

The Usability of Ceramic Sculpture and Augmented Reality in designing an Indoor PSA (A comparative study among the impressions of Egyptians, Koreans, and Chinese).

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Abstract:

This research deals with an artistic experience that combines fine art and applied art and the application of augmented reality technology. The beginning was by adopting the issue of "Animal Rights and Welfare" to raise awareness and educate the public. Researchers used the ceramic sculpture through a piece of art carved and processed in color specifically to express the content of the awareness message with augmented reality technology to design an "informal" indoor Public Service Advertisement. We can open a communication channel to broadcast multiple awareness messages from local and international bodies and associations through this creative concept. To demonstrate this concept scientifically, the researchers designed a questionnaire to survey and measure the attractiveness of the idea. Creativity and impressions of the recipient, and the extent of acceptance of the experience in artistic, academic, and market circles?

It was directed to the Egyptians, Koreans, and Chinese electronically; researchers applied the study to an exploratory sample of 50 participants from Egypt, South Korea, and China. Researchers tested The Questionnaire by verifying three statistical elements: The Validity, The Reliability, & The Internal Consistency of the Questionnaire.

Researchers applied to the final sample of 74 participants from the nationalities. The researchers used the 5-Likert scale, the statistical package SPSS Ver.22.

From the point of view of the sample members:

The research sample found that viewing the used ceramic sculpture is unnecessary so that the recipient will feel aesthetic pleasure based on the artwork's beauty (Ceramic Sculpture). However, the recipients' Impression of indoor PSA integrated with AR and ceramic sculpture has awareness and acceptance of the idea in the Ad through aesthetic pleasure.

Gender did not impact the recipients' Impression of using AR and ceramic sculpture in indoor PSAs; also, there is an effect of nationalities between the three groups (Egyptians, Koreans, and Chinese) in liking the idea of using AR and Ceramic Sculpture in indoor PSAs.

The researchers also found a statistically significant difference between Egyptian and Korean nationality in favor of the Egyptian. There is no statistically significant difference between Egyptian and Chinese on the Questionnaire.

The research also confirmed no differences between the three groups (student, professional, faculty member) in liking and accepting the idea of using AR and Ceramic Sculpture in indoor PSAs.

Keywords:

Ceramic Sculpture, Islamic metallic Luster, Indoor Advertising, PSA: Public Service Advertisements, AR: Augmented Reality.

الملخص

يتناول هذا البحث تجربة فنية تجمع بين الفن الجميل والفن التطبيقي، وتطبيق تكنولوجيا الواقع المعزز، كانت نقطة البداية من خلال تبني قضية "الرفق بالحيوان" موضوعاً لتوعيه الجمهور وتنقيفه، حيث استخدم فن النحت الخزفي من خلال قطعه فيه تم نحتها ومعالجتها لونها خصيصاً للتعبير عن مضمون رساله التوعية مع تكنولوجيا الواقع المعزز لتصميم اعلان داخلي "غير رسمي" للخدمة العامة حيث يمكننا من خلال هذا المفهوم الإبداعي فتح قناة اتصال لبث رسائل توعية متعددة من الجهات والهيئات المحلية والعالمية للجمهور، وللتدليل علي برهنه هذا المفهوم علميا قام الباحثان بتصميم استبيان لاستقصاء وقياس مدى جاذبية الفكرة الإبداعية والانطباعات لدى المتلقي، ومدى قبول التجربة في الأوساط الفنية والأكاديمية والسوقية؟

حيث تم توجيهه للمصريين والكوريين والصينيين إلكترونياً حيث طبقت الدراسة على عينة استكشافية تكونت من ٥٠ مشاركاً من مصر، وكوريا الجنوبية، والصين. وتم اختبار الاستبانة المستخدم من خلال التحقق من ثلاثة عناصر إحصائية: صحة الاستبانة، مصداقية الاستبانة، والاتساق الداخلي للاستبيان.

ثم تم تطبيقه على العينة النهائية والتي تتكون من ٧٤ مشاركاً من الثلاث جنسيات السابق ذكرها. حيث استخدم الباحثان مقياس ليكرت الخماسي، الحزمة الإحصائية SPSS اصدار ٢٢.

ومن وجهة نظر افراد العينة:

وجد الباحثان أنه ليس من الضروري شعور متلقي الإعلان بالمتعة الجمالية بناءً على جمال العمل الفني (النحت الخزفي) المستخدم في الإعلان الداخلي، ومع ذلك، فإن انطباع متلقي الإعلان الداخلي للخدمة العامة (PSA) والمدمج به تكنولوجيا الواقع المعزز لديه وعي وقبول للفكرة في الإعلان من خلال المتعة الجمالية.

ولم يؤثر متغير الجنس على انطباع المعلن إليهم باستخدام الواقع المعزز والنحت الخزفي في الإعلانات الداخلية للخدمة العامة؛ أيضاً، هناك تأثير للجنسيات بين المجموعات الثلاث (المصرية، الكورية، الصينية) على الإعجاب بفكره استخدام تكنولوجيا الواقع المعزز والنحت الخزفي في الإعلانات الداخلية للخدمة العامة.

كما وجد الباحثان أن هناك فروق ذات دلالة إحصائية بين الجنسية المصرية والكورية لصالح الجنسية المصرية. كما لا توجد فروق ذات دلالة إحصائية بين الجنسية المصرية والصينية في الاستبانة.

كما أكد البحث عدم وجود فروق بين المجموعات الثلاث (الطلاب، والمحترفون، وأعضاء هيئة التدريس) في الإعجاب وقبول فكرة استخدام تكنولوجيا الواقع المعزز والنحت الخزفي في الإعلانات الداخلية للخدمة العامة.

الكلمات المفتاحية

النحت الخزفي، البريق المعدني الإسلامي، الإعلان الداخلي، إعلانات الخدمة العامة، الواقع المعزز.

Introduction:

The dazzling element is one of the elements of attracting attention to the recipient of the visual image. In line with digital arts, we lived in the digital transformation age, with virtual reality and augmented reality technology entering all kinds of visual arts in the modern era. By integrating technology with ceramic sculpture, a hybrid art combines the plastic values of sculpture with the famous materials and techniques in ceramics. The research aims to create

an indoor advertisement that would provide visual enjoyment while delivering community awareness messages. It is to educate the people and raise the level of awareness of the citizen about animal rights and welfare, as it is one of the values of civilized societies.

Previous Studies:

There has been substantial growth in research into the use of augmented reality in marketing and advertising, including a study by (DINH Tien Minh et al., 2020). In their 2019 study, Lee, Heejun, Cho, Chang-Hoan highlight the mixed outcomes of AR's impact on advertising message understanding. (Lee, Heejun; Cho, Chang-Hoan, 2019), other studies have repeatedly found that AR produces better advertising effects, such as higher purchase intentions, preferences, product interest, and attitude toward an ad and a brand when compared to non-AR alternatives like researchers: G. Yaoyuneyong, J. Foster, E. Johnson, and D. Johnson, in 2016, P. Connolly, C. Chambers, E. Eagelson, D. Matthews, and T. Rogers, 2010 & J. Y. Sung and K. S. Cho in 2010 as cited in (Lee, Heejun; Cho, Chang-Hoan, 2019).

Research problem:

1. How can the plastic values of ceramic sculpture and augmented reality technology be combined to create an indoor PSA that reaches social awareness messages in the Animal Rights and Welfare Issues?
2. Can we create a Model of the usability of Ceramic Sculpture and augmented reality in designing an Indoor PSA in different Communities (Egypt, China, Korea) through the research results?

Research objectives:

The research objectives consist of the four main dimensions that are summarized as follows, as shown in Fig. (٠١)

1. **Aesthetic Objective:** Achieving aesthetic value by creating a piece of plastic art (a ceramic sculpture developed by the researcher) and releasing this through a new platform far outside the boundaries of traditional fine art exhibition halls (An Interactive Advertising)
2. **Applied Objective:** Achieving applied value by combining unique fine art (ceramic sculpture) with augmented reality in designing and developing an indoor advertisement characterized by originality and contemporary.
3. **Technological Objective:** Achieving technological value by using augmented reality technology and its functional integration with ceramic sculpture to provide an indoor ad that presents a societal value, namely, the preservation of Animal Rights and Welfare in general.
4. **Social Objective:** Achieving the value of feeling and immersion in urbanization and sophistication by Design an indoor advertisement to PSA: Public Service Advertisements that provide community awareness messages for the issue of Animal Rights and Welfare, This objective is related to the development of awareness and collective conscience among peoples, and it is one of the measures of people's progress, such as the peoples of the civilized world who care about Animal Rights and Welfare, because they transcend humanity in general.

