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Research Article
Multiple-criteria Decision Analysis: Public Value's Influence on Participation in Unused Medicine Recycling

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Abstract

Background and Objective: Improper disposal of medicine has led to environmental damage and human health hazards. However, the recent increase in public awareness of the importance of recycling provides an opportunity to address these problems. This study, evaluated the influence of public values on participation in unused medicine recycling. **Materials and Methods:** Values were analyzed through multiple-criteria decision analysis. First, Nagai's 5W1H method and interpretive structural modeling were performed to identify key factors and construct hierarchies. The weighting priorities of factors were then determined through the analytic network process and grey relational analysis was conducted. Questionnaires and interviews were administered to patrons of pharmacies and hospitals and the results were analyzed using super decision. **Results:** Resource maintenance was the key value in the first hierarchy, indicating that the public is concerned regarding whether medical resources are consumed efficiently. In the second hierarchy, the key factors were environmental protection, concept identity and personal moral cognition, suggesting that cognition and internal feelings are stronger motivators of participation in recycling than legal regulations. Finally, the key values in the third hierarchy were a sense of identity and a sense of belonging, implying that people consider the beliefs of family, friends and other community members in their decisions regarding recycling. **Conclusion:** According to the findings, three main conclusions were drawn. First, appealing to resource maintenance is an effective approach to promoting unused medicine recycling. Second, legal and moral regulations are not effective means for increasing public willingness to recycle unused medicine. Instead, governments should focus on changing public perception. Finally, promoting social communication is a useful technique for increasing recycling activity. Therefore, incorporating social networking is recommended into recycling promotion programs.

Key words: Unused medicines recycling, value, multiple-criteria decision analysis, interpretive structural modeling, analytic network process, grey relational analysis

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

United States geological survey (USGS)[1] has inspected water from major rivers and found positive results on domestic medicine, many studies carry out examinations on water resources, including lipid regulators, betablockers, antineoplastics, tranquilizers, antiphlogistics, analgesics, contraceptives, antiepileptics, stimulants, β2-sympathomimetics, hormones and psychiatric drugs. European researchers, in the study on Dore River, find that medicine inclusion in water has influence on the reproduction and sexuality[2-5], which might have been caused by careless disposal. Unused medicine is the medicine that is not needed after recuperation. If it is deserted at will, the environment will sustain the risk of damage. Although risk itself is uncertainty[6], every person involved is responsible to reduce the risk to minimum. Nowadays, medical care system has been study better day by day. People, after recovering from disease, usually have medicine left; however, most of them throw it away as common family wastes. Without taking precautions, the environment will be destroyed in the near future. Environmental protection administration of Taiwan conducted a survey on recycling, finding that the amount of the recycled had been increasing since, 2000. The survey indicates that the public willingness to support recycling is growing. Satisfaction is very important to people[7,8], the main reason for this is because people feel satisfaction in the process. The feeling is, for the public, the sense of value[9]. Values are typically a focus of studies on consumer decision-making. During the process of purchase decision-making, consumers are affected by environmental influences, individual differences and psychological processes. Environmental influences include family, situations, social class, cultural norms and personal influences[10]. From the other hand, there are few studies on the value of unused medicines recycling. As unused medicines recycling is part of common recycling, this study adopts results from other related studies on common resources recycling for comparison. From the study by Do Valle *et al.*[11], the beliefs held by leaders or majority may wield influence on the public willingness to recycling. Further, according to the studies by Vining and Ebreo[12] and Tonglet *et al.*[13], public willingness is subjected to specifications of law and moral. Other studies by Reid *et al.*[14] and Knussen *et al.*[15] indicate that convenience of recycling boosts public participation. To sum up, opinion leaders, majority of community, regulations of law and moral and convenience are the values related to public participation in recycling. Because values affect consumer's decision-making, the public decides whether to recycle unused medicine depending on their values, which may overlap with those proposed by Engel *et al.*[10]. Accordingly, this study examined the effects of values on unused medicine recycling to determine their influence.

