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Application of the Kano Model on Consumer Demand for Immune-Boosting Beverages

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ABSTRACT

The impact of the coronavirus epidemic worldwide has led consumers to change their behaviors, focusing on strengthening the body's immunity and preventing illness from the coronavirus. The objective of this study was to apply the kano model to survey the needs and characteristics of the immune-boosting beverages that consumers were satisfied with. The online questionnaire took place through a google form from April to June 2022. The target group was Thai people who used to or regularly consume healthy foods. The demographic result showed that out of the 200 consumers, 73.5% are female. Most consumers are employee and have an average monthly income of 10,001 – 20,000 THB. Consumers are asked about their behavior in choosing healthy food. It's indicated that they prefer to buy healthy food at department stores. The most consumed type of healthy food is a clean diet, which is a meal that is close to its natural state with less flavoring. Consumers place the highest priority on the nutrition within products and feel that most healthy diets are too expensive. The researcher gave a novel food product information and asked about purchasing decisions using a rating scale. The results of the acceptance score provided that consumers accepted if the novel product is in the form of a functional beverage that uses plant-based ingredients and can boost the body's immune. Kano model was applied in the last session. The kano model was developed by Dr. Noriyaki Kano, as one of the techniques to assess satisfaction. This model used negative and positive questions about the product attributes to classify the attribute into three qualities: basic, performance, and attractive needs. The result obtained showed that if the immune-boosting product is a functional beverage, it should have low calories, which are considered attractive attributes. These features can increase consumer satisfaction if the product is rich in antioxidants, protein, vitamins, and minerals. The longer shelf-life can also please consumers. The reverse attribute, bitterness, should not be presented in the product. The above features can help improve the quality of immune-boosting beverages and satisfy consumers who want to stay healthy.

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INTRODUCTION

The infectious disease epidemic from coronavirus has spread throughout the world since the end of 2019 until now. This leads to the limitation of dietary choices and changes in consumer behaviors to focus on strengthening the body's immunity and preventing illness from this virus. The perspective of Yonathan grad, Infectious Disease Epidemiologist from Harvard, indicated that the coronavirus would not disappear from the world, but, eventually, it will become a local infectious disease like Ebola and Influenza (Harvard T.H.chan, 2020). That means, in addition to getting efficient vaccines, daily life and diet choices are also essential to boost the body's immune.

Functional foods are foods rich in bioactive compounds which are more beneficial to the body than conventional foods. They can be consumed daily, unlike medicines or supplements that have more daily consumption restrictions. Several researchers show that functional foods reduce the risk of illness, promote metabolic activities and also reduce the risk of morbidity from coronavirus infection (Farzana et al., 2022). Polyphenol compounds and carotenoids can help stimulate the immune system. Non-energy components like vitamins and minerals also play a role in the functioning of innate and adaptive immunity (Lange, 2021). In addition to functional foods, the functional beverage market is also rising steadily. Statistic database (Statista, 2021b) has reported that in 2022, the market size of health and wellness beverages and packaged food market in Japan is expected to reach about 55.3 billion dollars. The global functional food and beverage market is also forecast to be worth over half a trillion U.S. dollars in 2028, with annual growth rate of about 9.5% since 2021 (Statista, 2021a).

In order to fulfill the need of consumers in consuming food and beverage products, marketing research is applied to gather the information that allows entrepreneurs to seek opportunities, trends, and consumers' pain points (Južnik Rotar and Kozar, 2017). Kano model was developed by Dr.Noriaki Kano, a Japanese quality expert, which is one of the techniques that can assess satisfaction, need, and expectations of any products and services from consumers (Amporn, 2019). The advantage of using the Kano model is that it helps to sort individual product attributes according to consumer preferences and to be able to prioritize each attribute in production planning. It can also tell the trend of the product attributes to how much satisfying the consumer will be (Jin et al., 2019). On the contrary, this model uses two opposite questions which can confuse the respondents. Additionally, the questionnaire used in Kano, if there are too many, would take a long time to answer and the model was unable to tell how each attribute would affect the overall consumer satisfaction (Mikulić and Prebežac, 2011). Therefore, this research aimed to (1) investigate the current consumer acceptance and demand for immune-boosting beverages by using the Kano model; (2) classify and prioritize each attribute of the beverage to meet consumer expectations.

