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Address
Egyptian Public Relations Association
Arab Republic of Egypt
Giza - Dokki

Ben Elsarayat - 2 Ahmed Zayat Street
Mobile: +201141514157
Tel : +2237620818
www.epra.org.eg
jprr@epra.org.eg

Journal of public relations research Middle East

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Exposure to Digital Signage and Message Recall: Determining the Effectiveness of the Billboard outside the Prophet's (PBUH) Mosque at Madinah al-Munawwarah

Dr. Osman B.Gazzaz(*)

drgazzaz@gmail.com

(*) Assistant Professor - Head of Media Affairs Department,: The Institute of the Custodian of Two Holy Mosques for Hajj & Omrah Research , Umm al-Qura University.

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Dr. Osman B.Gazzaz
Umm al-Qura University
drgazzaz@gmail.com

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Abstract

The present study has examined the pilgrims' use, perceptions and recall of the digital signage set up on the street opposite to the King Fahd Gate of the Prophet's (PBUH) Mosque to determine its effectiveness as a PSA tool. Data from the present study is also juxtaposed with data from a previous study on non-digital LED-scrolling billboards to highlight the effectiveness of the digital screens. Two types of measures of exposure, exposure frequency and screen usage in problem situations, are correlated with measures of unaided and aided recall. Partial correlations controlling for the demographic, exposure context, message-related interaction, and perceived usefulness of the screens were used to understand the mechanism of exposure-recall relationship. The main conclusion derivable from the above analysis of the factors of effectiveness --data on screen use, audience perceptions of the digital signage, and message recall -- is that despite its potential for great utility and effectiveness as a PSA tool the particular digital signage is performing below par. Recommendations are proffered on improving the effectiveness of the signage.

1: Introduction

1.1: Background & Significance

Digital signage is a useful tool of disseminating public service and commercial messages to a target audience in highly frequented locations. Frequency and pervasiveness with which the electronic billboards are used the world over is, in itself, a testimony to their effectiveness as message carriers. Advertising through electronic billboards is part of the outdoor or the out of home advertising market and is one of the fastest growing segments of the media industry in the Western world (Lopez-Pumerarejo & Bassell, 2009; Gambetti, 2010). Perhaps inspired by this worldwide trend of the use of digital signage, the Saudi government authorities have started deploying digital signage in and around the *Harama'en Sharifa'en* (the Two Holy Mosques) area for guidance of the pilgrims. One such big-sized non-scrolling digital billboard has been set up directly opposite to the King Fahd Gate of the Prophet's (PBUH) Mosque. This billboard mainly carries public service announcements (PSA) including the Prophet's (PBUH) *ahadiths*.

The effectiveness assumption of the billboards, *per se*, may well be a safe assumption to make but as our previous study of the EBBs in the Haram area has also demonstrated this is not always the case (Gazzaz, Khan, & Iqbal, 2014). In that particular study, the EBBs were found to be of limited use due to a number of location, size, message content and formatting deficiencies. Since we, too, believe that the electronic billboards can yet be effectively employed in various stages of the Hajj process, and since the structural and format factors of the particular digital signage put up outside the King Fahd gate of the Prophet's (PBUH) Mosque are different from the *al-Haram al-Shareef* signage at the time of previous study at Makkah al-Mukarramah, we propose to examine the utility of the particular digital billboard set up outside the Prophet's (PBUH) Mosque as well.

Additionally, Gazzaz, Khan & Iqbal (2014) may have inadequately examined exposure-recall relationship. For example, the dynamics of relationship were examined in terms of exposure frequency and unaided recall only. It can be argued that the effect of frequency of exposure on aided recall might be different from the unaided recall. Similarly for determining the effects of exposure on recall perhaps we need to conceptualize exposure more specifically as exposure to digital screens in actual situations of need and difficulty rather than a general frequency of looking at the screens while in the area. Moreover, unlike the signage under study outside the Prophet's (PBUH) Mosque, the studied signage in the above cited study comprised of the traditional LED-scrolling message boards of relatively smaller size. Of late, these scrolling-screens have been augmented with bigger-sized digital

screens where a displayed message remains static for a few second and then changes.

Nevertheless, our contention is that putting up digital billboards at some vantage points with digital messages endlessly scrolling or flashing across the screens does not automatically guarantee the intended results. The literature on outdoor or Digital Out Of Home (DOOH) advertising and billboard signage tells us that the structural variables of the billboards, such as location, size, message content, format and presentation variables, and the respondent variables like their demographic characteristics, their exposure characteristics, and their exposure context characteristics relate to effectiveness or recall of digital signage (Osborne & Coleman, 2008; Brown & Rothschild, 1993; Calder & Sternthal, 1980; Chevalier & Mayzlin, 2006; Donthu, Cherian, & Bhargava, 1993; Nelson, 2002; Raymond, 2003; Riebe & Dawes, 2006)

The present study, therefore, examines the pilgrims' perceptions of and exposure to the digital signage in question, and their learning from the screen. Whether the pilgrims, at all, notice these billboards and benefit from them. That is, the broad research question being addressed here is: What is the effectiveness or utility of the digital signage outside of the King Fahd Gate of the Prophet's (PBUH) Mosque? Effectiveness or utility of the electronic billboards implies the degree to which these billboards engage the pilgrims' exposure and attention. The construct effectiveness, in the minimum, also implies the extent to which the pilgrims learn and retain information from these boards. Learning; i.e., information recall, from the public information campaigns is indeed important for attitudinal and behavioral effects of a PSA campaign.