MATERIALS AND METHODS

Uncertainty is characteristic of human thinking and sense of value is a subjective feeling[16]. Under the same circumstances, different people will have various judgments of value. Such being the case, the study adopts three methods that are most suitable for discussion of feelings of value. Value is one of subject feelings[17], the analysis of which is expected to be marvelously achived by Multiple-Criteria Decision Analysis (MCDA). That is why we start with Nagai's 5W1H way and ISM (Interpretive Structural Modeling) to obtain key factors and hierarchy. Then, figure out the weighting priority of factors and complete the analysis by calculation by Analytic Network Process (ANP) and Grey Relational Analysis (GRA). The methods are described as the following.

5W1H and ISM: Chu *et al.*[18] conducted study based on Nagai's theory and so does this study. The process set by Chu *et al.*[18], runs as follows[18-20]:

- Compare two groups, one of which has the habits of recycling unused medicine and the other doesn't. Then, sift out Kansei words after identifying the differences between the groups
- Define Kansei words as value factors of people's applying themselves to unused medicines recycling:

$$A = (a_{ij}),\ i = j = 1, 2, ..., n \tag{1}$$

Define as the algebraic of the elements. There might either be relationship ($a_{ij} = 1$) or not ($a_{ij} = 0$) in the Matrix A.

$$A = [a_{ij}] = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2n} \\ a_{31} & a_{32} & a_{33} & \cdots & a_{3n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nn} \end{bmatrix} \tag{2}$$

After examining the relationship of the elements, complete the calculation of adjacency matrix and reachable matrix:

$$B = A+I \tag{3}$$

$$B^n = B^{n+1} \equiv T \quad (4)$$

- Identify the relationship between all value factors and construct causal association path of value factors

ANP: The ANP hierarchy is based on the causal association path of value factors. After obtaining ANP hierarchy, questionnaire survey start. At this stage, the study complies with the study presented by Saaty[21-25] and Saaty and Vargas[26]:

$$W = \begin{array}{c} \\ C_1 \\ \\ \\ C_2 \\ \\ \\ C_n \\ \\ \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \\ e_{11}\cdots e_{1m_1} & e_{21}\cdots e_{2m_2} & & e_{n1}\cdots e_{nm_n} \end{array} \\ \begin{bmatrix} W_{11} & W_{12} & \cdots & W_{1n} \\ W_{12} & W_{22} & \cdots & W_{2n} \\ \vdots & \vdots & \vdots\vdots\vdots & \vdots \\ W_{n1} & W_{n2} & \cdots & W_{nn} \end{bmatrix} \end{array} \quad (5)$$

- Causal association path of value factors is transformed into people's value hierarchy
- Confirm super matrix constructed and consistency (C.R. and C.I.)

$$C.I. = \frac{\lambda_{max} - n}{n-1} \quad (6)$$

Consistency C.I. $\leqq$ 0.1

$$C.R. = \frac{C.I.}{R.I.} \quad (7)$$

Consistency C.R. $\leqq$ 0.1

- Turn every weight of value factors into numerical value

GRA: The process of thee study, according to Nagai *et al.*[27] and Wen *et al.*[28] is described as the following[27-33]:

Define {P (X)} and Q as, respectively subject and one of the relationship. If the factors of {P (X)); Q} reach accountability, independence, expansion and existence, {P (X)); Q} will become one of the factor space form one of sequence as follows:

$$x_i(k) = (x_1(k), x_2(k)\cdots,\cdots, x_n(k)),\ k \in N,\ i \in N \quad (8)$$

Sequence must show three characteristics simultaneously: Polarization, non-dimension and scaling. Grey relational space can be explained through {P (X)); Q} (Γ can be used to gauge). It has below principles:

- Duality symmetry:

$$\Gamma(x_i, x_j) = \Gamma(x_j, x_i) \quad (9)$$

- Closeness: Total $|x_i(k)-x_j(k)|$ have control item $|x_i(k)-x_j(k)|$
- Duality symmetry:

$$\Gamma(x_i, x_j) = \Gamma(x_j, x_i) \quad (10)$$

- Wholeness:

$$\Gamma(x_i(k), x_j(k)) \overset{often}{\neq} \Gamma(x_j(k), x_i(k)) \quad (11)$$