MATERIALS AND METHODS

Sample selection

Purpose sampling was used to collect information from consumers, which were 200 participants living in Thailand, aged between 18-40 years, and all of them were regularly or used to consume healthy diets. An online questionnaire using google form was collected from April to June 2022. Divided into four sections: demographic, consumption behavior, consumer acceptance, and product characteristics.

Demographic and behavioral information

The first part was the collection of personal data of demographic respondents. Using a nominal scale and a checklist that can choose only one item per question, namely gender, age, current or highest education level, occupation, and average monthly income. Consumption behavior questions were also a nominal scale divided into two types of questions: (1) one choice selection; have you ever consumed healthy foods? A place to shop regularly and consumption frequency, and (2) multiple choices selection; the type of healthy foods purchased, important factors in product selection, and problems encountered in choosing healthy foods.

Consumer acceptance

The third part was quantitative data, using a rating scale of 5; 1 means definitely not buying and 5 means definitely buying. Interval criteria for ranking the average scores, the cut-off was 0.8, calculated from Width = (highest score – lowest score) / range

Questions include: If there are food products that help strengthen the body's immune system in the future, if this immune-boosting food product is in the form of a functional beverage, if this product is a functional beverage that focuses on plant-based ingredients, would you buy it?

Kano model analysis

To find the characteristics of the immune-boosting beverage that consumers are satisfied with. The Kano model uses questions that consist of positive (Functional) and negative (Dysfunctional) forms. The functional form asks consumers how it would feel if this attribute is present in a product. On the other hand, dysfunctional form asks how it would feel without this feature (Kano et al., 1984). Questions consisted of 5 aspects (Appearances, flavors, tastes, nutrition, and packaging) of the product, divided into 26 attributes. In this section, consumers can choose to answer five levels: satisfied, must be, neutral, live with, and dislike.

Took answers from both types of questions to find satisfaction levels (A, O, M, Q, R, I) by comparing the intersection in Table 1. Each level can be interpreted as follows (Kano et al., 1984): A (Attractive) = This attribute attracts customers, O (One-dimensional) = This attribute is the part that makes customers satisfied. M (Must be) = Required in the product. Q (Questionable) = Much awareness is needed. R (Reverse) = In addition to not wanting, it should be improved, and I (Indifferent) = Not different in the customer's feelings.

The frequencies of satisfaction levels were then taken to find the customer satisfaction coefficients from the equation (Berger et al., 1993): Satisfaction = (A+O) / (A+O+M+I) and Dissatisfaction = (O+M) / (A+O+M+I)(-1)

Customer Satisfaction Index (CSI) was obtained by comparing the proportions of customer satisfaction coefficients as shown in the equation (Amporn, 2019): CSI = |Dissatisfaction | / Satisfaction

Once the classified attributes were known, therefore, customer satisfaction index values were placed in descending order in each aspect to determine the priority of the quality improvement first.

Table 1. Kano evaluation table (Kano et al., 1984).

Customer survey responses		Dysfunctional form answer				
		Like	Must be	Neutral	Live with	Dislike
Functional form answer	Like	Q	A	A	A	O
	Must be	R	I	I	I	M
	Neutral	R	I	I	I	M
	Live with	R	I	I	I	M
	Dislike	R	R	R	R	Q

Statistical analysis

Statistical analysis was carried out using IBM SPSS statistic (version 25). Descriptive analysis was used in demographic, consumption behavior, and consumer acceptance data to calculate percentages, mean and standard deviation. All data from kano model were analyzed by Microsoft Excel to determine the level of satisfaction (A, O, M, Q, R, I), customer satisfaction coefficient and customer satisfaction index.