Furthermore, as of now, apart from a couple of small scrolling billboards there is just one major digital screen at the start of the street opposite to the King Fahd Gate area and there is definitely an urgent need to beef up digital signage in and around the Prophet's (PBUH) Mosque area for improved guidance of the pilgrims. Input from the present study shall be of use and value to putting up more digital signage in the area.

Hence, together with Gazzaz, Khan, & Iqbal (2014) study of the EBBs around the Holy Masjid in Makkah al-Mukarramah, the present study shall shine more light on how best to more pervasively deploy the digital signage to the pilgrims' advantage in the *Harama'en as-Sharifa'en.*

2: Literature Review

2.1: Theoretical Framework

Since the above identified broad research question relates with factors of effectiveness of digital signage, hence, in order to focus the study, we will provide a quick overview of outdoor advertising literature that pertain to structural and respondent related features of the digital screens' effectiveness.

2.2: Digital Signage: Factors of Effectiveness

Scant direct research on the factors that determine the effectiveness of the electronic billboards in information campaigns is available (Osborne & Coleman, 2008). Much of the past research on the outdoor advertising campaigns predates the widespread use of technological advances in the outdoor advertising like the introduction of the digital billboards. Additionally, a persistent preoccupation of researchers with television advertising coupled with difficulty of employing experimental methods in outdoor advertising research leaves us with little available research wisdom on the utility of the EBBs as a publicity tool. Nevertheless, television advertising research and research on traditional billboards generally lead us to conclude that a number of factors like the structural characteristics of the billboards, the message characteristics, characteristics of audiences, their exposure patterns and the situational context of exposure, may influence audience learning and information retention, and in turn the billboards' effectiveness in information campaigns. Taylor, Franke, & Bang (2006) has identified two criteria of billboard effectiveness as attention to billboards and improving recall. Hence use of clever creative execution of billboard messages is important. The traditional billboard literature has also identified short copy and simple message (single message, and use of clever phrases and/or illustrations) as one of the five principles of effective billboard advertising and higher recall (Taylor, Franke, & Bang, 2006; Bhargava, Donthu, & Carbon, 1994).

Additionally, for the digital billboards, distraction due to message clutter, the message scrolling speed, use of cellphones, and the presence of friends while frequenting the area have been found to significantly interfere with attention to billboards and thus recall of the billboard messages (Raymond, 2003; Riebe & Dewes, 2006). Similarly, talking with others about the message content (Nelson, 2002), attitudes toward the utility of the billboards as information resource, and exposure and attention to the screens, and the structural features of the billboards like the size of the billboard, the wordiness or readability of the message, the use of animations & action, the font size, the speed with which the messages scroll or flash through the screen all may influence the billboard recall and their utility in

information campaigns (Donthu, Cherian, & Bhargava, 1993; Taylor, Franke, & Bang, 2006; Osborne & Coleman, 2008).

2.3: Types of Recall

Literature on message effectiveness, as noted above, has used message recall as a factor of message effectiveness. In the absence of standardized measures of recall, some researchers argue for using types of recall to determine and understand message effectiveness (Bigsby & Monahan, 2013). Assumption is that type of recall differentially relates to different aspects of memory. Memory mainly comprises processes of encoding (involves message processing and evaluation), storage (maintenance of encoded information in relation to previously stored information, and retrieval -- access and use of old information, (Bigsby & Monahan, 2013; Lang, 2000). Bigsby & Monahan (2013) differentiate between recognition recall, the aided and the unaided recall. Recognition recall involves a kind of multiple choice test wherein a respondent is to select the target message from a list of choices. Aided recall involves describing specific part of a message; e.g., saying a word to the respondent and then asking him to describe the message pertaining to that key word. An unaided recall may comprise asking a respondent to describe any message seen on a digital billboard, for example. The unaided recall a least sensitive measure yields least amount of information recall (Bigby & Monahan, 2013).

It is argued that unaided recall is a better indicator of elaborative processing or high involvement with the message and aided recall is more likely outcome in low-involvement situation or shallow processing (Lang, 2000). The amount of time between exposure and recall may also impact recall. It may be aided recall is more likely in longer time duration between exposure and recall but recalls assessed immediately after exposure might not be well differentiated (Bigsby & Monahan, 2013).

2.4: Objectives of the Study

In view of the foregoing, and to adequately answer the above mentioned broad research question, the present study has posited the following specific research objectives:

1. To examine the pilgrims' use of and perceptions about the digital signage in the area directly opposite to the King Fahd Gates' of the Holy Mosque at Madinah al-Munawwarah.
2. To correlate the digital signage use with the aided and the unaided recall of the screen messages.

3. To identify factors that may strengthen the effectiveness of the digital billboard as a PSA tool.

2.5: Benefits:

The data created through the above objectives is expected to not only help determine the effectiveness of the particular digital signage in question but will help develop guidelines on how best to more pervasively employ digital billboards as a public service and civic information channel of information for the pilgrims in the Holy places in general.

3: Methods

3.1: Instrument Development

A survey instrument was developed in the months prior to Ramadan containing a mix of closed and open-ended questions tapping information on the pilgrims' use and perceived utility of the electronic billboard to them. The questionnaire was developed through an extensive review of the questionnaire from the previous year's study and through discussions sessions with colleagues well-experienced in field data collection from the pilgrims as well as those having extensive familiarity with the use of the electronic billboards in and around the Holy places. The questionnaire was initially prepared in the English language that was subsequently got translated into the Arabic & the Urdu languages. These translated versions were closely scrutinized for their close conformity to their English version and the purpose of the study.