If $\Gamma(x_i, x_j) \in \Gamma$ matches the above principles, it is one of the grey relational grade. The calculation in this study adopts the method by Nagai-Yamaguchi:

$$\Gamma_{ij} = \Gamma(x_i, x_j) = 1 - \frac{\overline{\Delta}_{ij}}{\Delta_{max.}} \quad (12)$$

$$\overline{\Delta}_{ij} = \left(\sum_{k=1}^{n} \left[\Delta_{ij}(k) \right]^2 \right)^{\frac{1}{2}}$$

Steps of Nagai-Yamaguchi's GGRG method:

Build up a relative weighting matrix $(R)_{m\times m}$ and the matrix is "Grey relational matrix".

$$R_{m\times m} = \begin{bmatrix} \Gamma_{11} & \Gamma_{12} & \cdots & \Gamma_{1m} \\ \Gamma_{21} & \Gamma_{22} & \cdots & \Gamma_{2m} \\ \vdots & \vdots & \ddots & \Gamma_{11} \\ \Gamma_{m1} & \Gamma_{m2} & \cdots & \Gamma_{mm} \end{bmatrix} \quad (13)$$

Relative weighting matrix $(R)_{m\times m}$:

Eigenvalue must be examined with $AR = \lambda R$. Then, calculate the weight of every target with the method of eigenvector:

$$P^{-1}RP = \text{diag}\{\lambda_1, \lambda_2, \lambda_3, \ldots\ldots \lambda_n\} \quad (14)$$

The sequences weighting value is the eigenvector corresponding λ (maximum λ).

Table 1: Kansei words cording

5W 1H	People who have unused medicines recycling habits	Strong or weak	People who don't have unused medicines recycling habits	Characteristic of kansei words	Coding	
What	Motivated	>>	Not motivated	Resource maintenance Hard	1	Resource maintenance
	Easily find common topics with others	>>	Hard to find common topics with others	Social contribution	2	Social contribution
	Multiple ways	>>	Single way	Social care	3	Social care
	Exceeds expectation	>>	Conform to expectation	Specifications of law and moral	4	Specifications of law and moral
	Consider	>>	Neglect	Environmental protection	5	Environmental protection
Where	Cooperative	>>	Uncooperative	Reduce drug wastage	6	Reduce drug wastage
	Accepted	>>	Not accepted	Peer influence	7	Peer influence
	Agree	>>	Disagree	Concept identity	8	Concept identity
Who	Agree with the meaning of the activity	>	Disagree with the meaning of the activity	The sense of identity	9	Public affairs participation
	Achieved from cooperate with the activity	>	Not achieved from cooperate with the activity	The sense of pleasure	10	Situation
	Achieved from mutual behavior	>	Not achieved from mutual behavior	The sense of belonging	11	Environmental regulations coordination
How	High frequency	>>	Low frequency	Public affairs participation	12	Community propaganda coordination
	Susceptible	>>	Unsusceptible	Situation	13	Personal moral cognition
	Exceeds the law rules	>>	Conform to the law rules	Environmental regulations coordination	14	The sense of identity
	Pretty cooperatvie	>>	Pretty uncooperative	Community propaganda coordination	15	The sense of pleasure
	Possess	>>	Not possess	Personal moral cognition	16	The sense of belonging

The study can be separated into 2 stages. In the first stage, pharmaceutists who have 1-5 years of experience in operating unused medicines recycling are invited as participants. They receive in-depth interviews. The Kansei words that are summarized from the talk are presented below:

- Causal association matrix is built up based on Table 1
- Causal association path in Fig. 1 is as follows (Fig. 2)
- In the second stage, value hierarchy is as follows (Fig. 3)

The study chooses pharmacies and hospitals as sample matrix, which has been pushing unused medicines recycling for the past 5 years. We invite people who patronize these businesses to fill in questionnaires. According to the results, select out the first ten people as subjects that have practiced recycling unused medicines more than ten times to accept ANP interview on questionnaire. This study analyze the interview results with super decesion.