RESULTS AND DISCUSSION

Demographic results

According to a demanding consumer survey for immune-boosting food product after coronavirus crisis, it was found that from 200 respondents, 73.5% were female, 20.5% were male, and 6% were LGBTQ+ (Table 2). Generally, respondents aged 24 - 29 years old (40%), 36.5% were 18 - 23 years old, 20% were 30 - 35 years old, and 3.5% were 36 - 40 years old. The current or highest level of education among consumers was a bachelor's degree with 87%, followed by a master's degree at 10.5%, high school level at 2%, and doctoral level at only 0.5%. Out of all consumers, it was found that 40.5% were employees, followed by students (30%), government or state enterprises (12.5%), self-employed (11.5%), freelancers (4.5%), and others (1%). 27% of respondents had a monthly income range of 10,001 - 20,000 baht, followed by 26.5% at 20,001 - 30,000 baht, 18.5% at 5,001 – 10,000 baht, 10.5% were below or equal to 5,000 baht, 9% at 40,001 baht or more, and finally 8.5% at 30,001 – 40,000 baht. From all the demographic results, it can be seen that most consumers were between Gen Z and Y, which are the ones who can easily access technology but still do not have much purchasing intent due to their limited salary. Therefore, the willingness to buy products for consumers in these age groups requires thorough research before making a final purchase decision (Muralidhar and Raja, 2019).

Healthy diets consumption behavior

The target consumers were first specified before launching the questionnaire. Therefore, 100% of consumers were regularly/used to consuming healthy diets (Table 2), and 39% preferred to buy healthy foods at department stores or supermarkets regularly. Followed by smaller stores such as seven-eleven (31.5%), shopping via e-commerce applications such as Lazada (21%), and the last 8.5% chose to contact the seller directly through social media.

Table 2. Demographic results and consumption behaviors of all consumers (n=200).

Details	Percentage
Demographic results	
Female	73.5
24 - 29 years old	40
Bachelor Degrees	87
Employee	40.5
10,001 – 20,000 THB	27
Healthy diets consumption behavior	
I've eaten before	100
Department stores/ Supermarkets	39
Clean diet	25.2
1 – 2 times per week	51.5
Nutrition	21.2
Too expensive	28.6

The healthy foods that consumers chose the most (Figure 1A) were clean diets (25.2%), vitamin drinking water (24%), tablet supplements (20.9%), instant powder such as collagen (17.7%), home-cooked food (11.6%), and others (0.7%). Most of them consumed 1-2 times/month (51.5%), with similar amounts, 3–4 times/month (30.5%), followed by 2 months/time (10%), and longer than 2 months/time (8%). Figure 1B shown the important factors that affect choosing healthy foods of consumers. Nutrition was the most influencing factor in consumer purchasing decision (21.2%), price (16.4%), taste (14.7%), promotion (11.5%), easy to find anywhere (11%), freshness (7.4%), package (6.7%), net content (6.4%), and novelty (4.6%). In addition, the common problems associated with the consumption of healthy foods (Figure 1C) were that products being too expensive (28.6%), the taste was unpleasant (18.9%), the quantity was too small (16.8%), hard to find anywhere (13.1%), low in nutrition values (7.7%), too much calories (7.5%), the package makes it difficult to eat (6.9%), and so on. Consistent with research by Pudngen (2013) that studied the healthy beverage consumption behavior of Gen Y in Bangkok, it was found that consumers who were students or company employees considered

the nutritional value of drinks, including the taste and reasonable price, affect the purchase decision.

Consumer acceptance

From Table 3, consumers accepted food product that can boost body's immune with an acceptance score of 3.86±0.94 points. Other than that, if this product was in the form of a functional beverage with higher nutrition values than other functional beverages, the acceptance score still up to 3.91±1.00 points. The acceptance score of 3.78±0.98 points was required after consumers were asked how they would feel if this functional beverage was made from plant-based ingredients. Chang et al. (2020) studied university students' purchase intent of functional beverages. The report showed that consumers who pay attention to maintaining health would be more interested in functional beverage, which also led to increased acceptance and purchase intent.

Table 3. Consumer acceptance in immune-boosting beverage (n=200).