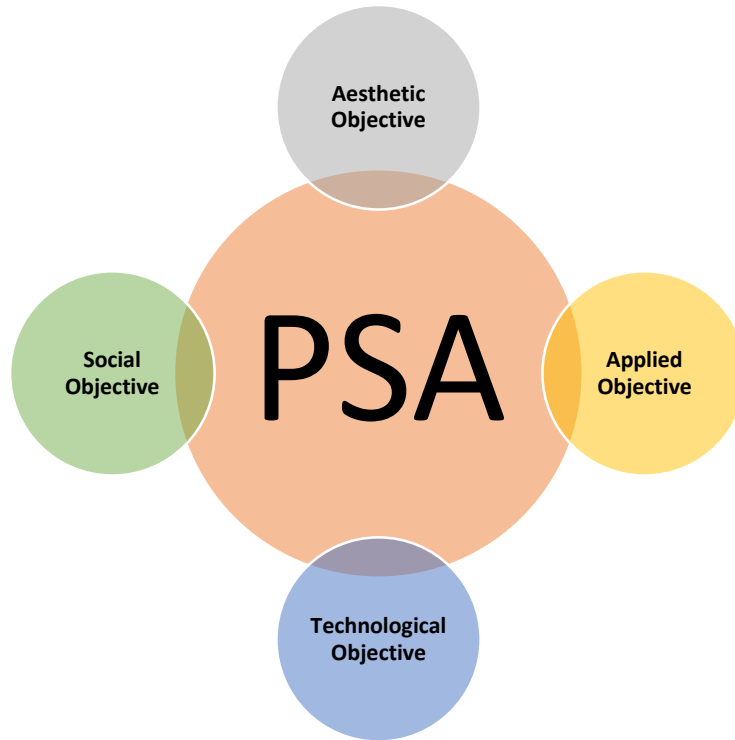


Fig. (٠١): Research Objectives - By Researchers

Research hypotheses:

- 1- **H1:** When viewers of the advertisement look at the used ceramic sculpture, they will experience aesthetic pleasure based on the artwork's beauty.
- 2- **H2:** Viewers of indoor PSA integrated with AR technology and ceramic sculpture have awareness and acceptance of the idea in the Ad through aesthetic pleasure.
- 3- **H3:** Maybe The females like the idea of using AR and Ceramic Sculpture in indoor PSAs more than males.
- 4- **H4:** There is no effect of nationalities/societies between the three groups in liking the idea of using AR and Ceramic Sculpture in indoor PSAs?
- 5- **H5:** There are differences between the three groups (student, professional, faculty member) in liking and accepting the idea of using AR and Ceramic Sculpture in indoor PSAs.

Through the hypothesis mentioned above, the researchers were able to form a perceived model for the study, as shown in the following Fig. (٠2):

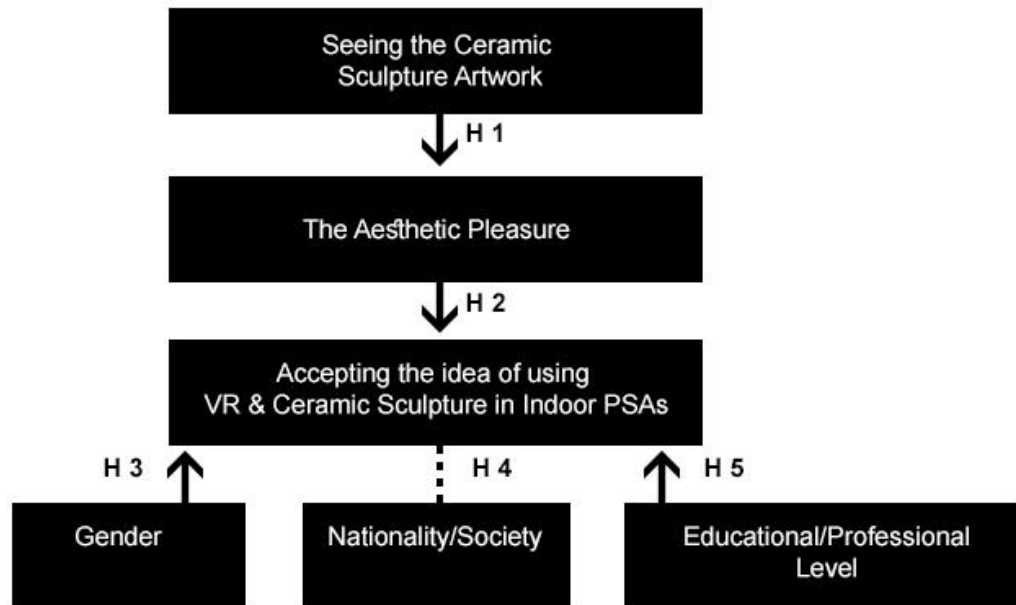


Fig. (٠2): "The Perceived Model of the study" By Researchers

Research Aspects:

First Aspect: The Fine Art & Aesthetic Aspect of the Scientific Project: This section will theoretically discuss the primary meaning and concept of Ceramic sculpture, Earthenware, Islamic metallic Luster & The Reduction Firing Process.

Ceramic sculpture: Ceramics is unusual and sometimes complex to define a genre of sculpture. Often treading the line between craftwork and art, pieces of ceramic work can sometimes split opinions on just how they ought to be regarded. However, whether the thing is an 'art or a craft,' a ceramic is created using non-metal minerals like natural clays or other kinds of earth. This material can sculpt and then fired.

This firing process converts the malleable base material into a tough, strong, corrosion-resistant material, producing long-lasting, sturdy pieces. An enormous variety of materials will make ceramic sculptures- either by themselves or through mixing with other substances.

There are even some entirely synthetic materials, like polymer clays. Counting on the bottom material used and the resulting properties of the thing once fired, it's going to be categorized within the following way: earthenware, terracotta, porcelain, bone China stoneware, and many others. (The Sculpture Park Website, 2022, p. Ceramic Sculptures).

Earthenware: A low-fired form of pottery in which the porous body is waterproof, either partially or totally, through covering glaze, The lower temperature at which it is fired (below 1100oC) lets for a wide range of glaze colors and a particular visual shine and texture. (Bircham Gallery Website, 2022 p. Ceramics); Earthenware clay has basically in mud

porcelain or (Kaolinite) is Clay ordinarily contains 40% Oxide of Aluminum, 46% silica, and 14% water could be by and enormous alluded to as having.

Two sorts of mud are found in nature. They are called essential and auxiliary muds. The necessary dirt is located on the stone from which it had been acquired. It isn't conveyed by running water or ice sheets; it is not blended with another sedimentary structure. The essential earth is substantial, thick, and clean. Auxiliary, or sedimentary dirt, is framed during a lighter silt structure lowered and put away. This second kind of dirt sedimentary synthesis is best and lighter than the essential mud. Various added substances give multiple properties to the soil (M. Anbarasu, N.K. Sathyamoorthy, 2020).

Islamic Metallic Luster: Lustres are metallic surfaces on glazes, commonly used Gold, Silver, Copper, Platinum, and Tin. (Bircham Gallery Website, 2022 p. Ceramics); could even be a metal glass nanocomposite thin layer made up of metal copper or silver nanoparticles embedded during a silica-based glassy matrix—the particles of metal range from two to 50 nm in size. Thus, the complete layer is approximately 100 nm to 1 mm thick. The foremost striking property of the luster surface is its capability to reflect light entirely metal surface and appear quite a gold layer. The luster technique was first applied to glass objects in early Islamic Egypt and later to glazed ceramics, Iraq 9th century AD. (Trinitat Pradell et al., 2008, p. e123).

