

Young Chinese Consumers' Willingness and Acceptance Towards Artificial Meats

Zekai Wang

¹ Crespi Carmelite High School

*Corresponding author. Email: wangzachary925@gmail.com

ABSTRACT

This paper asks the young Chinese consumers' willingness and acceptance towards Artificial Meats. To do so I sent out 100 questionnaires to investigate the attitudes of young Chinese people towards the consumption of artificial meat. I received 83 questionnaires in the final return stage. The key findings that I discovered were: Young Chinese consumers lack a comprehensive knowledge of artificial meat and they are conservative about artificial meats. When the safety and hygiene aspects of artificial meat are guaranteed, people are more willing to consume artificial meat. The sustainability of artificial meat has a positive impact on people's desire to consume it. However, this effect highly depended on people's awareness of the environmental effects of artificial meats. In order to raise the willingness to buy artificial meat, the government should increase the positive publicity of artificial food. At the same time, it is important to ensure that the production process of artificial meat is safe and sustainable, and to reduce the price of artificial meat.

Keywords: "Artificial Meat, Chinese Young consumers' willingness, Environmental Sustainability".

1. BACKGROUND AND INTRODUCTION

With the rapid development of China's livestock industry, livestock pollution problems are gradually becoming more prominent, and artificial meat will become a viable way to manage the problem of livestock pollution. In addition to the development and production of artificial meat, we also need to understand the Chinese consumer market's attitude toward artificial meat consumption.

The development of human livestock farming has now made great progress. According to the United Nations FAO (1998) data [1] China's pig rearing amounted to 486 million head, 117 million head of cattle, 256 million sheep, 3.804 billion birds, except for cattle rearing for the world's third, pigs, sheep and poultry are the world's largest. It raises environmental concerns. But the huge livestock industry can bring huge pollution while providing sufficient meat for people. For example, just take the national pig farming water discharge in 2001, the country rearing 486 million pigs, the annual water discharge is about 5.322 billion tons. And according to the survey of 444 pig farms living in the country, about 97.7% of the sewage is discharged directly from pig farms into rivers without treatment. These organic element-rich sewage discharged directly into the river is very likely to cause eutrophication of the river

water, which will seriously affect the water quality of the lower stream [2]. At the same time, the development of animal husbandry will also reach a bottleneck in a few years. Livestock is an industry with long cycles and high risks. Once the market changes, farmers will be more affected. In 2011, the price of pork in April was ¥24 per kg. In 2010, the price of pork in April was ¥28 per kg. 2011 saw a 16.7% drop in pork prices compared to the same period in 2010. Large scale farms will face a loss of ¥150 to ¥200 per pig sold [3]. Based on the current growth in meat demand, the total amount of human livestock production will soon fall short of the total amount of meat that people need. Meat is an important source of protein for humans. Over the past five years (2010-2015), per capita meat consumption has risen significantly and this trend is sure to continue. total global meat production has reached more than 300 million tons in 2013. By 2050, the world population will grow from 7 billion today to 9 billion. As the world's population grows, the demand for meat will continue to increase, and worldwide meat consumption will rise at double-digit rates for the foreseeable future [4].

According to Environmental problems of China's livestock and poultry farming industry and countermeasures for prevention and control [5], the main environmental problems of China's narrative farming month are: a very large amount of livestock waste

production. The pollution of the environment by livestock waste is very serious. China produced about 1.9 billion tons of livestock waste in 1999, 2.4 times more than industrial solid waste. Livestock waste pollution seriously threatens and affects the regional environmental quality of large and medium-sized cities. The untreated sewage from livestock farms contains a large amount of pollutants, and its high pollution load can pollute water bodies. The pollutants in livestock waste contain a large number of pathogens, microorganisms and parasites as well as their own mosquitoes and flies will increase the variety of pathogens in the environment, which may lead to epidemics. Livestock farming effluent may be used for irrigation and can harm the ecology of farmland.

