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Approaching the Preference of Senior Citizens for Mobile Photographs by the Methods of EGM and William DuMouchel's Continuous Kano Model

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Abstract: This study aims to explore the purposes and motivations of seniors using mobile photography and the preferences they get from it. The researchers took senior citizens who use mobile photography as the research object and used the evaluation grid method (EGM) to conduct in-depth interviews and questionnaires to investigate the emotional reactions and social interactions of this group when participating. After inductive analysis, the study identified the important factors and reasons that influence mobile photography as a leisure preference, summarized the important preferences and ideas of people using mobile photography in leisure activities, and integrated credible evaluations and opinions. It was found that the elderly use mobile photography for the main motivation of recording, and for the main purposes of leisure activities, selfies, photo editing software, getting to know new things and new friends, and uploading to social platforms to share, gaining a sense of happiness from mobile photography. In addition, unlike the traditional discrete Kano model, which is prone to losing certain information and resulting in increased data instability, William DuMouchel's continuous Kano Model analysis is used to observe the senior citizens' evaluation of mobile phone quality factors, while using satisfaction as a weighting factor. The Better coefficient reflects changes in satisfaction among the elderly with the presence of a certain function. It is hoped that this research method can provide a further understanding of the needs of the elderly for mobile photography, and at the same time provide a reference for the future promotion of mobile photography among the elderly.

Keywords: Mobile photography; Senior citizens; EGM; William DuMouchel's Continuous Kano Model

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1. Introduction

In the current 21st century, smartphones are inseparable from human beings. Whether it is a gathering

of family or friends, shopping, traveling, or in daily life, whenever people see interesting things, they usually take out their mobile phones to take pictures of the scene, or to take selfies at the moment. However, what a photographer captures is not just the scenery he or she sees, but also the angle, light, and composition of the frame. In this process, personal imagination and expectations have been added consciously or inadvertently (subconsciously). Today's mobile photography allows people to instantly use simple photo editing software to adjust the size, angle, light and shade, color, and filter style of the image, modify the photo to what they want, and finally upload it to social platforms to share. Therefore, taking pictures is no longer just about taking pictures. It is about making the scene you see match the effect that the photographer wants to present, expressing his or her feelings, or presenting it in a way that tells a story, to gain recognition and a sense of accomplishment. Elderly people often pose excitedly and confidently in public places, take photos of each other or take selfies with their mobile phones, and instantly upload images to share interactions with family and friends, while also recording diaries of their own lives. In community colleges specially established by government departments for senior citizens (Ministry of Education Senior Learning Network, 2023), seniors participate in mobile photography courses to learn skills, hoping to take "good" photos while also gaining more feedback on social platforms. Because senior citizens actively and vigorously use mobile phones to take photos, researchers have been motivated to explore the substantive and spiritual benefits that mobile phone photography brings to senior citizens in their leisure activities.

This study uses the evaluation grid method (EGM) to summarize the purposes, motivations, and true preferences of senior citizens for using mobile photography in leisure activities and integrates credible evaluations and opinions. William DuMouchel's Continuous Kano Model analysis is also used to observe the quality factors of the seniors' evaluations and opinions on this mobile phone. At the same time, satisfaction was used as a weighting factor, and the Better coefficient and the Worse coefficient were used to reflect the seniors' presence or absence of a certain function, showing whether they are satisfied or dissatisfied with changes. The scope of the research focuses on the elderly population; a questionnaire survey is conducted on the population aged 55–75 who use mobile phones to take photos. This study looks forward to providing this research method to better understand the needs of senior citizens for mobile photography and at the same time provide a reference for future promotion of its usage.

2. Literature discussion

2.1. Discussion on senior citizens

"Senior citizen" refers to the elderly. The word "senior" first originated from Singapore and other places. It is said that the term "senior" was coined in the late 1970s. At that time, Singapore's first senior citizen activity center was established on Maude Road, Jalan Besar, and the word "senior" was used for the first time. The name "senior citizen" is a general term for those aged 60 and above.

