and Silk 1983, 95). Bagozzi and Silk (1983, 95-96) explain the difference between these two concepts: in recall, some contextual cue is provided and the respondent must retrieve the target item from memory. In recognition, the target item is provided, and the contextual circumstances of the earlier event or experience must be retrieved. Further, Bagozzi and Silk (1983, 95) note that memory is multidimensional, and that recall and recognition capture only a portion of memory. They review some important multicomponent theories about recall and recognition from psychology literature (i.e. sequence of stages paradigm, levels of processing theory, dual-coding theory), and refer to *memory decay or forgetting* (Bagozzi and Silk 1983, 97-104). This discussion is particularly important for our case study because it may lead to a better understanding of potential source of error in using Day-After-Recall method, from a psychological perspective.

In their paper, Bagozzi and Silk (1983, 104-106) outline that memory decay (or forgetting) can be caused by different factors: (1) natural decay, (2) destruction (e.g. physical injury or emotional trauma), (3) interference effects, (4) inaccurate or incomplete encoding, (5) retrieval failures, or (6) information processing (e.g. information altered through construction processes, inferences, and generalization). Next, we will briefly discuss these factors by referring to Bagozzi and Silk (1983) paper.

First of all, Bagozzi and Silk (1983, 104-106) note that memory decay is natural. They explain that the decay process is caused by inherent physiological characteristics transformation of the brain during time. Thus, some people may suffer of memory decay due to age.

Secondly, Bagozzi and Silk (1983, 104-106) outline the interference effects which produce a decline in memory, as a consequence of the competition occurring among new and old pieces of information in memory. Hence, proactive-inhibition occurs when information learned at one point in time subsequently interferes with information learned at a later time). Retroactive-inhibition is the detrimental effect of recently learned information on previously acquired material. Interference can occur as a function of errors in decisions concerning the identification of potentially remembered information. The greater the number of similar pieces of information in memory compared to information must be identified, the higher the probability of an error is in identification (Bagozzi and Silk 1983, 104-106). Also, interference can occur as a result of a failure (i.e. caused by factors such as: brain damage, emotional blockage, time pressure, and information overload) to retrieve or access previously learned information.

Third, Bagozzi and Silk (1983, 104-106) emphasis that information processing is an active or interactive operation, whereby the perception and interpretation of material is a combination of the actual physical aspects of the material (i.e. past history and current interpretations), continually being reshaped.

Fourth, Bagozzi and Silk (1983, 104-106) review errors in recall or recognition, and note it may can occur as a result of construction-based inaccuracies, during encoding or retrieval activities, but probably not autonomously during mere storage. The inaccuracies can be determinate by distortions, false inferences, errors made in forming associations among ideas, or other constructive acts. The varying rates of decay for different information can explain different performance on recalling and recognition of radio listeners. Bagasse and Silk (1983) conclude in their paper that advertisements are sets of stimuli with complex meaning for people – thus, constructive processes are extensive and may result in different construction processes, different retrieval outcomes, and discrepancies in recall and recognition performance of individuals.

Based on Bagasse and Silk (1983) paper, we consider that the psychological mechanisms of human memory can explain why radio listeners may differ in recalling what radio station they listened yesterday, or to recognize a specific radio station.

6. Conclusions and Perspectives

Since 1930s, radio became a popular media and started to broadcast commercial messages to large audience. Because advertising is an important source for financing radio companies, broadcast research was important for both radio stations and advertising agencies.

First, audience research importance must be understood as a way for radio stations to create, adjust their business, and serve their listeners. This idea is restate by Wimmer and Dominick (2011, 351), authors quoting Phil LoCascio (2009) – a major market program director from New Jersey:

"Research is the only way to find out about a target audience and what they want from a station. Research helps us determine when we must adjust our business to meet new demands. This is important because changes in broadcasting can happen in a matter of minutes. Competition has increased dramatically with the advent of the Internet. We are now competing with stations from around the world in addition to local competition. How do we best serve your audience? We have to ask them."