So what is needed to solve this problem? It seems that artificial meat is a very feasible solution. Today, mainstream artificial meat is divided into two types. One type of artificial meat [6], (plant-based meat) known as soy protein, this artificial meat mainly relies on soy protein, because it is rich in a large amount of protein and a small amount of fat, so it is a healthier food. And the other type of artificial meat is the direct use of animal stem cells to proliferate the manufacturing of meat. People can use sugar, amino acids, oils, minerals and a variety of nutrients to feed the stem cells, so that they continue to grow in value, and eventually form artificial meat. This kind of artificial meat is expected to solve the environmental and animal protection problems faced when entering production, because it does not require all the processes in the traditional animal husbandry [7].

The use of animal cells to grow artificial meat (cultured meat) only really emerged in the early 21st century [8], and only in 2012 did the world's first cultured meat emerge, developed by Dutch scientist Mark Baust [9]. Based on the method that Alfieri [10] and Kadim [11] offered to make cultured meat. First they started by growing cells from family or fish muscle tissue on a membrane. The cells grow and expand and then are shed from the film, and then when the shed cell population builds up to a certain thickness, a whole piece of meat is formed.

Nowadays, commercial companies are exploring the markets of artificial meat. Beyond meat is a company that was founded in 2009 in the United States to produce artificial meat made only from plants. And the veggie burger meat they produce is already available in about 4,000 convenience stores and malls across the United States. In China, there are already many companies that are trying to develop artificial meat. One of them is YanTai ShuangTa Food Co. The company has entered into a partnership with KFC, which is using the company's artificial meat for its vegetarian burgers. These burgers are available at most KFCs in China. According to the 2021 China Plant-Based Meat Industry Insights White Paper, China's demand for plant-based

meat will increase by 200% over the next five years, and Euromonitor forecasts that China's artificial meat market will reach \$13 billion by 2023. In this regard, the Chinese artificial meat market is promising.

As artificial meat could be a potential solution to environmental crises, understanding consumers' willingness to eat artificial meat is a key question. The willingness of Chinese consumers to consume artificial meat is clearly a decisive factor. However, only a few studies have mentioned consumers' willingness to consume, and we know very little about Chinese consumers' willingness to consume.

Therefore, in this study, 100 surveys will be conducted on the consumption intentions of younger Chinese consumers towards artificial meat. It will give us a deeper understanding of the consumption intention of young Chinese consumers towards artificial meat.

2. DIVIDED OPINIONS

"Artificial meat" in the current environment of excessive environmental load and rising population, is bound to become the future development trend of human meat sources, but its development process still requires continuous investigation and optimization by scientists, as well as effective supervision by the relevant regulatory authorities, in order to become affordable and safe for everyone to consume "civilian food" [12].

Some optimistic industry players believe that in the long run, consumers are more concerned about eating healthier after solving the problem of having enough to eat. Artificial meat contains higher protein and lower fat, which is a good source of protein food. As people pay attention to nutrition and health, vegetarian plant meat has a certain market base and consumer groups.

However, most experts say that it is still difficult to replace meat with artificial meat on a large scale. Reporters interviewed found that at present, artificial meat is more like a commercial gimmick. Liu Rui [13], an associate researcher at the Institute of Food and Nutrition Development of the Ministry of Agriculture and Rural Affairs, said that to develop plant meat with senses similar to real meat products, the production technology requirements are high. For clean meat cultured with animal cells or tissues to simulate the physiological environment in the body, in sterile, moderate and nutrient-rich conditions, so that the isolated cells or tissues survive, grow and maintain the structure, there are no mature products on the market, whether consumers can accept it is unknown, and the market outlook is unclear.

In addition, an important reason limiting the commercialization of artificial meat is the high cost. "Although the current cost has been significantly reduced

from a few years ago, it is still significantly higher than traditional meat." Xue Yan [14] said.