RESULTS

All values are shown at Table 2 and 3. We calculate Table 2 and 3 with GRA and come up with Table 4 and 5.

Given the key value, resource maintenance (0.69), in the first hierarchy, it can be inferred that the public are concerned about whether medical resources are consumed with efficiency. It can be seen that the key to the participation is the cognition and internal feeling rather than legal regulations, judging from the key values in the second hierarchy environmental protection (0.72 and 0.70), concept identity (0.72) and personal moral cognition (0.73) and the key values in the 3rd hierarchy, the sense of identity (0.69, 0.72, 0.71, 0.71, 0.75 and 0.71) and the sense of belonging (0.68, 0.73 and 0.73).

DISCUSSION

After comparing the results of this study with those of other studies by Do Valle *et al.*[11], Vining and Ebreo[12], Tonglet *et al.*[13], Reid *et al.*[14] and Knussen *et al.*[15], following findings have been attained:

- Opinion leaders, majority of community determines the willingness of public participation in unused medicine recycling, which is supported by both this study and that by Do Valle *et al.*[11]. The public follow leaders or majority in order to gain the sense of identity and the sense of belonging. This is true to the willingness of public participation in unused medicine recycling. In the 3rd hierarchy, the sense of identity receives 6 highest weights in the second hierarchy (respectively, 0.69, 0.72, 0.71, 0.71, 0.75 and 0.71), while the sense of belonging receives three highest (respectively, 0.68, 0.73 and 0.73)

Kansei words	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Resource maintenance					o	o					o					
Social contribution							o	o		o						
Social care					o				o			o				
Specifications of law and moral							o				o		o			
Environmental protection														o	o	o
Reduce drug wastage														o	o	o
Peer influence														o	o	o
Concept identity														o	o	o
Public affairs participation														o	o	o
Situation														o	o	o
Environmental regulations coordination														o	o	o
Community propaganda coordination														o	o	o
Personal moral cognition														o	o	o
The sense if identity																
The sense of pleasure																
The sense of belonging																