Questions	Acceptance score*	Acceptance level
If in the future, there're food product that help strengthen the body's immune system, would you buy it?	3.86 ± 0.94	Well
If in the future, this product is in the form of functional beverage, would you buy it?	3.91 ± 1.00	Well
If this product is a functional beverage that focuses on plant-based ingredients, would you buy it?	3.78 ± 0.98	Well

* Values are expressed as means ± SD

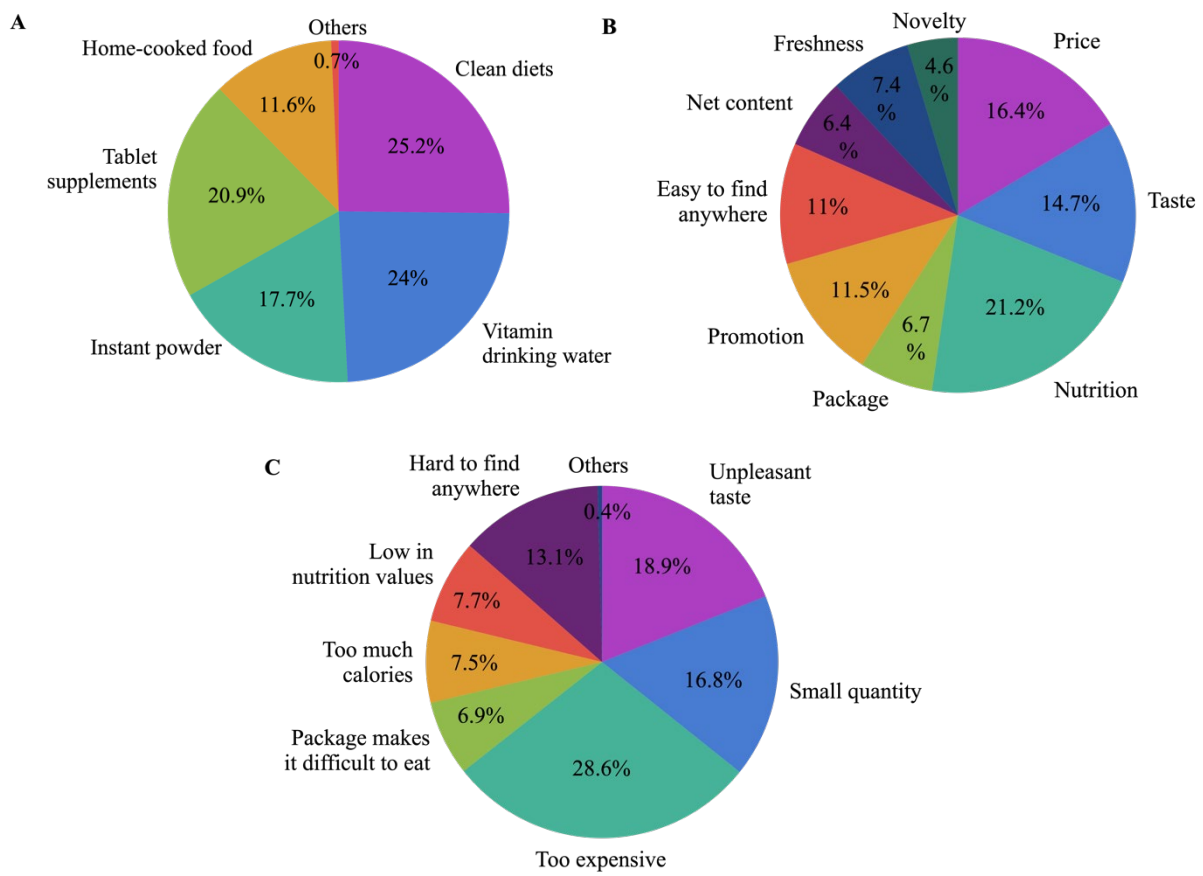

Figure 1. Consumption behaviors of all consumers (n=200); A = Type of healthy foods purchased, B = Factors affected in product selection, and C = Problems encountered in choosing healthy foods.

Kano model analysis

By using the Kano model to classify the product characteristics in each aspect as shown in Table 4 and Figure 2, it was found that appearances and flavors of the product were classified as 'Indifferent', meaning whether these attributes are present in the product or not does not make consumers feel satisfied nor dissatisfied. The reason why each attribute yielded no difference may be due to the fact that consumers were unable to think of the actual flavors of the immune-boosting beverages, and the consumer may lack experience in tasting some of the beverages, making the results impractical.

Comparing the customer satisfaction coefficient in terms of appearances, if this immune-boosting beverage looked clear with no sediment (A1) tended to be more satisfying to consumers than turbid or milk-like texture beverages (A2), which is consistent with

Figure 2 and the satisfaction coefficient is 0.23. When the satisfaction coefficient is closer to 1, the attribute has a greater influence on consumer satisfaction. On the other hand, the dissatisfaction coefficient is very close to -1, which means that the lack of that feature in the product will result in more dissatisfaction with the consumer (Amporn, 2019).