The final interview schedule comprised of a mix of standard close-ended questions that tapped the pilgrims' socio-demographic status, and the open-ended questions that tapped their exposure and attention to the billboards and information recall in addition to tapping their perceptions of and attitudes about the electronic billboards. The questions also focused on issues of location and size of the billboards, substance of the content, and its display and presentation. Some of the questions also tapped the context within which exposure to the billboards happened. The recall items in this year questionnaire included both the unaided and the aided recall items. The aided recall was measured as per Bigsby & Monahan (2013) operationalization of that construct. According to them, the aided recall involves describing specific part of a message to the respondent; e.g., saying a word to the respondent and then asking him to describe the message pertaining to that key word. As such in the present study, the aided recall comprised a battery of five key phrases picked from over 25 messages displayed on the main non-scrolling digital billboard and the respondents were asked to describe the messages

pertaining to those key words. This yielded a ratio level measurement with scores ranging from 0 (No message correctly described to 5 (all 5 key words correctly linked to description of five messages. The unaided recall was measured as per our previous study (Gazzaz, Khan & Iqbal, 2014). As such, operationally, the unaided recall comprised asking a respondent to describe any message seen on the digital screen under study.

3.2: Sample and Data Collection

Data were collected by four trained interviewers. Prior to data collection, the interviewers were trained. Two detailed and extended training sessions were held with four post-graduate and doctoral students, who also had had considerable prior experience of interviewing the pilgrims for the purpose of field surveys. The points that were emphasized and discussed in the training sessions pertained to the purpose of study, the techniques of interviewing, meaning and purpose of each of the questions in the interview schedule, instructions for the interviewers, and how to correctly record the answers. Each interviewer was asked to conduct five interviews as a practice run. Further training happened through joint debriefing session through video conference.

Two hundred interviews were completed by these interviewers in two languages from a non-probability convenience sample of the pilgrims, who frequented the area opposite the Kind Fahd and the Al-Salam Gates of the Mosque. The data was collected in different time periods of the day.

Since a secondary purpose of this year's data gathering was also to pretest a few question items for the Hajj season's study pertaining to communication ecology of the Egyptian pilgrims, 75 percent of the respondents were Arabic speaking. And close to 65 percent of the Arabic speaking respondents belonged to Egypt.

3.3: Coding and Data Cleaning

After the data were collected in the month of Ramadan, the coding of the responses commenced. While coding the close-ended questions was pretty simple, responses to open-ended questions have been quite time-consuming. Two coders developed a detailed listing of the responses to each of the open-ended questions that helped us develop a detailed coding scheme for the responses to open-ended questions. Some open-ended questions that entailed multiple responses were coded through multiple-response method while some others through multiple dichotomy method of coding. After the coding of the open-ended items, the data were input into SPSS data files. Univariate frequency runs on the collected data were carried out and a complete codebook was created. The codebook was analyzed for stray coding and missing data to clean up the data for analysis.

4: Data Analysis and Results

4.1: Statistical Procedures Chosen

To meet the study's objectives, the collected data were analyzed through descriptive statistical analysis comprising univariate and bivariate frequency distribution, conditional contingency tables, and zero-order and partial correlations. Because of the non-probability nature of the sample, interval estimation and significance testing were not considered.

4.2: Use of the Screen & the Context of Exposure

A number of billboard-use variables were looked at. Table 1 summarizes the findings on the pilgrims' exposure to the digital billboard and their exposure context. Operationally, the pilgrims' use of the billboards meant frequency of exposure to the digital signage in the specified area. 67.6% sometime or often look at the screen while in the study area. The rest (32.4%) either mostly never look at the screen or chose not to respond to the question When asked on a 3-point scale, ranging from 1 (never) to 3 (often), how often did they use the billboards when faced with a problem, 33.3% of the pilgrims reported actually using the screen in problem situation sometime or often, whereas 66.7% never use it in problem situations. Only about 5% of the pilgrims ranked billboards in top two sources of help in problem situations. The rest relied most on other sources of information and help like family, friends, mualams, and the tour operators and others.

Two exposure-related contextual variables in Table 1 respectively are: the context (whether alone or in the company of others while in the area), and the subsequent interpersonal interaction about the content of the message. These variables were included because, according to the literature reviewed above, these could potentially influence message recall. Over 35% of the respondents said they were usually alone in the area and a little over 64% said they were usually in the company of friends and others. A little over 54% of the respondent never talked with others about the messages seen on the screen, the rest (close to 46%) talked, at least, sometime about the billboard messages with others.

4.3: Pilgrims' Perceptions about the Digital Signage

The pilgrims' perceptions about the electronic billboards were indexed essentially by three items in the instrument: a closed-ended item, and a set of two open-ended questions. The close-ended question measured the degree of perceived usefulness or utility of the billboards to the respondents. On a 3-point scale, ranging from not at all helpful to very helpful, the respondents were asked about

how much helpful did they think the billboard were to them. About 31% of the sample did not respond. The pilgrims' perceptions are shown in Table 2. Of those who responded, about 6% perceived the billboards as not at all helpful to them. Over 94% perceived the screen as helpful.

The open-ended set tried to tap the pilgrims' perceptions about the structural characteristics of the billboards. The first question asked if they could indicate places where the EBBs were needed most. About 62% of the sample (109 of 176 cases) responded to the question by indicating at least one location. Out of 127 valid responses from 111 cases, three places stood out distinct in the analysis; *viz*, in the area around the Prophet's (PBUH) Mosque (19.3% of cases), on streets to the Mosque (19.3% of cases), and near the Mosque's gates. These areas may be ordered on a continuum of most general (around the Mosque) to most specific (on the gates of the Mosque).