Fig. 1: Causal association matrix

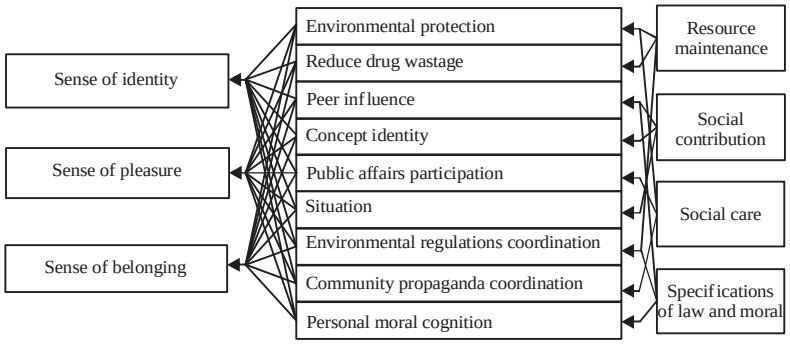

Fig. 2: Causal association path

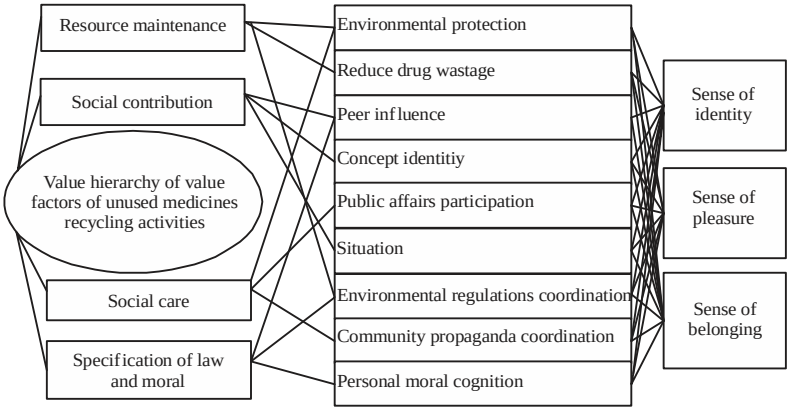

Fig. 3: Value hierarchy

Table 2: Weights of all value in 1st and 2nd hierarchy

	Samples										
Factors	A	B	C	D	E	F	G	H	I	J	Mean
Resource maintenance											
Environmental protection	0.59	0.64	0.33	0.63	0.45	0.35	0.42	0.34	0.21	0.44	0.44
Each factor weight under resource maintenance	0.77	0.74	0.67	0.74	0.71	0.21	0.36	0.7	0.79	0.8	0.65
Reduce drug wastage	0.16	0.19	0.17	0.19	0.23	0.7	0.59	0.24	0.13	0.12	0.27
Environmental regulations coordination	0.07	0.06	0.17	0.06	0.06	0.08	0.05	0.06	0.08	0.07	0.08
Social contribution	0.06	0.05	0.47	0.11	0.45	0.04	0.42	0.04	0.04	0.44	0.21
Each factor weight under social contribution											
Peer influence	0.19	0.19	0.15	0.07	0.12	0.28	0.23	0.47	0.47	0.47	0.26
Concept identity	0.74	0.74	0.79	0.77	0.8	0.66	0.71	0.47	0.47	0.47	0.66
Situation	0.06	0.06	0.07	0.16	0.07	0.06	0.06	0.05	0.05	0.05	0.07
Social care	0.25	0.21	0.16	0.2	0.04	0.53	0.13	0.1	0.37	0.09	0.21
Each factor weight under social care											
Environmental protection	0.74	0.74	0.77	0.79	0.8	0.66	0.66	0.77	0.8	0.36	0.71
Public affairs participation	0.06	0.06	0.07	0.08	0.12	0.06	0.05	0.07	0.07	0.05	0.07
Community propaganda coordination	0.19	0.19	0.16	0.13	0.07	0.28	0.29	0.16	0.12	0.59	0.21
Specifications of law and moral	0.09	0.1	0.04	0.05	0.07	0.07	0.04	0.07	0.37	0.04	0.09
Each factor weight under specifications of law and moral											
Peer influence	0.19	0.06	0.06	0.07	0.06	0.28	0.09	0.16	0.1	0.29	0.14
Environmental regulations coordination	0.06	0.19	0.71	0.16	0.19	0.06	0.14	0.77	0.09	0.05	0.24
Personal moral cognition	0.74	0.74	0.23	0.77	0.74	0.66	0.78	0.07	0.81	0.66	0.62