The Reduction Firing Process: "reducing the amount of oxygen in a kiln," like that the flame/fuel searches to more oxygen and will pull said oxygen out clay bodies. reduction in the treatment of electrons being donated to a metal/element/surface via some set of reactions, then another component in the same group of responses is oxidized (electrons lost). (Ryan Copping, 2020).

Artwork concept: The idea of the sculpture reflects the relationship between humans and animals in its most beautiful form. This relationship is one of affection and mercy, expressed through a little girl hugging a young goat and an innocent smile on the little girl's face.

There is a state of acceptance and stillness of the young goat that reflects his reassurance towards humans; this image is the desired image of the relationship between humankind and animals. Bright colors are used on the surface of the ceramic sculpture to reflect the sense of joy stemming from childhood. To express the warmth of the relationship between the two elements of work, "human and animal," These bright colors are implemented by metal reduction technique inside ceramic fire kilns (Islamic metallic luster). **Fig. (03)**

Artwork Data: Artwork title: "she is friendly," Material: Earthen Wear Clay, Technique: Islamic Luster (Redaction Technique), Dimensions: 25*25*15 CM, Production Date: 2021.



Fig. (٠3): The artwork was made by the researcher as a ceramic sculpting artist.

The two researchers used the following sentences scale of statistical importance for measuring aesthetic pleasure. these sentences are mentioned by J. Blijlevens et al., 2017: (Like to look, Nice to see, pleasing to see, Attractive, Beautiful) (J. Blijlevens et al., 2017, p. 91) and the two researchers translated these five sentences into Chinese, Korean and Arabic. (**Appendix: Questionnaire** – Section 1 - Indicators of Measuring for Aesthetic Pleasure in the Used Artwork:)

Second Aspect: The Applied Art & Usability Function Aspect of the Scientific Project:

The Technical Processes: Sculpture Technique: Hand Built, firing degree: 980 c., Colored Glaze Components: 10 of turquoise stain+ 200 ml of white glaze (To color the child's body), 3 grams of brown stain on 50 grams of transparent glaze (hair coloring), 7 grams of copper carbonate $CuCO_3$ +150 ml transparent glaze (To color the little goat), Metallic Luster Components:7grams of bismuth oxide Bi_2O_3 , 3grams of silver nitrate $AgNO_3$, 150mg clear glaze +600 ml water

• **Justifications for choosing the ceramic sculpture material in the designed advertisement model understudy:**

1. The selected work is made of ceramic materials and not from other materials capable of external presentation, such as bronze, iron, and fiberglass, suitable for external displays.
2. The researchers chose the ceramic for ease of treating its surface in the manner of metallic luster, which can give impressions of joy and pleasure due to the presence of colors.
3. Color inks are difficult to apply to other materials suitable for external shows.

• **Implementation Stages:**

4. Sprayed the girl's body with a mixture of glaze consisting of 10 grams of turquoise dye mixed with 200 milliliters of white glaze.
Then color the hair 3 grams with a brown dye on 50 grams of transparent glaze, leaving the face without any glaze (pottery). **Fig. (04).**
5. Sprayed the body of the young goat with a glaze consisting of 7 grams of copper carbonate $CuCO_3$ added to 150 ml transparent glaze.
After spraying the colored glazes, a diluted glaze water layer with an oxide will reduce bismuth oxide Bi_2O_3 and silver nitrate $AgNO_3$. **Fig. (05).**

6. A reduction process inside the oven at 700 degrees by using white sugar as an organic substance that burns oxygen inside the electric range.

• **Coloring results after reduction:**



Fig. (٠4): 10 of turquoise stain + 200 ml of white glaze

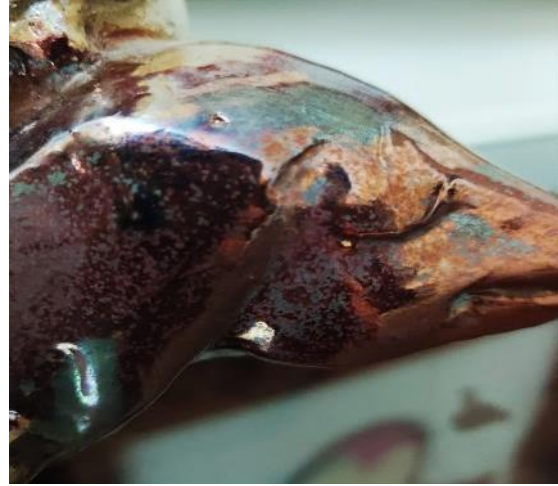


Fig. (٠5): 7 grams of copper carbonate $CuCO_3$ +150 ml transparent glaze

We are in the process of mixing fine arts and applied arts with augmented reality technology to produce an interactive indoor advertisement; in the literature of scientific research, the keywords for this part can be defined as follows: Jack G. Wiechmann described Advertising as the following "The Process of calling the public's attention to the availability of goods, services, or causes" (Wiechmann, Jack G., 1996, p. 4).

• **OOH Formats: Outdoor & Indoor Advertising:** OOH is an abbreviation for "Out of Home" Advertising, As mentioned from (OAAA.org: Out of Home Advertising Association of America).

OAAA.org classified OOH formats fall into four major categories as follows:

1- Billboards: Examples: (Bulletins, Digital Billboards, Posters, Junior Posters, Wall Murals).

2- Street Furniture: Examples (Bus Shelters, Urban Street Furniture, Digital Street Furniture)

3- Transit: Examples (Airport, Digital Airport, Buses, Rail/Subway, Digital Rail/Subway/Transit, Mobile Billboards, Taxis, Digital Taxis/Rideshare, Vehicle Wraps, Vehicle Wraps)

4- Place-Based: Examples (Arenas/Stadiums, Cinema, Digital Place-based, Interior Exterior Printed, shopping malls, Digital Shopping Malls). (Out of Home Advertising Association of America, Inc., 2021)

In General Idea, there are two main kinds of advertisements: Indoor Ads & Outdoor Ads. Indoor advertisements are all displayed inside a building, and This is commensurate with the

nature of ceramic sculpture in the style of metallic luster, which requires internal display and not outdoor display, as mentioned before in the justifications for choosing the execution material.

• **Justifications for choosing the kind of Advertising "Indoor Advertising" as the advertisement model understudy:** According to the Indoor Billboard Advertising Association, 89 percent of respondents "agree" or "strongly agree" that indoor advertising is a good way to see messages, 3 out of 4 respondents considered changing their behavior after viewing, and 84 percent remembered seeing specific ads indoors. (The Indoor Billboard Advertising Association, 2022) Among the previously mentioned statistics is the importance of indoor advertisements and their impact on the intended audience, and since the research issue is an issue concerned with changing societal concepts towards animal welfare, choosing the type of advertisement - indoor advertisement is supposed to be an appropriate choice for the issue covered by the advertisement.

• **PSAs: Public Service Advertisements**

PSAs are frequently used to change public perceptions by increasing awareness about specific concerns or issues. (Damewood, Cassie L., 2022), The general subject of this research is to educate the public on the topic of animal rights and welfare as following clarifications: **Animal Rights and Welfare Indoor PSA Messages:** The researcher, in his capacity as a creative director of the indoor PSA, extracted the advertisement messages to be broadcast in this indoor PSA to the community and translated them into three languages: Arabic, Korean, and Chinese. The researcher extracted messages from information from the (Animal Welfare Foundation) website on the Internet and other sources. (AWF Website, 2017, p. An-Introduction-to-Goat-Keeping.pdf) & (Wikipedia website, p. Goats_as_pets, 2022, about: Nawroth, Christian; Brett, Jemma; McElligott, Alan, 2016, Deamer, Kacey, 2016, Kimberling, D.V.M., Cleon., 2016). **Table (01)** displays these advertising messages (11 Main Messages for 11 different Keyframes) to raise awareness of Animal Rights and Welfare Issues – In This Indoor PSA has a goat as an example for animals.

Graphic Design Steps for designing The Indoor PSA:

The researcher has designed a graphic that consists of three components:

- Ceramic statue photos consisting of a girl and a baby goat.
- Graphic background designed by the researcher to express the natural environment.
- Advertising messages (11 Main Messages for 11 different Keyframes) are referred to in **Table (01)** to educate Ad recipients about animal rights and welfare.