The second open-ended question asked them to indicate changes to the present screen that would increase it utility to them as an information resource. Close to 57% (100 of 176) responded to this question proposing at least one change, and 43% of the cases (76 of 176) did not answer the question. A total of 132 responses from 100 cases were coded by two coders into eleven broad categories with an inter-coder agreement of over 97 percent (disagreement in a few items were resolved through discussions). Five categories of responses stood out. These pertained in descending order to: Bigger screens are needed (31% of cases), no change needed to the present screen (30% of cases), and tied categories of increase the number of screens and include messages in other languages apiece with 24% of cases, increase the practical utility (pilgrims' problem-oriented) of information (14% of cases).

4.4: The Pilgrims' Message Recall

The unaided and the aided recall were examined. Tables 3 & 4 respectively report the frequencies of the categories of recall for each of the two recall-types. For the unaided recall, the pilgrims were asked in an open-ended query to recall whatever messages they had seen on the screen. The answers were coded into a 3-point scale ranging from recalled no message to recalled part of a message to recalled one complete message. The aided recall was a ratio level measure where the pilgrims were asked to recall a message from a key word from the screen's messages. In all 5 key words for five messages (a word a message apiece) were given. The score thus could range from 0 (recalled no message) to 5 (recalled all five messages).

Little over 58 percent of the cases (102 out 176) did not respond to the question. Of those who responded (74 cases in all) to the question, 32.4% did not recall

anything. Fifty-percent recalled part or some of the message and 17.6% recalled at least one complete message.

In terms of the aided recall, Table 4, 45.0% of 140 cases who responded could not recall a single message. 30.7% recalled one message and 20.0% recalled two messages and three messages. Little over 4% correctly recalled than three or messages. Average recall score on a scale of 0-5 was .88, with a median of 1.

When asked about reasons for non-recall, 71.6% of 176 cases did not respond or did not know the reason. Of those who responded 76% said that they did not either see the message or did not pay enough attention. Twelve percent apiece cited language barrier and the fast changing screen.

4.5: How Recall Relates to Exposure

Unaided Recall was first examined in bivariate distribution across categories of exposure (cf. Table 5) and then, by way of simple elaboration analysis, bivariate relationship between billboard exposure and recall was examined across categories of the variable "pilgrim groups" (Table 6).[1] These tables together suggest that there may be an over-all weak relationship between frequency of exposure and recall. For example, in zero-order table (Table 4) the Goodman Kruskal's tau is .19 indicating a weak relationship. But when we elaborate the relationship further by controlling for the effect of pilgrim group we find in the conditional table (Table 6) that the relationship between exposure frequency and unaided recall may be weak among the Urdu- speaking group (Goodman Kruskal's tau of .19 for that group) but moderate for the Arabic speaking group (cf. Goodman Kruskal's tau of .26 for the Arabic speaking group in Table 6).

Table 7 gives a bigger picture of the relationship between the two criterion variables of recall (the interval level 3-point unaided recall scale and the ratio level 6-point aided recall ranging from zero message recalled to 5-messages recalled correctly) and exposure frequency (3-point ordinal scale) and several other predictors. The other antecedents of recall in the table that are found in the literature are argued to predict, mediate or moderate the effects of exposure on recall are: age in years, educational level completed (6-point interval scale), pilgrim groups (a dichotomy), frequency of interaction about the message (a 3-point ordinal scale), perceived usefulness of screen (a 4-point ordinal measure), area frequenting status (a dichotomy of being alone or in company), and screen usage in problem situation (a dichotomy of usage). The frequency of exposure and

[1] The ordinal variables of frequency of exposure and extent of unaided recall were each recoded into dichotomous variables respectively comprising no exposure and some exposure, and no recall and some recall categories for the purpose of crosstabs. The pilgrims were divided into two groups on the basis of language. The pilgrims from the subcontinent speaking Urdu comprised the Urdu speaking group, and the pilgrims from the Arab countries in the Arabic speaking group.

the screen usage are two different types of exposure variables. While the former taps a general or incidental attention to the screen, the latter variable implies a more involved perhaps motivated exposure and attention to the screen.

A number of weak to moderately strong relationships seem to show up in Table 7. At the zero-order level the unaided recall seem to be predicted by frequency of exposure (r=.19), by education (r=.29), by interaction about the message (r=.34), by perceived usefulness of the screens (r=.31), and by screen usage in problem situations (r=.32). The aided recall on the other hand seem to be predictable at the zero-order level by exposure (r=.30), by interaction about the message (r=.22), by perceived usefulness of the screen (r=.34), and by screen usage in problem situations (r=.27). The entries in the table are zero-order product moment Pearson correlation coefficients. That means nothing is partialled out of the bivariate relationships. Although in small samples these might not be very reliable but with bigger-sized samples (size greater than 100), these may be taken as a good and somewhat more reliable direction pointers.

Apart from these just noted nine predictor-criterion relationships, several moderately strong zero-order inter-predictor relationships are also evident in Table 7. For example, as compared to non-Arabs, the Arabs (mostly Egyptians) are likely to be in the company of others while in the area of the screen (cf. frequenting status & pilgrim group, r= -.24), and they are more likely to talk about the screen message with others (r= -.31), and they are more likely to use digital signage in problem situations than the non-Arabic speaking group (r= -.42).

Additionally, the more the people use the digital screens in problem situations the more they chat about the message with others (r=.68) and the more they perceive the screens as a useful resource in problem situations (r=.33). Similarly, the more highly educated the pilgrims the more they perceive the digital screens as a helpful resource in problem situations (r=.32). Now the question is what these zero-order correlations between pairs of predictors tell us. Since some of these predictors also relate highly with aided and unaided recall like the screen uses, exposure, perceived usefulness of the screens, and interaction about the screen's messages, the chances are that the exposure-recall relationships might be due to other relationships. Hence there is a need to go beyond the zero-order relationships to determine spuriousness. Hence we looked at partial correlation as well.