Taiwan region's Ministry of Education established "elderly learning centers" in towns and cities in 2006 to allow the elderly to learn on-site, mainly targeting citizens over the age of 55 (10 years earlier than the Taiwan region officially designated 65 as an elder). The pronunciation of "Le-ling" is also a homophony of the English word "Learning", which means "happy to learn, happy to forget age", imitating Confucius' life attitude of "working hard and forgetting to eat, being happy to forget worries, not knowing that old age is coming." It is hoped that the elderly will forget their age through

learning, thereby inspiring the lifelong learning spirit of Taiwan region's elders to live and learn until they are old. This has become a general term for the implementation of the elderly education system across the country, and "elderly" has become the latest synonym for the elderly in the Taiwan region. Although the current statutory retirement age in the Taiwan region is 65 years old, the labor standards law also reserves that workers can "self-retire" as long as they have worked for 25 years or are 55 years old and worked for 15 years. With the Taiwan region's rapid population aging, work planning after retirement requires better policy support to cope with the development and needs of an aging society [1].

2.2. Leisure benefits

Iwasaki believes that leisure can allow all human beings to obtain a more valuable and meaningful life and improve the quality of life [2]. Leisure has been traditionally defined in three ways: as an activity, time remaining after work, or as a subjective perception and experience [3]. Several studies pointed out that leisure is a psychological entity, mainly determined by people's sense of freedom to participate in leisure, that is, choosing to do or the freedom not to do anything else will create a sense of obligation and lose the sense of leisure [4–5]. Bright proposed that the benefits of leisure on human life include psychological benefits, physiological benefits, social benefits, and environmental benefits [6]. Chih-Jiun Lin and Hui-Hsin Chaing divided the benefits of elderly people's participation in leisure activities into four aspects: psychological, physiological, social, and self-learning and realization [7]. In addition to personal interests, they also add social interests such as educational interests and aesthetic interests. Participating in leisure activities can not only relax emotions, learn new knowledge, and enhance interpersonal relationships, but also enhance mental sensory stimulation, improve physical and mental health, enhance family intimacy, improve self-attitude, and enhance self-confidence.

2.3. Mobile photography types

Photography was invented less than 200 years ago, but it has always been full of vitality and continuous development. Nowadays, the world of photography is constantly changing with the emergence of new technologies and techniques, along with the emergence of fresh photography trends. In 2023, photographic image creation will increasingly focus on narrative storytelling, becoming one of the future trends in photography. Capturing a moment is no longer just a photo when the shutter is pressed, but is woven around the photographic theme into a story. Annie Tao believes that lifestyle photography is not just about capturing snapshots, but capturing images that reveal stories, are personal, and have a relationship and feeling with the subjects [8]. Photography pursues the beautification of photos, which has aesthetic value.

According to the researcher's experience in teaching mobile photography at a community college and observing social interactions among senior citizens, the most common photographic images are lifestyle themes. Lifestyle photography has several different definitions. A photography website believes that lifestyle photography focuses on capturing real-life moments and activities in a visually appealing and artistic way. Using images to tell life stories is more casual than traditional ones, and can also be integrated with other types of photography, such as fashion or food photography, and so on. Lifestyle photography involves capturing portraits and other styles of everyday photography artistically. It has grown in popularity over the past few years. Emerging from social media, people present their lifestyles to friends and family. Sometimes it's to show off, but sometimes it's to record

memories of good times and cherish them for life.

Flytographer defines "life photography" as a general term for a photography style characterized by emotion, relaxation, and fun [9]. Lifestyle photography reflects the current season of life, recording remembrances with family and friends, even the less special days, capturing the simplest moments. The current lifestyle photography on social media platforms is divided into five types, modern headshots, family photos, milestones, travel memories, and hometown memories.

3. Research models and methods

3.1. Evaluation grid method (EGM)

EGM is one of the important researches of Miryoku Engineering Methods. It is a design concept based on consumer preferences that allows operators and consumers to have a communication interface and jointly explore ways to create attraction and knowledge. To analyze the factors of attraction and understand the interviewees' feelings about the attractiveness of the product, EGM provides in-depth interviews, provides stimuli based on sample themes, and understands the different feelings of the interviewees through the original concept of the theme. The subjects are then guided to conduct a clearer analysis of their concepts, and then derive concrete and abstract reasons from them, sort out personal real preferences and ideas, integrate credible evaluations and opinions, build a network, and draw an EGM structure diagram. This method can achieve abstract reasons that are difficult to obtain with general research methods. The EGM process can generally be divided into the following steps: (1) Prepare stimulus samples and numbered charts for interviews. (2) Provide in-depth interview theme sample cards. (3) Respondents chose to dislike and reject from the sample cards. (4) Respondents kept the cards they liked and categorized them inductively according to their preferences. (5) Respondents were asked to explain the reasons for the classification, such as, why they liked it, and to establish original ratings. (6) Based on the initial assessment, respondents were asked one by one for both concrete and abstract reasons. (7) The interview results were summarized and mapped into an EGM diagram.