Table (01): Arabic, Chinese & Korean Indoor PSA Messages (11 Main Messages).

Arabic Indoor PSA Messages	Chinese Indoor PSA Messages	Korean Indoor PSA Messages
حقوق الحيوان ورعايته	动物权利和福利	동물의 권리와 복지
يمكن تربية الماعز كحيوانات أليف	山羊可以作为宠物饲养。	염소는 애완 동물로 키울 수 있습니다.
الماعز حيوانات اجتماعية للغاية	山羊是非常社会性的动物。	염소는 매우 사회적인 동물입니다.
الماعز حيوان ودود متفاعل مع الإنسان	山羊是与人类互动的友好动物。	염소는 인간과 상호 작용하는 친근한 동물.
يمكن الاحتفاظ بآثنين من الماعز معًا على الأقل.	两只山羊至少要养在一起。	적어도 두 마리의 염소는 함께 두어야 합니다.
تربية الماعز: تحتاج كل عنزة ٢٠ مترا مربعا أو أكثر.	山羊养殖：每只山羊需要20平方米或更多。	염소 사육: 각 염소는 20제곱미터 이상이 필요합니다.
تعد المنطقة المسيجة بحديقة منزلك مناسبة لتربية الماعز	家庭花园的围栏区域适合饲养山羊。	집 정원의 울타리가 있는 지역은 염소 사육에 적합합니다.
أوقفوا قص ذيل الماعز وعمليات العقم.	停止切割山羊尾巴并停止阉割。	염소꼬리 자르기 중지 및 거세 중지.
يصبح الأطفال الذين يلعبون مع الماعز أقرب إلى الطبيعة والبيئة.	与山羊玩耍的孩子们更接近自然和环境。	염소와 노는 아이들은 자연과 환경에 더 가까워집니다.
تحتاج الماعز إلى تغذية منتظمة ومياه نظيفة ولعق الملح.	山羊需要定期喂食、干净的水和舔盐。	염소는 정기적인 먹이, 깨끗한 물 소금물이 필요합니다.
الماعز حيوانات مشقوفة الظلف يجب فحص أقدامهم وتقليم أظفارها.	山羊是偶蹄动物。他们的脚需要检查和修剪。	염소는 발굽이 갈라진 동물이므로. 발을 확인하고 다듬어야 합니다.

Third Aspect: The Technological Aspect of the Scientific Project

Before starting to review the technology part of the application under study, three terms commonly used in this field will be defined: "VR", "MR," & "AR" To shed more light on the difference between these three technologies.

- **VR:** it is an abbreviation for virtual reality. It is entirely immersive, fooling your senses into believing you are in a different place or world than the real one. You will enter a computer-generated world of graphics and sounds using a head-mounted display (HMD) or headset. (Intel, 2022).
- **MR:** considered an abbreviation for Mixed Reality, interacts with and modifies physical and virtual products and situations utilizing next-generation sensing and imaging technology in MR, which combines the real world with digital aspects. You can view and immerse yourself without ever removing your headset while engaging with a virtual environment with your own hands in the real world. It allows you to have one foot (or hand) in the actual world and the other in an imaginary world, breaking down basic concepts like real and imaginary and providing an experience that could revolutionize the way you play and work today. (Intel, 2022).
- **AR,** considered an abbreviation for Augmented Reality, is a technology that overlays digital information on real-world objects. One of the most well-known instances is Pokémon GO*. The real world remains essential, but augmented reality enriches it with digital elements, stacking new layers of perception and complementing your reality or environment. (Intel, 2022). Designers can utilize augmented reality to add computer-generated input to parts of a user's physical world. Designers provide real-time relation to changes in the user's environment, such as movement, for digital content ranging includes music, video, graphics, GPS overlays, and more. (The Interaction Design Foundation, 2022, p. augmented reality). So, the research falls within the framework of using the latest technology (augmented reality), In applying the above-mentioned scientific definitions, the idea of scientific research depends on applying an indoor ad using ceramic sculpture and augmented reality technology; previously, as a ceramic sculpture artist, the researcher clarified the concept of artwork as a ceramic sculpture.

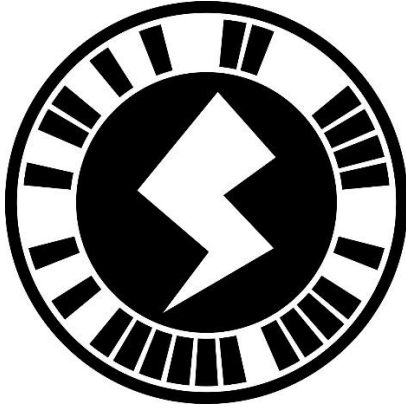
Augmented Reality Implementation Steps for designing The Indoor PSA:

1. Designing Animation Screens (11 Main Key Frames for the 11 different awareness messages for the 11 main scenes in the indoor PSA) Fig. (06) some of the main keyframes, then Making The animation file for the main scenes. (Extension File: .mp4).
2. Using "Zapworks Application" through (<https://zap.works/>) (Trial Version) and Download the ZapCode for this ZapWorks Project (Our Indoor PSA) Fig. (07 A).
3. Make a Photo of the Ceramic Statue as Fig. (08 A) as a trigger.
4. Scanning the AR Project ZapCode Fig. (07 B) through the Zapper Mobile App.
5. Then, Point your mobile camera lens at the statue as Fig. (08 B) through the Zapper Mobile App.

6. Automatically, the augmented reality video will be played without playing the icon as soon as the mobile lens is pointed at the statue through the Zapper Mobile App and you can watch the video Fig. 09 (A & B).



Fig. (06): Some of the keyframes from the 11 main Keyframes Indoor PSA.



(A)



(B)

Fig. (07): A: the ZapCode for this ZapWorks Project (Our Indoor PSA), B: scanning it through the Zapper Mobile App.

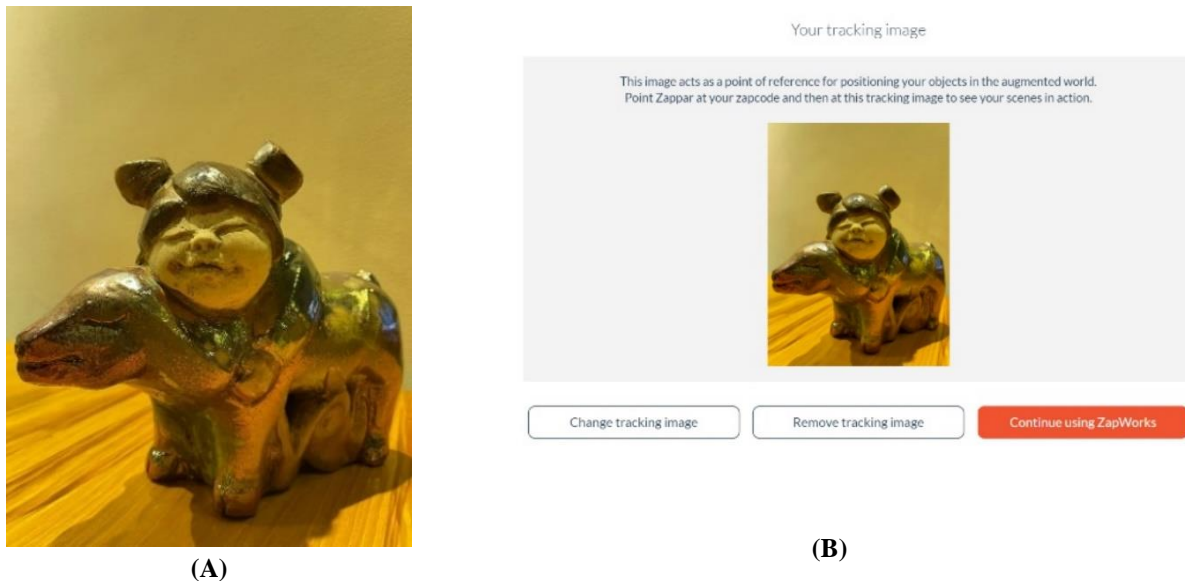


Fig. (08): A: the trigger Photo for this ZapWorks Project (Our Indoor PSA), B: inside the “Zapworks Application” through (<https://zap.works/>) (Trial Version).