Table 3: Weights of all value in 3rd hierarchy

	Samples										
Factors	A	B	C	D	E	F	G	H	I	J	Mean
Environmental protection											
Sense of identity	0.74	0.77	0.71	0.79	0.79	0.66	0.71	0.47	0.74	0.74	0.71
Sense of pleasure	0.19	0.16	0.23	0.13	0.15	0.29	0.21	0.47	0.19	0.19	0.22
Sense of belonging	0.06	0.07	0.06	0.08	0.07	0.05	0.09	0.05	0.06	0.06	0.07
Reduce drug wastage											
Sense of identity	0.74	0.3	0.74	0.77	0.74	0.36	0.66	0.74	0.74	0.8	0.66
Sense of pleasure	0.19	0.07	0.16	0.16	0.06	0.59	0.29	0.19	0.19	0.07	0.2
Sense of belonging	0.06	0.63	0.1	0.07	0.19	0.05	0.05	0.06	0.06	0.12	0.14
Peer influence											
Sense of identity	0.16	0.06	0.07	0.06	0.15	0.06	0.36	0.07	0.05	0.09	0.11
Sense of pleasure	0.08	0.19	0.12	0.19	0.07	0.28	0.05	0.16	0.29	0.09	0.15
Sense of belonging	0.76	0.74	0.8	0.74	0.79	0.66	0.59	0.77	0.66	0.81	0.73
Concept identity											
Sense of identity	0.77	0.28	0.77	0.8	0.79	0.59	0.77	0.69	0.74	0.8	0.7
Sense of pleasure	0.07	0.07	0.07	0.12	0.07	0.05	0.07	0.23	0.06	0.07	0.09
Sense of belonging	0.16	0.64	0.16	0.07	0.15	0.36	0.16	0.08	0.19	0.12	0.21
Public affairs participation											
Sense of identity	0.16	0.07	0.23	0.15	0.07	0.66	0.29	0.36	0.47	0.47	0.29
Sense of pleasure	0.06	0.13	0.06	0.07	0.12	0.05	0.05	0.05	0.05	0.05	0.07
Sense of belonging	0.77	0.79	0.71	0.79	0.8	0.29	0.66	0.58	0.47	0.47	0.63
Situation											
Sense of identity	0.06	0.06	0.07	0.15	0.07	0.05	0.28	0.05	0.24	0.04	0.1
Sense of pleasure	0.19	0.23	0.12	0.07	0.15	0.29	0.06	0.36	0.1	0.78	0.24
Sense of belonging	0.74	0.71	0.8	0.79	0.79	0.66	0.66	0.59	0.66	0.17	0.66
Environmental regulations coordination											
Sense of identity	0.74	0.74	0.71	0.8	0.77	0.71	0.47	0.74	0.66	0.36	0.67
Sense of pleasure	0.06	0.06	0.06	0.07	0.06	0.21	0.05	0.06	0.27	0.05	0.1
Sense of belonging	0.19	0.19	0.23	0.12	0.16	0.09	0.47	0.19	0.06	0.59	0.23
Community propaganda coordination											
Sense of identity	0.74	0.33	0.77	0.74	0.8	0.29	0.8	0.47	0.59	0.36	0.59
Sense of pleasure	0.19	0.61	0.16	0.19	0.07	0.66	0.12	0.47	0.36	0.59	0.34
Sense of belonging	0.06	0.06	0.07	0.06	0.12	0.05	0.07	0.05	0.05	0.05	0.06

Table 4: GRA results of the 1st and 2nd hierarchy

Factors	GRA
Resource maintenance	0.69
Each factor weight under resource maintenance	
Environmental protection	0.72
Reduce drug wastage	0.44
Environmental regulations coordination	0.54
Social contribution	0.12
Each factor weight under social contribution	
Peer influence	0.38
Concept identity	0.72
Situation	0.58
Social care	0.48
Each factor weight under social care	
Environmental protection	0.70
Public affairs participation	0.56
Community propaganda coordination	0.44
Specifications of law and moral	0.52
Each factor weight under specifications of law and moral	
Peer influence	0.43
Environmental regulations coordination	0.53
Personal moral cognition	0.73

Table 5: GRA results of the 3rd hierarchy

Factors	GRA
Environmental protection	
Sense of identity	0.69
Sense of pleasure	0.45
Sense of belonging	0.57
Reduce drug wastage	
Sense of identity	0.72
Sense of pleasure	0.42
Sense of belonging	0.56
Peer influence	
Sense of identity	0.53
Sense of pleasure	0.50
Sense of belonging	0.68
Concept identity	
Sense of identity	0.71
Sense of pleasure	0.54
Sense of belonging	0.46
Public affairs participation	
Sense of identity	0.34
Sense of pleasure	0.59
Sense of belonging	0.73
Situation	
Sense of identity	0.51
Sense of pleasure	0.46
Sense of belonging	0.73
Environmental regulations coordination	
Sense of identity	0.71
Sense of pleasure	0.53
Sense of belonging	0.46
Community propaganda coordination	
Sense of identity	0.75
Sense of pleasure	0.29
Sense of belonging	0.59
Personal moral cognition	
Sense of identity	0.71
Sense of pleasure	0.54
Sense of belonging	0.46