Second, advertisers continually want information about the people who hear commercial announcements to optimize their campaigns. Thus, audience research is important for radio managers to properly adjust programs and for advertisers to create more efficient campaigns.

Third, radio audience ratings are estimates of audience size and may vary depending on the methodology researchers' use. Hence, ratings may be affected by errors and they should be interpreted with caution. Although, scholars note four sources of error in ratings data (i.e. sampling error, non-response error, response error, and processing error), in this paper we focused mainly on *response error* - generated in measurement process.

Fourth, research companies have a variety of measurement techniques they can use for radio ratings – each one with advantages and disadvantages. However, in this article we argue that *a solution to reduce response error could be to use mixed methods (i.e. declarative and passive methods) for measuring radio audience*. This measurement approach could lead to a better estimation of radio consumption, radio ratings, and to a better understanding of listeners' behavior. From our point of view, using new technologies in radio audience research design could provide more precise data, such as in TV audience measurement, for advertisers and broadcasters.

Sixth, measuring radio audience in Romania using Day-After-Recall method seems to be problematic. As we noticed in the latest ratings report, 13% of radio listeners don't remember the station they listen yesterday. The psychological mechanisms of memory decay can explain this significant number. The conclusion is that radio listeners may differ in recalling what radio station they listen yesterday, or to recognize a specific radio station. Thus, considering potential memory errors and the large number of listed radio station, Day-After-Recall method may not be the best option for estimating ratings. Therefore, in USA and in some EU countries, different measurement approaches are being tested, and better results are achieved.

In this section we propose a set of potential solutions to overcome the methodological issues related to radio measurement in Romania:

- increasing the number of radio station agreed by ARA, for a better representation of the industry (i.e. more local and regional radio station membership);

- a higher budget for measuring radio audience (i.e. this could be achieved by extending the number of station which pay membership fee);

- using hybrid methodologies (i.e. combining new technology, declarative and passive methods) for measuring radio audience;

- expanding the list of radio stations measured;

- radio digitization implementation to better estimate radio consumption, radio ratings, and listeners' behavior.

In our view, there is no unified and correct solution of measuring radio audience. From a methodological perspective, we can benefit of using new technology to estimate more accurately radio ratings. Considering the growth of online radio stations, podcast listening, and radio apps, new approaches may be needed to measure media consumption. Researchers must find new methods to evaluate radio audience by collecting online and offline data. An integrated measurement approach could lead to develop new techniques for assessing radio audience.

The European Broadcasting Union (EBU)[1], the leading association of national media organizations in the world, *considers that the future of radio is digital, multiplatform, and hybrid*. In a special report, available on https://www.ebu.ch, EBU concludes:

- digital broadcast radio is the key to radio's future: digital terrestrial radio should be protected and strengthened as a backbone of

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[1] Data available on The European Broadcasting Union (EBU) website. Accessed January 4th, 2018. https://www.ebu.ch/about

European broadcasting. This means promoting the DAB/DAB+/DMB digital radio standards, but also of enabling European states to decide which standard best suits their populations;

- digital technologies are becoming ever-present in our everyday lives. Thus, digital radio is more spectrum-efficient than FM radio, which leaves less room on the crowded airwaves for expansion or for new stations;

- digital radio encourages start-ups and enables broadcasters to offer many more stations, programmes, and services;

- radio digitization enhances the listening experience;

- radio combined with Wi-Fi (i.e. hybrid radio) invites listeners to engage in conversation with their chosen station, sharing opinions and comments, socializing the experience, or enabling a user to easily search for more information;

- listeners will have a greater choice of programmes and stations, all transmittable in crystal clear audio, while broadcasters can exploit creative and commercial development opportunities of digital radio.

Radio digitization will have also a great impact on radio audience measurement. According to The European Broadcasting Union, digital also means that radio stations can accurately monitor their audiences, using data to improve output and attract advertisers. Thus, research companies can benefit of technological change and update their measurement techniques.

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