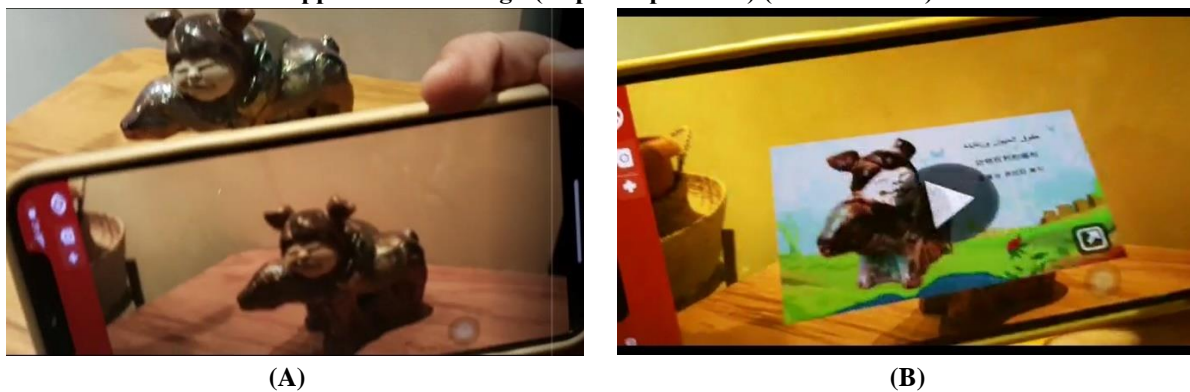


Fig. (09): A: The augmented reality video will be played without playing icon, B: you can replay the Indoor PSA again when you press the “Play Icon” Inside the Zapper Mobile App.

The researchers designed a questionnaire to survey and measure the attractiveness of using Ceramic Sculpture with AR in Indoor PSA to demonstrate the concept scientifically.

The Creativity, impressions of the recipient, and the extent of acceptance of the experience in artistic, academic, and market circles in the three different communities: (the Egyptians, Koreans, and Chinese Communities – As shown in the questionnaire on the Appendix page).

Procedures: Psychometric Properties of the Questionnaire

• The Validity of the Questionnaire:

We applied on an exploratory sample of 50 specialists (N = 50), Calculating validity using EFA: (exploratory factor analysis), Principal Component Method & the Varimax Rotation Method, some factor analysis tests such as the KMO test (Kaiser-Meyer-Olkin); As well as the Bartlett test, the results of those tests: KMO = 0.661, Bartlett's Test = 405.449, df = 105, Sig = 0.000. The value of Bartlett's test is a statistically significant value at the level of significance (0.01), meaning there is a strong correlation between variables.

The Initial Eigenvalues & The Rotation Sums of Squared Loadings appear that There are three Initial Eigenvalues whose value is more significant than one. **Fig. (10)** the graph of the three Initial Eigenvalues value of the three factors resulting from the factorial analysis of the Questionnaire, and **Table (02)** shows the saturation of the questionnaire expressions on three factors before and after the rotation.

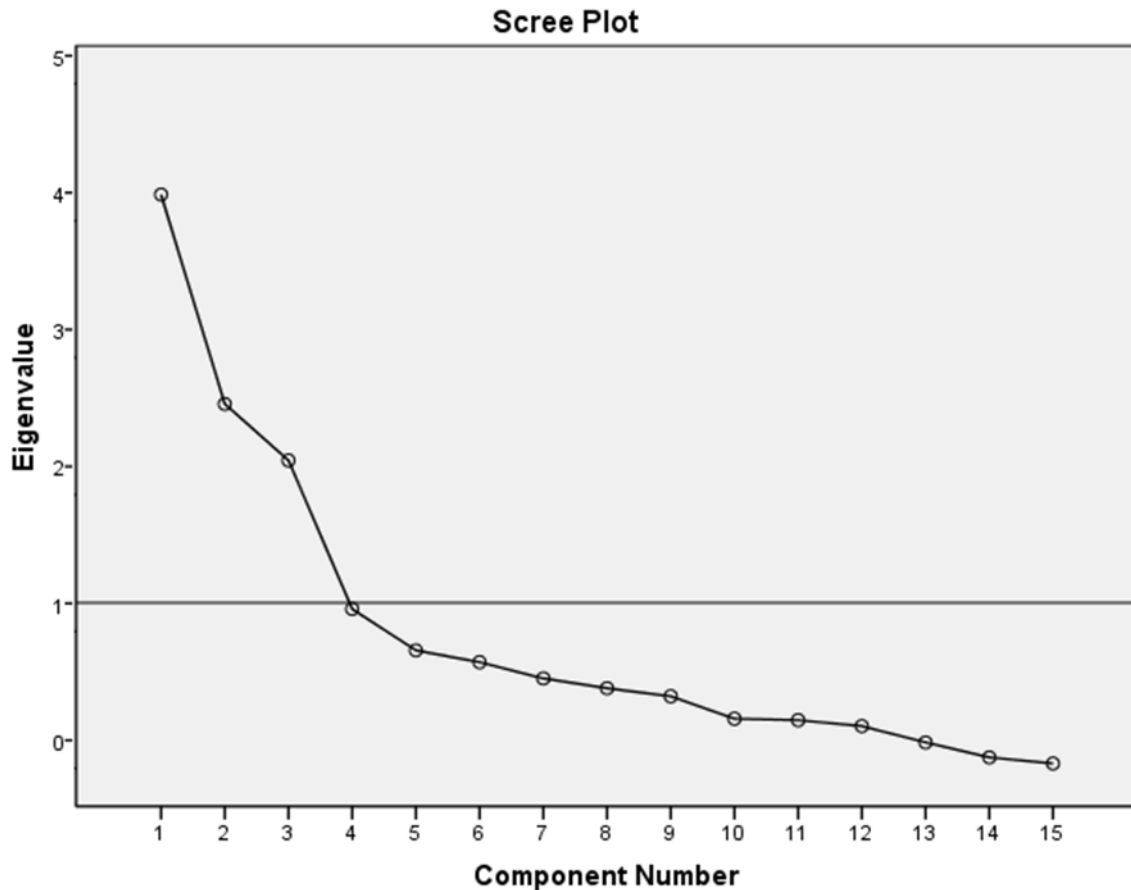


Fig. (10) shows the graph of the three Initial Eigenvalues values for the three factors. They result from the factorial analysis of the Questionnaire.

Table (02): Saturation of the questionnaire expressions before and after rotation on the three resolution factors

Item NO	Questionnaire Sentence	Component Matrix Extraction			Rotated Component Matrix Extraction		
		The first factor	The second factor	The third factor	The first factor	The second factor	The third factor
1	This is a beautiful statue.	٠,٦١١			٠,٧٩٧		
2	This is an attractive statue.	٠,٥١١			٠,٧٠٥		
3	This statue is pleasing to see.	٠,٥٢١			٠,٧١٨		
4	This statue is nice to see.	٠,٥٤٧			٠,٧٢٠		
5	I like to look at this statue.			٠,٥٦١	٠,٧٩٣		

6	Do you think that augmented reality will increase the attention span in Public Service indoor advertising?		٠,٨٠٧			٠,٨١٣	
7	Do you think the use of augmented reality will arouse the interest of Public Service indoor advertising recipients?		٠,٧٤٦			٠,٧٩٣	
8	It is a good idea to use augmented reality in Public Service indoor advertising?		٠,٦٣٠			٠,٧٦٦	
9	Do you think augmented reality in Public Service indoor advertising will deliver the advertising message clearly to serve society well?			٠,٤٣٢		٠,٥٠٢	
10	Do you think augmented reality technology in Public Service indoor advertising will deliver the advertising message creatively to serve society well?		٠,٦١٦			٠,٦٥٦	
11	Do you think that the use of augmented reality with Ceramic Sculpture will it increase the attention span in Public Service Indoor Advertising?	٠,٨٢٩					٠,٩٣٤
12	Do you think the use of augmented reality with Ceramic Sculpture will arouse the interest of Public Service Indoor Advertising recipients?	٠,٦١٣					٠,٦٢٧
13	Do you think the use of augmented reality with Ceramic Sculpture in Public Service Indoor			٠,٤١٨			٠,٥٠٣

	Advertising is a new idea?						
14	It is a good idea to use augmented reality with Ceramic Sculpture in Public Service Indoor Advertising?	٠,٨٦٠					٠,٨٨٦
15	Do you think the idea of using ceramic sculpture with augmented reality in Public Service Indoor Advertising represents originality and modernity?	٠,٧٩٩					٠,٩٣٤

Table (02): shows the factor analysis revealed three factors ranging between (0.502: 0.934); Which indicates the validity of the Questionnaire.