Table 7 also provides 7^{th} order partial correlation of frequency of exposure with the unaided and the aided recall. The control variables were: age, education, pilgrim group, interaction with others about the message, perceived helpfulness/usefulness of the message, individual status while frequenting the screen area, and screen usage in problem situations. As the note to Table 7 shows, the attenuation to original zero order correlation coefficient was minimal in the case of the unaided recall (.19 vs. .18). This implies that the weak relationship may

have survived the test in the sample. The aided recall upon the 7th order control improved from the original zero-order r=.30 to the 7th order partial r of .36. This implies that probably a moderately strong relationship between exposure and aided recall does obtain in the sample.

Usage of screens in problem situation, the other exposure variable, that appears strongly related with the unaided recall (r=.32) and the aided recall (r=.27) was further examined through partial correlation procedures. The 7th order partial figures shown at the foot of Table 7 indicate considerable attenuation in the original zero-order coefficients. For the unaided recall the reduction was from an r of .32 to an r of .04 and for the aided recall the coefficient reduced to .13 from .27.This probably implies that the original relationship in the sample is either spurious (explainable by a control variable) or, depending on the nature of the variables is indirect. That is, it is being explained or mediated by one or another of the control variables in the study. Now controlling for the effects of all of the above test variables in a single block does not provide us with the opportunity to understand the effect of each variable and thus elaborate the relationship between the screen usage in problem situations and recall. Moreover, since our belief is that screen usage in problem situation is likely to be a motivated and an involved activity hence understanding the mechanics of its relationship with the two types of recall may give us insight into the effectiveness of the digital screens as a PSA tool. Hence, it was decided to partial out the control variables in ordered steps entering variables one at a time to a cumulative control.

Tables 8 & 9 provide the zero order and the first to the 7th order partial coefficients for the relationship of the screen usage with the unaided and the aided recall variables respectively. In Table 8, we see a significant drop in the size of partial coefficient at the 5th order partial. The drop is from a moderately strong relationship (r =.28) to a virtual no relationship (r =.10). The variable entered at the 5th order is interaction (frequency of talking about the screen messages with others). Since theoretically screen usage is likely to precede interaction in time order, we can safely conclude that the relationship/effect of screen usage on unaided recall is not direct but through the interaction about the screen message. Hence the interaction may be said to mediate the relationship of the screen usage on unaided recall.

Table 9 elaborates the relationship of the screen usage with the aided recall. Two points are noteworthy in this table. Firstly, we notice a suppressor role for the variable pilgrim group in the screen usage-recall relationship. When the effect of the pilgrim group is controlled for, the size of the 4th order partial coefficient improves (from r =.24 for the previous step to r =.34 at the 5th order). The suppressor role is understandable because we know from Table 7 that the variable pilgrim group has a negative relationship (r = -.42) with the screen usage and a

weak but a positive relationship with aided recall (r =.11, DF = 140) in the sample. Hence, when this undermining effect is controlled for the positive relationship between the screen usage and the aided recall gets a boost. Secondly, we notice that the relationship seems to be disappearing at the 6th order partial (r =.13, *DF* = 95). The control variable at the 6th order partial is the extent of perceived usefulness of the digital screen. Since perceived usefulness of the screen might not logically precede screen usage, one may argue that the effect of the screen usage on aided recall might in part be through perceived usefulness of the digital screen. That is, the screen usage in problem situation leads to perceived usefulness of the digital screens in problems that in turn leads to improved scores on aided recall.

Figure 1

Screen Usage and Unaided Recall

Indirect Relationship

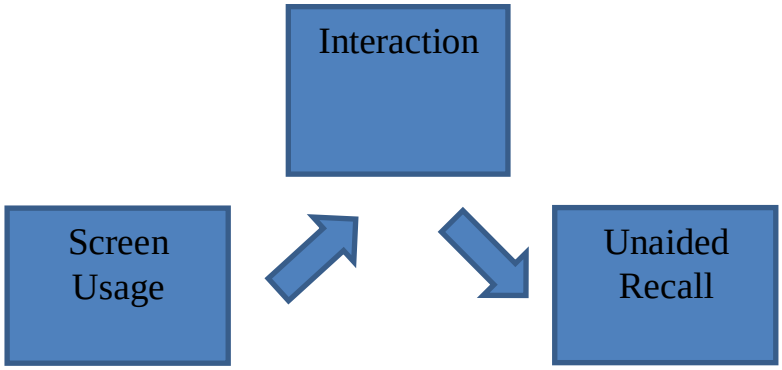
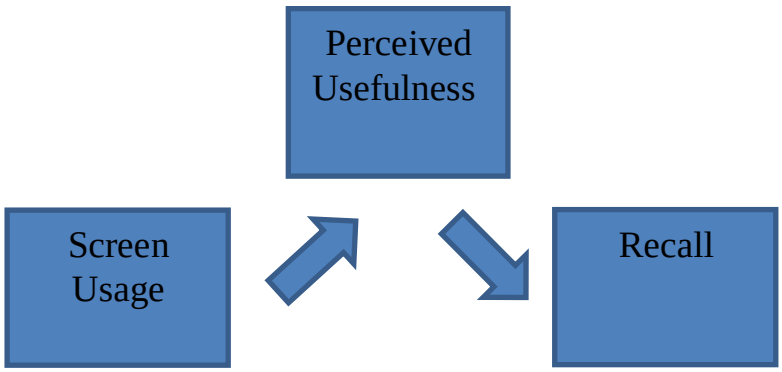


Figure 2

Screen Usage and Aided Recall

Indirect Relationship



4.6: The Scrolling & the Digital Boards: Juxtaposing the Results

Tables 1, 2, & 3 contain figures from the present study on digital signage as well as the previous study on LED-scrolling billboards. Black figures in parentheses in the two tables are the findings from the previous study on the scrolling billboards. Although both the populations comprised the Ramadan Omrah pilgrims, yet the figures represent two *different* non-probability samples of pilgrims and may not be directly comparable. Nevertheless, these figures do highlight some interesting points of comparisons. The LED-scrolling boards seem more noticeable, and a higher percentage of respondents say they use them sometime/often yet a higher percentage do not talk about the messages carried by the EBBs. Perhaps these screens do not deeply engage the attention of the respondents, who seem to be missing out on the substance of the messages. That is why perhaps fewer people perceive the scrolling boards as helpful (cf. Table 2). The language barrier is not cited as acutely in the present digital signage study as in the previous one of the 1433 (H).