3.2. William DuMouchel's continuous Kano model analysis

Japanese scholar Noriaki Kano published "Motivational Factors and Hygiene Factors in Quality" in October 1979, based on the "Motivational Factors-Hygiene Theory" proposed by psychologist Herzberg in 1959 [10]. This article introduces quality management into the two-dimensional dimension of satisfaction and health care. The satisfaction and dissatisfaction models (Kano's Two-Dimension Model) were established for the first time, as shown in **Figure 1**. Think of the x-axis as the degree to which quality factors are present. The further to the right, the more sufficient the quality factors are, and the further to the left, the less abundant the quality factors are. The y-axis is considered consumer satisfaction. The higher it is, the higher the consumer satisfaction; on the contrary, the lower it is, the more dissatisfied the consumer is. Five different area curves are presented in the quadrants to represent the relationship between the five mass elements of the Kano Model. Satisfaction is not necessarily directly proportional to quality adequacy, which means satisfaction will be affected by the adequacy of different qualities. Through this model, we can understand the relationship between different quality factors and satisfaction, and find out the important quality factors that can effectively improve consumer satisfaction. Kano Model considers different aspects, and the correlation between consumer "satisfaction" and product "quality." Quality attributes are divided into five elements: attractive quality elements, one-dimensional quality elements, natural quality elements, indifferent quality elements, and

reverse quality factors.

As for the continuous variable analysis method provided by William DuMouchel, the data we collected from the positive and negative questionnaires are as follows [11]. Fully functional (positive): -2 (I hate this), -1 (tolerable), 0 (It doesn't matter), 2 (This is how it should be), 4 (I like this). Loss of functionality (negative): -2 (I like this), -1 (This is how it should be), 0 (It doesn't matter), 2 (Tolerable), 4 (I hate this). Then calculate the average score of the forward and reverse questions, and compare it with the range of quality attributes in **Figure 2** to know what attributes the function belongs to, and then draw a two-dimensional chart. William DuMouchel's quality attribute classification table and two-dimensional chart (**Figure 2**) also include basic type (M), expectation type (O), charm type (A), indifference type (I), reverse type (R), and question type (Q). DuMouchel strengthens the proportion of positive functions and enhances the effect of positive functions. For other forms of Continuous Kano Model-related research applications such as Chin-Chin Kuo [12]. For the discrete Kano Model, Mike Timko uses "Better" and "Worse" coefficients to reflect changes in users' satisfaction or dissatisfaction with the presence or absence of a certain function. Although they do produce numerical results that can be used for relative comparison, these values are based on a Kano classification derived from the combined simplification of all respondents' answers. Timko himself also mentioned in his article that the loss of information will lead to increased instability in the data, as well as giving equal weight to all answers and ignoring their original strong or weak emotions. Nonetheless, function presence and function loss scores calculated using DuMuchel's continuous analysis method can also achieve the same purpose without such problems, which is why this study focuses on it. Additionally, this study also uses the satisfaction-weighted Better coefficients to show the degree of reflection of a certain function; that is, Better coefficient = function coefficient satisfaction [13–14].