- **The Reliability of the Questionnaire:**

In several ways: Cronbach's Alpha α for the Questionnaire as all was (0.741), And the Split Half values: Pearson's Correlation Coefficient was (0.675), Spearman-Brown Coefficient was (0.806), indicate that the Questionnaire has an appropriate degree of Reliability, can be trusted, and is valid for application.

- **The Internal Consistency of the Questionnaire:**

Table (03): The correlation coefficients by the Items

The First Axis		The Second Axis		The Third Axis	
Item	Correlation coefficient	Item	Correlation coefficient	Item	Correlation coefficient
1	**٠,٨١١	6	**٠,٧٦٥	11	**٠,٩٠٧
2	**٠,٧٢٣	7	**٠,٧٨٠	12	**٠,٧٤٣
3	**٠,٧٢٦	8	**٠,٧٢٦	13	**٠,٥٤٨
4	**٠,٧٣٣	9	**٠,٥٩٤	14	**٠,٨٦٣
5	**٠,٧٩٣	10	**٠,٦٨٥	15	**٠,٩٠٦

(**) Significant at the level (٠,٠١)

Table (03) shows the correlation coefficients between the items of the Questionnaire, and the total score for each dimension separately ranged between (0.548) and (0.906). All of them are statistically significant at the level (0.01).

Table (04): The correlation coefficients by the axes

Axes of the Questionnaire	Correlation Coefficient
The First Axis: Indicators of Measuring for Aesthetic Pleasure in the Used Artwork	**٠,٨٥٦
The Second Axis: Indicators of Measuring impressions about using	**٠,٤٨٣

augmented reality in Public Service Indoor Advertising	
The Third Axis: Indicators of Measuring impressions on using Augmented Reality together with Ceramic Sculpture in Public Service Indoor Advertising	**٠,٥٠٥

(**) Significant at the level (٠,٠١)

Table (04) shows the correlation coefficients total score of the Questionnaire total score for each of its axes ranged between (0.483) and (0.856), all of which are statistically significant at the level (0.01). It is clear from the previous two tables (02) & (03) that the Questionnaire has internal consistency.

Discussion & Results:

• Statistical Data Processing

Applied on a sample of 74 specialists (N=74), the researchers used the 5-Likert scale, the statistical package SPSS Ver.22, through frequencies, percentages, and relative weights from the point of view of the study sample to reach descriptive data, and classified the estimates of the study sample into five levels: Very High Level: (From 4.21 to 5.00), High Level: (From 3.41 to 4.20), Medium Level: (From 2.61 to 3.40), Low Level: (From 1.81 to 2.60), Very Low Level: (1.00 to 1.80).

• The First Axis: Indicators of Measuring for Aesthetic Pleasure in the Used Artwork

Table (05): Frequencies, percentages, averages, and standard deviations for the sample opinions about the first axis of the study, N = 74

No	Frequency	Responses					Mean	Standard Deviation	Order of items	Availability
	Percentage	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree				
١	Freq.	4	17	26	16	11	٣,١٨	١,١١٥	5	Medium
	%	5.4	23.0	٣٥,١	٢١,٦	١٤,٩				
2	Freq.	1	11	23	32	٧	٣,٤٥	٠,٩٠٩	2	High
	%	1.4	14.9	31.1	43.2	٩,٥				
3	Freq.	1	18	24	24	٧	٣,٢٤	٠,٩٧٧	4	Medium
	%	1.4	24.3	32.4	32.4	٩,٥				
4	Freq.	1	10	23	33	7	٣,٤٧	٠,٨٩٥	1	High
	%	1.4	13.5	31.1	44.6	٩,٥				
5	Freq.	3	9	33	20	9	٣,٣١	٠,٩٧٨	3	Medium
	%	4.1	12.2	44.6	27.0	١٢,٢				
Axis as a whole							٣,٣٣	٣,٩٧١	Medium	

Table (05) The relative weight of the first axis reached (3.33) – (medium level), which confirms the availability of these items to a medium degree, and the viewpoint of the study sample tends to the neutral trend about the availability of these indicators. The relative weights of the items in this axis ranged from (3.18) to (3.47). It contains (5) items, The researcher attributes this result to the fact that beauty is a uniquely personal experience that differs from one person to the next and from society to society.

• **The Second Axis: Indicators of Measuring impressions about using augmented reality in Public Service Indoor Advertising**

Table (06): Frequencies, percentages, averages, and standard deviations for the sample opinions about the second axis of the study, N = 74

No	Frequency	Responses					Mean	Standard Deviation	Order of items	Availability
	Percentage	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree				
6	Freq.	2	7	18	36	11	٣,٦٤	٠,٩٤٥	5	High
	%	2.7	9.5	24.3	48.6	14.9				
7	Freq.	1	4	17	42	10	٣,٧٦	٠,٨٠٨	2	High
	%	1.4	5.4	23.0	56.8	13.5				
8	Freq.	1	4	18	35	16	٣,٨٢	٠,٨٨١	1	High
	%	1.4	5.4	24.3	47.3	21.6				
9	Freq.	1	7	17	37	12	٣,٧٠	٠,٩٠٣	4	High
	%	1.4	9.5	23.0	50.0	16.2				
10	Freq.	1	7	14	40	12	٣,٧٤	٠,٨٩٢	3	High
	%	1.4	9.5	18.9	54.1	16.2				
Axis as a whole							٣,٧٣	٣,٧٩٧	High	

Table (06) The relative weight of the second axis reached (3.73) – (High level), which confirms the availability of these items to a high degree, and the viewpoint of the study sample tends to the positive direction about the availability of these indicators. The relative weights of the items in this axis ranged from (3.64) to (3.82). It contains (5) items; The researcher attributes this result to the fact that using augmented reality will increase the attention span in Public Service indoor advertising. It arouses the interest of Public Service indoor advertising recipients.

It is a good idea to use AR in Public Service indoor advertising. And augmented reality in Public Service indoor advertising will deliver the advertising message clearly to serve society well.

AR technology in Public Service indoor advertising will provide the advertising message creatively to help the community well.

• **The Third Axis: Indicators of Measuring impressions on using Augmented Reality together with Ceramic Sculpture in Public Service Indoor Advertising**

Table (07): Frequencies, percentages, averages, and standard deviations for the sample opinions about the third axis of the study, N = 74

No	Frequency	Responses					Mean	Standard Deviation	Order of items	Availability
	Percentage	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree				
11	Freq.	1	5	16	44	8	٣,٧٢	٠,٨٠٣	2	High
	%	1.4	6.8	21.6	59.5	10.8				
12	Freq.	0	6	16	44	8	٣,٧٣	٠,٧٦٤	1	High
	%	0.0	8.1	21.6	59.5	10.8				
13	Freq.	1	6	24	34	9	٣,٥٩	٠,٨٥٩	5	High
	%	1.4	8.1	32.4	45.9	12.2				
14	Freq.	1	5	17	45	6	٣,٦٨	٠,٧٧٨	3	High
	%	1.4	6.8	23.0	60.8	8.1				
15	Freq.	1	7	20	37	9	٣,٦٢	٠,٨٧١	4	High
	%	1.4	9.5	27.0	50.0	12.2				
Axis as a whole							٣,٦٧	٣,٣٥٧	High	

Table (07) The relative weight of the third axis reached (3.67) – (High level), which confirms the availability of these items to a high degree, and the viewpoint of the study sample tends to the positive direction about the availability of these indicators. The relative weights of the items in this axis ranged from (3.59) to (3.73). It contains (5) items, The researcher attributes this result to the fact that AR with Ceramic Sculpture will increase the attention span in Public Service Indoor Advertising.