The just-noted points are further borne out from Table 3 on unaided recall of messages. As compared to the present study almost 100% more respondents fail to recall anything from the scrolling screen (32.4% vs. 63.7%); fewer people recalling some message from the screen and even far fewer recall one complete sentence/message. Aided recall was not examined in the scrolling billboards study.

5: Conclusion

5.1: Summary of the Main Findings

The main objective of the study has been to find out about the pilgrims' use and perceptions of the digital signage on the street opposite to the King Fahd Gate of the Prophet's (PBUH) Mosque, to correlate their exposure and use to recall of the digital signage, and to highlight factors that can help improve its effectiveness. The data analyzed in the previous section leads us to the following composite conclusion:

- Although the main digital signage is highly visible in the area, barely one-third of the sample uses it in problem situations. Despite being perceived as useful in problem situations by almost the entire sample, the digital signage hardly gets cited as one of the top two sources of help. Half of the sample does not talk about the messages with others, which impacts negatively on message recall and the utility of the signage.

- Messages were poorly recalled with little over half of the sample could not correctly recall messages with tips. In the sample, exposure and screen usage seem to have a weak to moderately strong relationship with recall.

- As for the dynamics of the effect of screen usage, the process in the sample seems to be thus: the screen usage influences discussions and perception about the messages and these in turn produce message recall. If the screen usage does not produce interaction or positive perceptions about the message, the message recall might not instance.

- Upon juxtaposing the digital signage data with the LED-scrolling board data from the previous study, we may conclude that although the scrolling boards tend to be more noticeable, the digital signage more deeply engages the attention, leads to greater interaction with others about the messages, and more positive perceptions about the usefulness of the screens and better recall.

- Nevertheless, the factors highlighted in the sample that might improve the effectiveness of the digital signage are: increasing the size and the number of the screens, putting up screens near the major gates of the Prophet's (PBUH), and increasing the practical utility and linguistic variety of the messages.

- In terms of two factors of effectiveness of the digital signage: its capacity to engage the pilgrims' attention, and its capacity to produce awareness and learning, the main conclusion derivable from the above analysis of the data is that despite *its potential for great utility and effectiveness for the pilgrims the digital signage under study is not that much effective.*

6: Recommendations

Based on the study's data and the just mentioned conclusion, the following recommendations, pertaining to the structural and substantive characteristics of the digital signage, are proffered to increase their utility as a public service announcement (PSA) tool that:

- Somewhat bigger digital screens should be installed on the major gates of the Prophet's (PBUH) Mosques.
- The displayed message should be simple preferably limited to one short sentence.
- Where possible illustrations should also be used.
- The text should be cast in bigger type-size.
- The screen should change not sooner than after every 15 seconds.
- The text should be cast in the Urdu, the Turkish, and the Persian, the Malay, the Bengali, and the French languages besides the present Arabic and the English languages.
- The message content should be such that the pilgrims should perceive them as helpful and it should have practical relevance for the pilgrims so that they feel like talking to others about it.
- Big-sized scrolling screens carrying very short messages and scrolling very slowly should be installed near the digital screens to supplement the digital screens as the scrolling screens seem to have the capacity to capture attention better.

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Table 1

Pilgrims' use of the billboards & the context of exposure

Pilgrims who …	Percent	N
Looking at the screen sometime/often while in the area	67.6 (77.8)	176 (122)
Use the screens sometime/often in difficulty	33.3 (43.6)	164 (170)
Cited billboards as one of top two sources	4.8 (11.4)**	124 (175)
Are usually alone while frequenting the area	35.5 (30.3)	169 (175)
Never talk about the EBBs messages with others	54.2 (67.5)	118 (154)

*Figures within parentheses pertain to billboard study of Masjid al-Haram Shareef.
**These pertain to top three sources hence not comparable.

Table 2

Pilgrims' perceptions about the effectiveness of EBBs

Frequency Distribution of the Pilgrims' Perceptions	Percent	N
Perceived the screens as helpful	94.6 (70.3)	111 (121)
Proposed at least one new location	67.6 (54.0)	176 (175)
On Streets to Al-Haram	19.3 (23.5)	127 (129)
Near the Haram Gates	67.0 (20.2)	127 (129)
At least one structural change to the EBBs	56.8 (62.0)	100 (175)
Changes in: location, size, number, format (a maximum of two responses)	64.0 (49.0)	100 (143)
Increase number of screens	24.0 (23.0)	100 (143)
Increase the size	31.0 (20.0)	100 (143)
Change the presentation format	5.0 (4.0)	100 (143)
Increase the practical relevance of the content	13.0 (8.4)	100 (143)
Increase the religious content	1.0 (3.0)	100 (143)
Include other languages	24.0 (37.8)	100 (143)

Table 3

Unaided Recall of the Messages

Pilgrims who recalled	Percent	N
Nothing from the screens	32.4 (63.7)	74 (113)
Some message from the screen	50.0 (30.1)	74 (113)
One complete sentence from the screen	17.6 (6.2)	74 (113)