In terms of flavors of the beverage (Figure 2), it was found that lemon (F10) and apple (F7) were more likely to be in the must-be requirements area. By this area, it means that the attributes in this group must already be present in the product, which does not create a more remarkable impression on consumers. Conversely, if these attributes are not present, it will reduce consumer satisfaction (Južnik Rotar and Kozar, 2017). Consequently, female consumers' preference for immune-boosting beverages made from fruits or vegetables was consistent with the results reported that females chose to consume more fruits and vegetables than males (Baker and Wardle, 2003).

In terms of taste, which is another critical factor in creating consumer satisfaction, it was found that all three flavors were classified in the indifferent area (Figure 2), but the sweet taste (T1) had coefficient values that were slightly more than sour (T2). Therefore, from the graph, it can be seen that point T1 tended to the area of must-be requirements more. The bitter taste (T3) can be seen from the graph that the two coefficients were the lowest. This was consistent with Table 4, where the bitter taste had the highest frequency of the 'Reverse' group (103 in 200). Berger et al. (1993) stated that the reverse means that the consumer clearly doesn't want this attribute in the product.

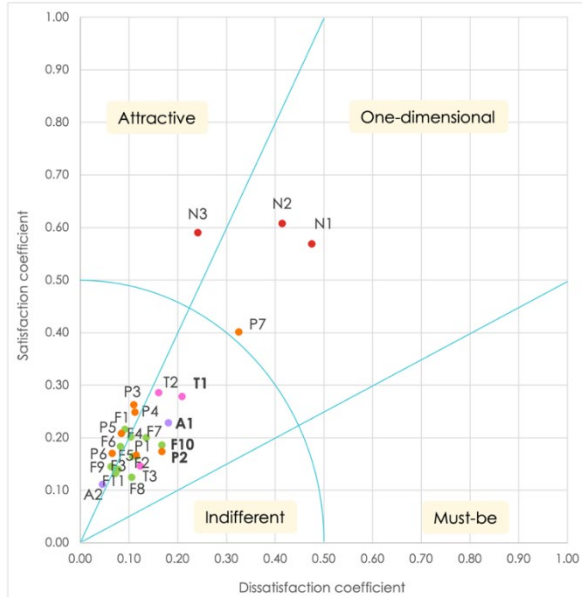

Figure 2. Attributes classification according to satisfaction and dissatisfaction coefficient

Table 4. Kano classification of immune-boosting beverage attributes from all consumers (n=200).

	Attributes	M	O	A	I	R	Q	Sat.	Dis.	CSI	Rank
Appearances											
A1	Clear with no sediment	11	20	19	121	19	10	0.23	-0.18	0.79	1
A2	Milk-like texture	4	3	14	132	37	10	0.11	-0.05	0.41	2
Flavors											
F1	Chocolate	2	12	21	118	38	9	0.22	-0.09	0.42	11
F2	Vanilla	13	6	21	125	30	5	0.16	-0.12	0.70	3
F3	Oat	6	5	15	126	40	8	0.13	-0.07	0.55	7
F4	Tea	6	11	22	125	28	8	0.20	-0.10	0.52	8
F5	Orange	10	7	19	122	37	5	0.16	-0.11	0.65	5
F6	Grape	6	8	23	132	27	4	0.18	-0.08	0.45	9
F7	Apple	15	8	26	121	22	8	0.20	-0.14	0.68	4
F8	Lychee	13	4	16	128	30	9	0.12	-0.11	0.85	2
F9	Pomegranate	7	3	20	129	30	11	0.14	-0.06	0.43	10
F10	Lemon	17	11	20	119	25	8	0.19	-0.17	0.90	1
F11	Ginger	9	1	17	102	63	8	0.14	-0.08	0.56	6
Tastes											
T1	Sweetness	16	17	27	98	30	12	0.28	-0.21	0.75	2
T2	Sourness	15	12	36	105	23	9	0.29	-0.16	0.56	3
T3	Bitterness	9	2	11	67	103	8	0.15	-0.12	0.85	1
Nutrition											
N1	Rich in antioxidants and protein	13	73	30	65	12	7	0.57	-0.48	0.83	1
N2	Rich in vitamins and minerals	7	70	43	66	8	6	0.61	-0.41	0.68	2
N3	Low calories	14	26	72	54	23	11	0.59	-0.24	0.41	3
Packages											
P1	Net volume 45 ml	11	9	20	134	18	8	0.17	-0.11	0.69	3
P2	Net volume 150 ml	24	4	25	114	27	6	0.17	-0.17	0.97	1
P3	Net volume 480 ml	13	5	38	108	26	10	0.26	-0.11	0.42	5
P4	Glass bottle	11	8	34	116	27	4	0.25	-0.11	0.45	4
P5	Plastic bottle	7	6	26	115	38	8	0.21	-0.08	0.41	6
P6	Canned bottle	5	5	21	122	40	7	0.17	-0.07	0.38	7
P7	Keep longer than 1 month	19	38	32	84	17	11	0.40	-0.33	0.81	2