And arouse the interest of Public Service Indoor Advertising recipients, and that maybe is a new & good idea & represents originality and modernity.

- **The axes of the questionnaire:**

Table (08): Axes, weighted averages, and Std. Deviations, N = 74

No	Axes	Weighted Average	Std. Deviation	Order of Axis	Availability
1	The First Axis	٣,٣٣	٣,٩٧١	٣	Medium
2	The Second Axis	٣,٧٣	٣,٧٩٧	١	Hight
3	The Third Axis	٣,٦٧	٣,٣٥٧	٢	High
The Weighted average of the overall the Questionnaire		٣,٥٨	٨,٩٧٦	High	

Table (08) The relative weight of the Questionnaire was (3.58) (High level); it confirms the existence of a tendency in the viewpoint of the study sample note. And the responses of the sample members were high; It falls within the scale category (3.41 to 4.20).

The second axis comes first level Questionnaire as a whole; With an average of (3.73), in the fourth category of the average (3.41 to 4.20). Then third axis second place with an average of (3.67), in the fourth category of the average (3.41 to 4.20).

Then the first axis refers to the aesthetic pleasure in the artwork, comes in third place at the level of the Questionnaire; It came with an average of (3.33), which is one of the indicators of the third category of the average (2.61 to 3.40), which confirms the availability of a medium degree in the displayed advertisement.

- **Gender variable:**

Table (09): "t" Valur for the male and female groups

Group	N	Mean	Std. Deviation	df	t	Sig. (2-tailed)
Male	37	٥٣,٤٩	٩,٠٩٧	72	٠,١٥٤	٠,٨٧٨
Female	37	٥٣,٨١	٨,٩٧٥			

Table (09) Using a t-test for two groups of males and females, there is no statistically significant difference between the two groups at the level (0.05).

- **Nationality variable:**

Table (10): Means and Std. Deviations of the three nationalities

Group	N	Mean	Std. Deviation
Egyptians	25	٥٧,٧٢	٧,٩٩٨
Chinses	23	٥٢,٧٠	٨,٧٦٢
Koreans	26	٥٠,٥٨	٨,٨٩١

Table (10) There is a difference between the three groups' averages (Egyptian, Chinese, Korean), so was used the one-way ANOVA to determine the (F) values.

Table (11): One-Way ANOVA for Nationality groups

Source	Sum of Squares	df	Mean Square	F	Sig
Between Groups	٦٨٠,٦٠٩	2	٣٤٠,٣٠٥	٤,٦٤٦	٠,٠١٣
Within Groups	٥٢٠٠,٢٥٦	71	٧٣,٢٤٣		
Total	٥٨٨٠,٨٦٥	73			

Table (11) that the value of (F) was (4.646), which is a statistically significant value at the level (0.05), which indicates that there are differences between the mean scores of each of the three groups (Egyptian, Chinese, Korean).

Table (12): Scheffe test between Nationality Groups

Mean	Groups	Egyptian	Chinese	Korean
٥٧,٧٢	Egyptian	—		
٥٢,٧٠	Chinese	٥,٠٢	—	
٥٠,٥٨	Korean	*٧,١٤	٢,١٢	—

(*) Significant at the level (٠,٠٥)

By searching for the position of the differences between the three groups (Egyptian, Chinese, Korean), the researchers used the "Scheffe" test for dimensional comparisons in **Table (12)**, So there's a measurably noteworthy distinction at the level (0.05) between Egyptian and Korean nationality in favor of the Egyptian.

Also, there is no statistically significant difference at the level (0.05) between Egyptian and Chinese nationality on the Questionnaire.

- **Educational/Professional Level:**

Table (13): Means and Std. Deviations of the three educational/professional level Groups

Group	N	Mean	Std. Deviation
Student	27	٥٥,٧٠	٧,٨٧٣
Professional	19	٥٠,٦٨	١١,٣٧٨
Academic Staff	28	٥٣,٦٨	٧,٨٣٧

Table (13) shows the averages of the three groups were very close on the Questionnaire.

Table (14): One-Way ANOVA for Educational/Professional Level groups

Source	Sum of Squares	df	Mean Square	F	Sig
Between Groups	٢٨١,٠٢٣	2	١٤٠,٥١١	١,٧٨٢	٠,١٧٦
Within Groups	٥٥٩٩,٨٤٢	71	٧٨,٨٧١		
Total	٥٨٨٠,٨٦٥	73			

The researchers used one-way ANOV in **Table (14) to confirm that.** The value of (F) was (1.782), which is not a statistically significant value at the level (0.05), showing that there are no differences between the mean scores of each of the three groups (student, professional, faculty member).

Results:

1. **Refused H1:** Because the aesthetic pleasure statically measurements indicated the availability of its items in a range of medium degree, which confirms the viewpoint of the study sample tends to the neutral trend about the availability of these indicators. The researcher attributes this result to the fact that beauty is a uniquely personal experience that contrasts from one individual to another and from society to society.
2. **Accepted H2:** There is a tendency to employ AR technology and ceramic sculpture to design indoor advertisements. And develop them to serve public advertisements.
3. **Refused H3:** There was no statistically significant difference between the men & women at the level (0.05) between the men & women.
4. **Refused H4:** Because There are differences between the mean scores of each of the three groups (Egyptian, Chinese, Korean), There is a statistically significant difference at the level (0.05) between Egyptian and Korean nationality in favor of the Egyptians, no statistically significant difference at the level (0.05) between Egyptian and Chinese. (Maybe Need More Investigation in the future research work).
5. **Refused H5:** There are no differences between the mean scores of each of the three groups (student, professional, faculty member).
6. **Formation A Model:** Formation of the Model of the usability of Ceramic Sculpture and augmented reality in designing an Indoor PSA in different Communities (Egypt, China, Korea) Through the research results mentioned above, the researchers could form a final tested model for the study. as appeared figure Fig. (11) "The Model of the usability of ceramic sculpture and augmented reality in designing an Indoor PSA in different Nations (Egypt, China, & Korea) through research results."

Recommendations:

- 1- The link between fine and applied arts and augmented reality technology to produce and invent new forms of creativity that are compatible with the current era, and which is characterized by the uses of mobile applications.

2- Calling for the development of the curricula of the colleges of fine and applied arts in Egypt to include the technological dimension and the augmented reality technology and linking it to the academic curricula.

3- Holding seminars and educational courses on the role of augmented reality and its capabilities and linking it to the field of arts in general, to raise awareness among professionals and amateurs.

4- Conducting more joint research between different fields of studies "interdisciplinary research" to come up with new studies that enjoy innovation and modernity, especially in the field of fine and applied arts and information technologies.

Future Work:

The researchers believe that we need more research to be conducted in this direction to link the fine arts, including ceramic sculpture, with advertising and augmented reality. To perform more experiments on multiple samples in different countries by exploring the main characteristics of these markets to market this kind of creativity.