Note: Figures in the parentheses belong to the previous scrolling boards study

Table 4

Aided Recall of the Messages

Pilgrims who correctly recalled	Percent	N
Nothing	45.0	140
One message	30.7	140
Two messages	20.0	140
Three to five messages	4.3	140

Table 5

Unaided Message Recall by Exposure to the Screens

		Exposure	
		No Exposure %	**Some Exposure %**
Recall	No Recall	100.0	25.8
	Some Recall	0.0	74.2
	N	100.0(6)	100.0(66)

Goodman-Kruskal's tau= .19

Table 6

Unaided Message Recall by Exposure by Groups

	Pilgrim Groups			
	Urdu-Speaking		**Arab Pilgrims**	
		Exposure		
	No Exp. **%**	Some/frequent Exp. **%**	No Exp. **%**	Some/frequent Exp. **%**
Recall				
No Recall	100.0	33.3	100.0	22.2
Some Recall	0.0	66.7	0.0	77.8
Total (N)	100.0 (1)	100.0 (21)	100.0 (5)	100.0 (45)
Goodman-Kruskal's Tau:	(.19)		(.26)	

Table 7*

Zero-order Correlations between Predictor & Criterion Variables

Variables ► ▼	1	2	3	4	5	6	7	8	9	10
1. Exposure Frequency	1 144									
2. Unaided Recall	.19 (67)	1 69								
3. Aided Recall	.30 (131)	.43 (67)	1 140							
4. Age	-.03 (144)	-.15 (69)	-.14 (140)	1 176						
5. Educ.	.02 (144)	.29 (69)	-.14 (140)	-.19 (176)	1 176					
6. Pilgrim Groups	-.13 (144)	-.14 (69)	.11 (140)	-.10 (176)	-.06 (176)	1 176				
7. Interaction	.12 (117)	.34 (61)	.22 (111)	-.08 (118)	-.07 (118)	-.31 (118)	1 118			
8. Usefulness	-.06 (111)	.31 (58)	.34 (105)	-.02 (111)	.32 (111)	-.17 (111)	.15 (104)	1 111		
9. Frequenting Status	.12 (144)	.03 (69)	-.05 (139)	.15 (169)	-.03 (169)	-.24 (169)	.10 (118)	-.01 (111)	1 169	
10. Screen Usage in Problems	.15 (133)	.32 (65)	.27 (132)	-.07 (164)	.03 (164)	-.42 (164)	.68 (112)	.33 (103)	.05 (157)	1 164
Mean	2.16	1.87	.88	43.21	2.70	1.28	1.54	2.17	1.64	1.34
Sd.	.75	.68	1.03	11.27	1.25	.45	.65	.50	.48	.47

The 7th order partial correlation between Exp. - frequency and the unaided and the aided Recall respectively were (.18) & (.36) after the effects of Age, Educ., Pilgrim Group, Interaction, Usefulness, frequenting status, & Screen usage in difficulty were partialled out.

The 7th order partial coefficient between screen usage in problems and the un-aided and the aided recall respectively were (.04) & (.13) after the effects of Age, Educ., Pilgrim Group, Interaction, Usefulness, frequenting status, & frequency of exposure were partialled out

****Figures in parenthesis are pairwise Ns.**

Table 8

Correlation Coefficients of Unaided Recall with Screen Usage*

	Zero 0rder	1st Order	2nd Order	3r Order	4th Order	5t Order	6th Order	7th Order
Screen Usage	.32	.31	.30	.30	.28	.10	.04	.04
	(63)	(62)	(61)	(60)	(59)	(54)	(50)	(49)

*Figures in parentheses are degrees of freedoms of Pearson's r. The partial coefficients control for exposure, age, education, pilgrim group, interaction, perceived usefulness, and frequenting status respectively in that order.

Table 9

Correlation Coefficients of Aided Recall with Screen Usage

	Zero 0rder	1st Order	2nd Order	3r Order	4th Order	5t Order	6th Order	7th Order
Screen Usage	.27	.24	.24	.24	.34	.22	.13	.13
	(130)	(128)	(127)	(126)	(125)	(104)	(95)	(94)

*Figures in parentheses are degrees of freedoms of Pearson's r. The partial coefficients control for exposure, age, education, pilgrim group, interaction, perceived usefulness, and frequenting status respectively in that order.

Appendix

جامعة ام القرى معهد خادم الحرمين الشريفين لابحاث الحج والعمرة	دراسة قياس استخدام وتلقى المعتمرين للتوعية من خلال الشاشات الاليكترونية فى المنطقة المركزية بالمدينة المنورة كمصدر معلومات

CASE NUMBER: …… (AREA……..)_	☐☐☐
NUMBER OF THE INTERVIEWER:	☐☐
DATE OF THE INTERVIEW: (……) .2013	☐☐

01	Your nationality?	(……)	☐☐☐
02	How old are you?	(……) years old	☐☐☐
03	Marital status:	1. Married 2. Single	☐
04	Any of your family members with you?	1. Yes 2. No	☐
05	Are you performing Omrah as a group?	1. Yes 2. No	☐
06	Did you perform Omrah during Ramadan before?	1. Yes 2. No	☐
07	Education:**(Circle the number for the response)**	**1-** Did not go to school **2-** Matric or less **3-** Higher Secondary. **4-** Bachelor **5-** Master or above **6-** Others	☐

08	Did you personally or people around you face any situations during your stay in the Kingdom for Omrah that bothered you or created difficulties or complications for you personally or people around? Pl. name as many problems as you can recall.. **(Interviewer, list all the problems in the space provided)**	
	…… …… …… ……	☐☐ ☐☐ ☐☐ ☐☐