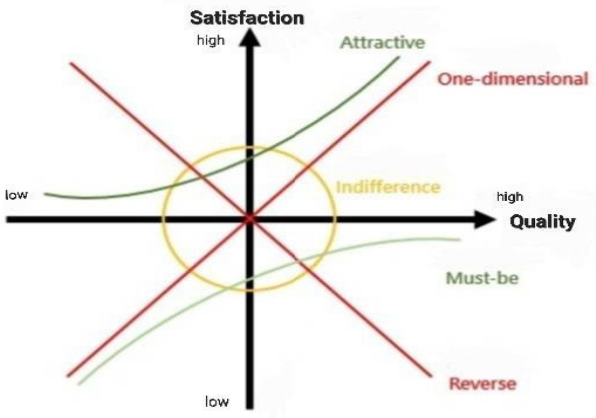

Figure 1. Kano model

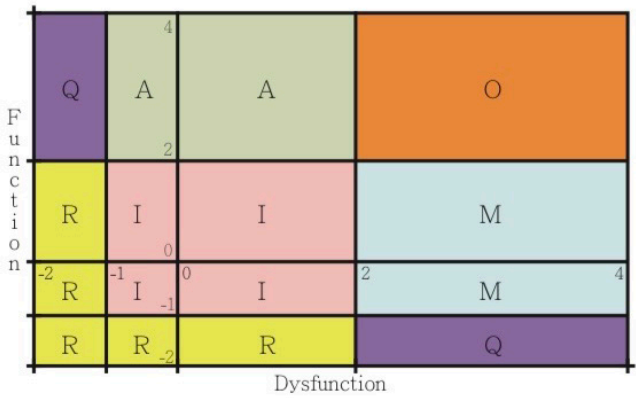

Figure 2. Quality attribute determination decision matrix

4. Data analysis results

4.1. Miryoku Engineering's network diagram of attractive factors

First, highly involved scholars, senior art creators, and designers with design practice backgrounds are invited to conduct focus group discussions. Through in-depth qualitative interviews and quantitative questionnaires, Miryoku Engineering's evaluation grid method (EGM) was used to conduct in-depth interviews and inductive analysis of highly involved people, and three original reasons were found: "enhancing knowledge", "recording", and "leisure", as well as seven concrete charm factors and ten abstract charm factors. The "Discussion on the Leisure Benefits of Mobile Photography — Take the Elderly Group as an Example of EGM Diagram" is obtained as shown in **Figure 3** as the basis for the theme.

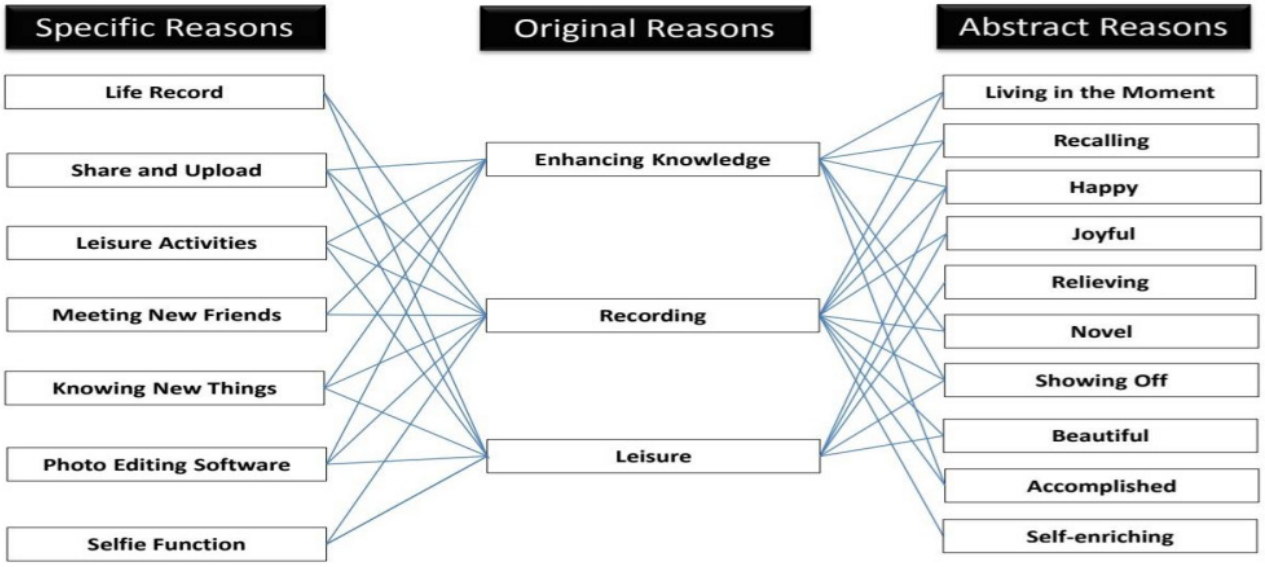

Figure 3. EGM diagram

The factors of attribute evaluation can be summarized from the EGM diagram. The three original reasons are "enhancing knowledge", "recording", and "leisure", which are leisure attributes. The 7 specific reasons "life record", "share and upload", "leisure activities", "meeting new friends", "knowing new things", "photo editing software" and "selfie function" are the attributes of using mobile photography. The abstract reasons are "living in the moment", "recalling", "happy", "joyful", "relieving", "novel", "showing off", "beautiful", "accomplished", "self-enriching" ten items in total, which are intuitive descriptions of users.