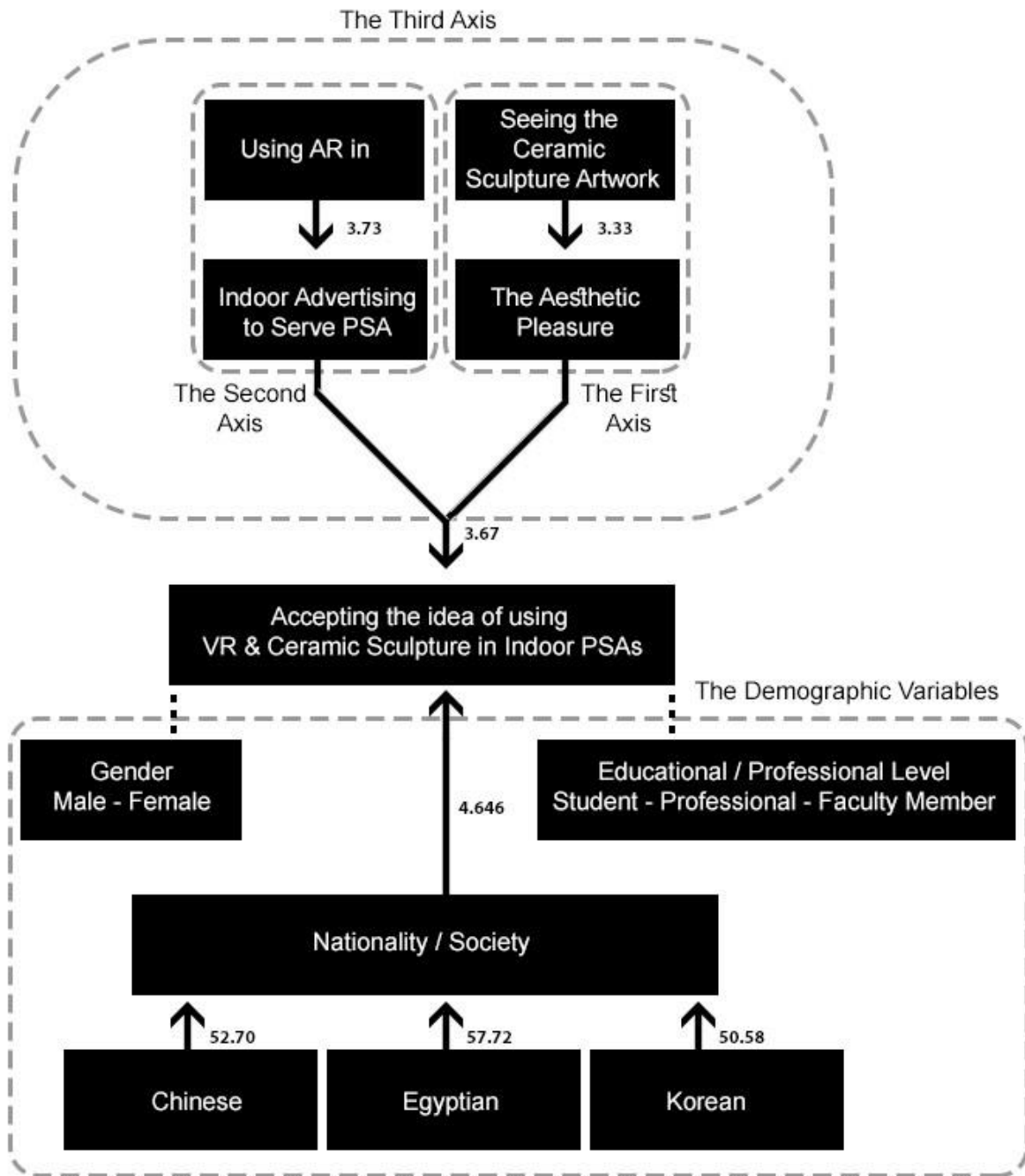


Fig. (11): “The Model of the usability of Ceramic Sculpture and Augmented Reality in designing an Indoor PSA in different Nations (Egypt, China, Korea) through research results” – According to the sample opinions. By Researchers.

Appendix: Questionnaire

1- Indicators of Measuring for Aesthetic Pleasure in the Used Artwork:	
衡量使用过的艺术品中美感的指标 :	
사용된 예술 작품의 미적 즐거움을 측정하는 지표:	
English Sentences	1- This is a beautiful statue 2- This is an attractive statue 3- This statue is pleasing to see 4- This statue is nice to see 5- I like to look at this statue (the five sentences extracted fromJ. Blijlevens, et al, 2017).
Chinese Sentences	1- 这是一个美丽的雕像 2- 这是一个有吸引力的雕像 3- 这雕像是高兴地看到 4- 这个雕像很高兴看到 5- 我喜欢看这个雕像
Korean Sentences	1- 이것은 아름다운 동상입니다 2- 매력적인 동상입니다 3- 보기만 해도 기분이 좋아지는 이 동상 4- 이 동상은 보기에 좋다 5- 나는 이 조각상을 보는 것을 좋아한다.
2- Indicators of Measuring impressions about using augmented reality in Public Service Indoor Advertising:	
衡量在公共服务室内广告中使用增强现实的印象的指标 :	
공공 서비스 실내 광고에서 증강 현실 사용에 대한 인상 측정 지표:	
English Sentences	6- Do you think that augmented reality will increase the attention span in Public Service indoor advertising? 7- Do you think the use of augmented reality will arouse the interest of Public Service indoor advertising recipients? 8- Do you think it is a good idea to use augmented reality in Public Service indoor advertising? 9- Do you think augmented reality in Public Service indoor advertising will deliver the advertising message clearly to serve society well? 10- Do you think augmented reality technology in Public Service indoor

	advertising will deliver the advertising message creatively to serve society well?
Chinese Sentences	6- 您认为增强现实会增加公共服务室内广告的注意力吗？ 7- 您认为增强现实的使用会引起公共服务室内广告接收者的兴趣吗？ 8- 您认为使用增强现实技术是个好主意吗公共服务室内广告？ 9- 您认为公共服务室内广告中的增强现实会清楚地传达广告信息以更好地为社会服务吗？ 10- 您认为公共服务室内广告中的增强现实技术会创造性地传递广告信息以更好地为社会服务吗？
Korean Sentences	6- 증강현실이 공익실내광고에서 주목도를 높일 것이라고 생각하는가? 7- 증강현실의 활용이 공익실내광고수혜자들의 관심을 불러일으킬 것이라고 생각하는가? 8- 공익실내광고에 증강현실을 활용하는 것이 좋은 아이디어라고 생각하십니까? 9- 공익실내광고의 증강현실이 광고 메시지를 명확하게 전달하여 사회에 잘 봉사할 것이라고 생각하십니까? 10- 공익실내광고의 증강현실 기술이 광고 메시지를 창의적으로 전달하여 사회에 잘 봉사할 것이라고 생각하는가?
3- Indicators of Measuring impressions on using Augmented Reality together with Ceramic Sculpture in Public Service Indoor Advertising: 增强现实结合陶瓷雕塑在公共服务室内广告中使用效果的衡量指标： 공공 서비스 실내 광고에서 세라믹 조각과 함께 증강 현실 사용에 대한 인상 측정 지표:	
English Sentences	11- Do you think that the use of augmented reality with Ceramic Sculpture will increase the attention span in Public Service Indoor Advertising? 12- Do you think the use of augmented reality with Ceramic Sculpture will arouse the interest of Public Service Indoor Advertising recipients? 13- Do you think the use of augmented reality with Ceramic Sculpture

	<p>in Public Service Indoor Advertising is a new idea?</p> <p>14- Do you think it is a good idea to use augmented reality with Ceramic Sculpture in Public Service Indoor Advertising?</p> <p>15- Do you think the idea of using ceramic sculpture with augmented reality in Public Service Indoor Advertising represents originality and modernity?</p>
Chinese Sentences	<p>11- 您认为增强现实与陶瓷雕塑的使用会增加公共服务室内广告的关注度吗？</p> <p>12- 您认为将增强现实与陶瓷雕塑结合使用会引起公共服务室内广告接受者的兴趣吗？</p> <p>13- 您认为在公共服务室内广告中使用陶瓷雕塑增强现实是一个新想法吗？</p> <p>14- 您认为在公共服务室内广告中使用陶瓷雕塑增强现实是个好主意吗？</p> <p>15- 您认为在公共服务室内广告中使用增强现实陶瓷雕塑的想法代表原创性和现代性吗？</p>
Korean Sentences	<p>11- 도자조각과 함께 증강현실을 활용하면 공익실내광고에서 주목도가 높아진다고 생각하는가?</p> <p>12- 도자조각과 함께 증강현실을 활용하면 공익실내광고 수혜자들의 관심을 끌 수 있다고 생각하십니까?</p> <p>13- 도자조각과 함께 증강현실을 공익실내광고에 활용하는 것이 새로운 아이디어라고 생각하십니까?</p> <p>14- 공익실내광고에서 도자조각과 함께 증강현실을 활용하는 것이 좋은 아이디어라고 생각하십니까?</p> <p>15- 공익실내광고에서 증강현실이 적용된 도자조각이 독창성과 현대성을 대변한다고 생각하는가?</p>

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