09	Of these, which ones would you say are the two most important problems that need immediate attention of the authorities **(Interviewer record in the space provided in the order indicated by the respondent):**	
	I-…… II-……	☐☐ ☐☐

10	Thinking about all of the ways of communicating for information and help in **problem situations**, pl. name two most important sources that you turned to for information and help in case of a problem. **(Interviewer list the names of the sources in the order indicated in the space provided).**	
	I-…… II-……	☐☐ ☐☐

11	Following are the communication sources that the pilgrims use to communicate (get or give information or help) about any problem they encounter in the Kingdom during their Hajj/Omrah sojourn. Tell us how often do you use each of the following for information.. . Would you say you use each of these never, sometime or often to communicate about the problems? **(Read out the items to the respondent and circle the number of the response.)**					
	Use the Saudi mass media system like newspaper, TV, and radio etc.	1- Never	2- Sometime	3- Often	9- DK	☐
	Use the Digital screens & signboards	1- Never	2- Sometime	3- Often	9- DK	☐
	Talk to tour operator/private agent	1- Never	2- Sometime	3- Often	9- DK	☐
	Go to information counters in the area	1- Never	2- Sometime	3- Often	9- DK	☐
	Talk to friends, family, co-pilgrims	1- Never	2- Sometime	3- Often	9- DK	☐
	Talk to govt. officials/agencies	1- Never	2- Sometime	3- Often	9- DK	☐
	Any other source. (Pl. specify)	1- Never	2- Sometime	3- Often	9- DK	☐

12	There are Dars sessions in the Prophet (PBUH) Mosque. How often do you attend these Dars sessions ?					
	1- Never	2- Sometime	3- Often	4- Very often	9- DK	☐

13	If you do not attend, why do you not attend these Dars? ..... ----------	☐☐ ☐☐

14	Are there any Dars sessions in the Prophet (PBUH) Mosque in your own language? 1. Yes 2. No 9. DK	☐
15	How often do you pass by or remain in this particular area? 1. Never 2. Sometime 3. Often 4. Very Often 9. DK	☐
16	Have you seen digital screen/billboard in this area? 1. Yes 2. No 9. DK	☐
17	When you are in this area or pass through it, you are: 1. Usually alone 2. Usually with others. 9. DK	☐
18	When you are in this area, how often do you look at the screens and/or the messages? 1. Never 2. Sometime 3. Often 4. Very Often 9. DK	☐
19	When you look at the TV/LED screen messages roughly for how long do you look at them (Interviewer press for response in seconds or minutes): Minute ---------- Seconds ----------	☐☐☐☐
20	How often do you talk about the messages on the screen with others?	

	1. Never 2. Sometime 3 Often 4. Very Often 9. DK	☐
21	How much helpful these Screens were in providing you with useful information: 1. Not at all helpful 2. Helpful 3. Very helpful 9. DK	☐
22	Can you name places where you think these TV/ digital screens are needed most:	☐☐ ☐☐ ☐☐ ☐☐
23	What changes to these TV screens, if any, do you want made? **(Interviewer explain the changes in terms of location, size, information content, or the manner in which the messages are scrolled/flashed, and record the answer)**	☐☐ ☐☐ ☐☐ ☐☐
24	Can you recall any message from the LED/ digital screen in full or in part?	☐☐ ☐☐ ☐☐ ☐☐
25	I say a word or a phrase from the Screen's messages Can you recall anything about the messages? **1- Water** ..... **2- Children** ..... **3- Pathways in the Haram area**..... **4- Masjid's Gate numbers/names** ..... **5- Carrying your belongings**	☐☐ ☐☐ ☐☐ ☐☐ ☐☐
26	If you cannot recall a message can you guess why you can't? **(Interviewer, help the respondent with the reasons. Tell him it could be due to problems with the screen or that he was not paying attention etc.)**	☐☐ ☐☐

	....	☐☐ ☐☐

27	Cell phones are a useful source of getting or giving help in problem situations. How often do you talk to each of the following for problems through cell-phones? **(Interviewer explain that here talking means getting or giving help not just exchanging pleasantries or hello, hi type of calls.)** You talk through cell phones about problems for information and help:					
	To friends & family within the Kingdom and or co-pilgrims	1. Never	2. Sometime	3. Often	9- DK	☐
	To tour operator/private agent	1. Never	2. Sometime	3. Often	9- DK	☐
	To Saudi govt. officials/agencies	1. Never	2. Sometime	3. Often	9- DK	☐
	To any other source. (Pl. specify).....	1. Never	2. Sometime	3. Often	9- DK	☐
28	SMS messages are sent to cell phone by government carrying useful information and guidance for pilgrims how often do you receive them? 1. Never 2. Sometime 3 Often 4. Very Often 9. DK					☐
29	**How often do you read them?** 1. Never 2. Sometime 3 Often 4. Very Often 9. DK					☐
30	**How helpful are these messages?** 1. Not helpful 2. Helpful 3. Very helpful 9 DK					☐
31	**If you find them unhelpful, why do you say so?**					☐ ☐

32 How much satisfied do you think you are with the behaviors of officials or the quality of services provided. For each of the following tell me if you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied with each of the following agencies or officials. **(Interviewer ask the question, read the responses and circle the relevant numbers)**

Items	Very Dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied	No Answer	
How much satisfied are your with the overall efforts of the Saudi govt. for the pilgrims	1	2	3	4	5	9	☐
Behavior of tour operators or agents	1	2	3	4	5	9	☐
Saudi Immigration services	1	2	3	4	5	9	☐
Law & order agencies	1	2	3	4	5	9	☐