- Convenience doesn't count as a value of unused medicines recycling. This study finds that convenience in recycling is not one of the values of unused medicines recycling, though it is in the studies by Reid *et al.*[14] and Knussen *et al.*[15]. In their studies, common resources can be reclaimed for use, which rewards citizens for handing recycled materials over to recycling companies. If above recycling process lacks convenience (i.e., more transportation fee required due to insufficient recycling locations), citizens will weigh cost against benefits before turning in recycled items. However, unused medicines recycling doesn't provide any benefit because recycled medicine will be destroyed. Thus, it is obvious that people aren't eager for rewards when they participate. That explains why convenience doesn't come in the value hierarchy of unused medicines recycling. It is not a value and carries no weight
- Specifications of law and moral don't weigh with public willing in unused medicines recycling. Its weight is 0.19 by ANP in the first hierarchy. Its weight by GRA is not higher than that of resource maintenance. According to the studies by Vining and Ebreo[12] and Tonglet *et al.*[13], public willing is influenced by specifications of law and moral. However, their studies on common resources. On the contrary, many countries haven't enacted laws to mandate unused medicines recycling and citizens won't be accused or blamed even if they don't take part in unused medicines recycling. Apparently, the difference between unused medicines recycling and common resources recycling is broad, so that results from common resources recycling are sometimes not found in unused medicine ones. After weight calculation of values, find values affected by laws or regulations did not have high weightings of influence. Therefore, the key factors affecting people's willingness to recycle unused medicine are not values instilled by laws or regulations, but rather are their cognition and internal feelings

The key weightings observed from this study overlapped with the influences proposed by Engel *et al.*[10] on the consumer decision-making process. This means that the public'sz decision-making regarding recycling unused medicine is similar to that of consumers when purchasing products. Both of these processes are affected by environmental influences. Although, the purpose of unused medicine recycling is environmental protection, which does not occur from purchasing products, these two activities are depending on the participant's values. In addition to

resource maintenance and environmental protection, the key values affecting unused medicine recycling also include concept identity, personal moral cognition, the sense of identity and the sense of belonging. The similarities between these key values and the influences proposed by Engel *et al.*[10] are listed as follows:

- Resource maintenance and environmental protection categorized as a cultural norm, which is a type of environmental influence. Once more people start to prioritize environmental protection regarding unused medicine recycling, this concept is likely to gradually develop into a cultural norm. As it becomes more widely accepted, this cultural norm is likely to attract more people in the form of a virtuous cycle. Thus, the public is likely to eventually follow this cultural norm and begin to recycle unused medicine
- The sense of identity and concept identity categorized as personal influences, which are a type of environmental influence. People not only care about how others think of them, but also want their family or friends to accept their decisions. When a well-intended concept is accepted by the majority of a community, an individual is likely to unconsciously accept and enact this concept and thus seek a sense of identity from the community. Likewise, if most of the people in a community accept and participate in unused medicine recycling, people who have never engaged in this activity are like to do so more frequently under the influences of a sense of identity and concept identity
- Personal moral cognition categorized as a situation, which is a type of environment influence. Establishing concrete laws and regulations might quickly encourage the public to recycle unused medicine, but this is not as effective as increasing the public's moral cognition, which exerts a more enduring and stronger influence than laws and regulations do. In addition, enforcing laws and regulations can only prohibit the public's explicit behavior. However, the government can educate the public on the harmful effects of unused medicine on children and future generations to increase their moral cognition. Therefore, the public can learn that recycling medicine is closely related to their life and stop carelessly disposing of unused medicine
- The sense of belonging categorized as other influences, which are a type of environmental influence. A sense of belong is a crucial feeling for human beings. When an individual participates in an activity with other members of a group, they fit in, become a part of the group and thus develop a sense of belonging. Because a group leader has a strong influence on most of the members, if the leader recycles unused medicine, then the other members are more likely to do so as well. Thus, the government can promote this activity by communicating with the leaders of major communities or groups in Taiwan who can exert their influence on the members to contribute toward yielding effective results

CONCLUSION

Resource maintenance is particularly effective, favorable promotion outcomes can be achieved in the future if resource maintenance is used as the basis for developing promotion strategies. Legal and moral specifications are not the primary reason for the public to recycle unused medicine, the government must changing the public's perception. Promoting social communication can be an effective tool, we suggested that social networking be incorporated into promoting unused medicine recycling to ensure further success and substantial results.

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