The nutritional value of immune-boosting beverages (Figure 2) found that two attributes were categorized into 'One-dimensional' groups; the drink was rich in antioxidants and protein (N1) and that the drink was rich in vitamins and minerals (N2). It indicated that if the above attributes are available more in the product, the level of consumer satisfaction will also increase proportionally.

Furthermore, the last attribute of nutrition was low calories (N3), which was classified in an attractive area. 'Attractive needs' are the parts that indicate that consumers do not expect this attribute to be included in their products, but if the manufacturer added it will be able to make a more impression and attractive to the product (Južnik Rotar and Kozar, 2017).

As for the beverage package, it was found that if the shelf life was more than one month or longer (P7), it would increase consumer satisfaction because of the highest in coefficients and was categorized as one-dimensional. All attributes from the packaging aspect were categorized as indifferent, but considering both coefficients of 150 ml net volume (P2), and the characteristics of using glass bottle packaging (P4) were 0.25 and -0.11, which were inferior to the shelf life and consistent with Figure 2 where both attributes tended towards the must-be requirements area. Therefore, choosing these packaged beverages tended to be more satisfying to consumers than other formats.

Considering the satisfaction index (CSI) of the 26 attributes, they were sorted in descending order in each aspect to determine which characteristics should be given the most importance or to select a quality improvement first. They can be sorted as follows: Appearances: clear without sediment and turbid beverage, Flavors: lemon, lychee, vanilla, apple, orange, ginger, oat, tea, grape, pomegranate, and chocolate, Taste: bitter, sweet and sour, Nutrition: rich in antioxidants and protein, vitamins and minerals and low in energy. Packaging: net volume 150 ml., shelf life one month or more, net volume 45 ml., packaged in glass bottles, net volume 480 ml., packaged in plastic bottles and canned packaging.

Evaluation of the Kano model, the researcher can choose to prioritize the attributes according to the M>O>A>I rule, or the researcher can use the customer satisfaction index (CSI) as well (Amporn, 2019). In this study, group classification and satisfaction index results were in the same direction. Therefore, the beverage to enhance immunity should be a clear solution, sweet taste with no bitterness, rich in nutrition, can be stored for more than one month or longer, had a lemon flavor. Developing a distinctive feature of the product was keeping this beverage low energy, which will be a point that can attract consumers to turn their attention to our products.

CONCLUSIONS

The use of online questionnaires to collect data to study the current consumer acceptance and market demand for immune-boosting beverages was effective and comprehensive based on the research objectives. The results of the demographic data showed that the majority of consumers were women of working age and had a relatively limited income. It can be concluded that consumers preferred to eat clean diets, choosing healthy diets based primarily on nutritional value. The general problem was that healthy diets were too expensive in the consumers opinion. Consumers' acceptance of immune-boosting beverages was at a high level for all conditions. The application of the Kano model to determine the characteristics of the desired immune-boosting beverages that should be applied in future product developments were the immune-boosting beverages should be rich in antioxidants, proteins, vitamins and minerals, had a shelf life of more than 1 month, keeping in low energy and avoiding the bitter taste in the product as much as possible. Therefore, it can be seen that the Kano model is a marketing tool that can be used as a guide for the development of products and services appropriately.

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