4.2. William DuMouchel's continuous Kano model analysis

Kano model quality survey is consistent with the two-dimensional concept. The questionnaire was designed as a two-way inquiry method with positive and negative items, using a five-point Likert Scale to measure "like", "must have", "neutral", "can live with", and "dislike." "Like" five levels are used to evaluate the positive and negative questions. There are 150 valid questionnaires. This study used the statistical software SPSS 17 to test the reliability analysis method. After the questionnaire was collected, the Cronbach's Alpha value of the overall questionnaire was 0.964, which is very reliable. From the continuous variable analysis in **Figure 2**, it can be seen that William DuMouchel's continuous Kano model classification has 1 unary quality, 2 natural qualities, and 4 attractive qualities as shown in **Table 1**.

Table 1. Two-way analysis of William DuMouchel's continuous Kano model

	Function	Dysfunction	Classification attributes	Satisfaction	Better coefficient	Satisfaction ranking
Life record	2.739	1.528	A	4.323	11.84	2
Share and upload	1.958	2.070	M	4.097	8.022	6
Leisure activities	2.585	1.852	A	4.032	10.423	5
Meeting new friends	1.979	2.113	M	3.806	7.532	7
Knowing new things	2.676	1.535	A	4.065	10.854	4
Photo editing software	2.859	1.655	A	3.806	10.881	3
Selfie function	3.197	2.197	O	3.903	12.478	1

From the two-way analysis of William DuMouchel's continuous Kano model (**Table 1**), it is known that the "Selfie function" is a one-dimensional quality factor. When the needs are met, the user will feel very satisfied. When the needs are not met, users will be very dissatisfied. This type of demand is what a product should have and is usually the focus of comparison between products. "Share and upload" and "meeting new friends" are natural quality elements. Users will not be satisfied when their needs are met. When needs are not met, users will be very dissatisfied. Basic requirements are the core requirements that a product must have, and they are also the requirements that the product must do and continuously improve. "Life record", "photo editing software", "knowing new things", and "leisure activities" are the attractive quality elements of the product. This demand exceeds users' original expectations for the product, making a sharp increase in user satisfaction often leads to higher user loyalty.

Moreover, from **Table 1**, observing the quality model and the better coefficients, it can be seen that "life record" and "photo editing software" are attractive qualities with high satisfaction, indicating that users value and feel that the quality of life records taken with mobile phones is important. Photography functions and storage space should continue to be maintained and enhanced, which is the main source of competitive advantage to improve the quality of mobile phone photography and achieve its goals. "Selfie function" is an expected high-satisfaction quality. The function is highly valued by senior citizens. The expected quality can achieve overall satisfaction. It means that mobile phone manufacturers must strengthen the key attributes and invest more resources to optimize them. It is also the decisive quality factor for the development of mobile photography. "Meeting new friends" and "share and upload" are necessary qualities with low satisfaction. It shows that users feel that these two functions are necessary but their satisfaction is not high, so these services should be strengthened. "Knowing new things" and "leisure activities" are attractive qualities with moderate satisfaction, indicating that users think these two functions are of high importance but the actual performance is lower than the service items. This means that this quality attribute does not meet the needs of users and still needs to be improved and strengthened.

5. Conclusion and suggestion

This research shows that the living habits of today's senior citizens are gradually changing. Going out to take photos with friends can learn new things, broaden one's knowledge, and gain a sense of happiness. Mobile photography allows the elderly to share and upload their creations with peers, family members, and online friends, promoting social connections; therefore, it is recommended that senior citizen community colleges add teaching courses on the operation and retouching of mobile photography, and provide on-site demonstration teaching guidance can make learning results more significant. Moreover, this study also provides reference directions for mobile phone manufacturers' products for senior citizens to use phone quality functions. Seniors love to take selfies, and mobile phone selfies need to be enhanced with wide-angle and large aperture functions; photo editing on the phone itself needs to be simplified to make it easier for the elderly to operate; and photo storage capacity needs to be increased for high-quality photos.

Researchers suggest that the user interface of mobile phones needs to be more user-friendly, strengthen artificial intelligence, use voice control instead of touch-key photography function settings, solve the inconvenience of aging eyes of the elderly, and use finger dexterity. Furthermore,

it is important to reduce the weight and size of mobile phones to avoid the burden of elderly people carrying them on their bodies for long periods. These substantial improvements will promote the frequency and perceived enjoyment of mobile photography among seniors, enhance interactions with people, promote mental sensory stimulation, improve physical and mental health, enhance close relationships with family and interactions with friends, enhance self-confidence, and gain a sense of accomplishment in self-identity. This research method is expected to further understand the needs of senior citizens for mobile photography and at the same time provide a reference for the promotion of senior citizens using them for photography in the future.

Disclosure statement

The authors declare no conflict of interest.

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