Li Jian said the future development of plant meat is still relatively promising, but plant protein has some fishy taste, which seriously affects the quality of plant meat, still needs to be overcome.

The future development of artificial meat, still can not be separated from the national diet structure and dietary habits of adjustment and change [15].

3. WHAT MIGHT AFFECT PEOPLE'S CONSUMPTION BEHAVIOURS?

The concept of artificial meat is currently not clearly understood in the market. There is also not enough literature to conduct a comprehensive survey of the consumer viewpoint perception of artificial meat. Even those studies that have done so do not make detailed distinctions between specific populations. For example, the scope of the survey is defined as young middle-aged or elderly or based on social class or education level.

As of now, it seems that one of the factors that may have a strong influence on the consumption perception of artificial meat in the Chinese consumer market is the fact that people consume artificial meat based on their environmental beliefs. If we can identify the environmental behavior of these people and combine it with their consumption of artificial meat, we can justify this theory.

There is only one study in this topic, Chinese Consumers' Attitudes and Potential Acceptance toward Artificial Meat [16] This article shows that the potential acceptance of artificial meat in China depends on Chinese dining, culture, and perceptions of food and traditional philosophies. Factors such as the safety, taste, and nutrition of artificial meat have little influence on people trying it. Since China's society is changing rapidly, the age of the sample population is an important factor, and samples of different ages may have very different ideas. In my opinion, this study did not have a clear age split, it cannot tell us how Chinese young consumers think of artificial meat. So I reexamined the willingness of Chinese consumers to consume artificial meat based on young people as the standard.

Although there are not many direct studies on Chinese consumers' willingness to consume artificial meat, if one considers the consumption of artificial meat as an environmental behavior, one can borrow some environmental studies that discuss what factors influence people's environmental behavior.

Based on previous studies, we have found that some of these factors have an important impact on the consumption intentions of green consumers. For instance, the organic vegetable market is about consumers believing in the sustainability of organic

vegetable products and that the use of organic products is of great importance to the environment. In the decision making process, consumers' trust in the organic market, as well as their estimation of the value of organic products, can influence their willingness to purchase green products [17]. Second, concern for the environment are all important factors that influence consumer perceptions of green consumption [18]. Third, emotion also plays a role, both passion for nature and intimacy with nature have a positive impact on people's behavior to protect the environment [19]. Other factors, such as culture, diet also shape their willings. Consumers with different characteristics showed different attitudes to cultured meat [20]. Plus, price also matters [21].

In other words, the problem of livestock pollution in the world is becoming more and more prominent, and the sustainability of artificial meat can solve this difficult problem. However, the lack of awareness of artificial meat in Chinese consumer groups makes it difficult to form a perfect artificial meat consumption system in a short period of time. There is no systematic conceptual study on the consumption concept of artificial meat among young Chinese consumers. Therefore, there is no way to develop an effective means to promote and popularize artificial meat among young Chinese consumers. On the other hand, the period of environmental protection concept of consumers is a direct influencing factor on the viewpoint of artificial meat consumption. Therefore, we can study the environmental behavior of young Chinese consumers to determine their environmental philosophy, and use it to study the relationship between consumer environmental philosophy and the sustainability of artificial meat.

4. METHODOLOGY

My goal is to find out food sustainability prospects in China, the introduction of artificial meat in China as a sustainable solution, would sustainable consumers welcome it? In this study, a survey was distributed to find out the consumer attitudes and environmental behaviors of consumers in Hangzhou, Zhejiang Province, China.

Compared to other survey instruments the survey format is more convenient, more representative, and because the answers to the questions in the questionnaire are more standardized (mainly close questions) it is easier to answer and easier for the researcher to compare the results [22][23].

In the present study, I hypothesized that When artificial meat is accessible, young urban sustainable customers in China prefer artificial meat to conventional meat. The possible main motivation is sustainability.

The main sample of the questionnaire is young consumers in most advanced city in China----- HangZhou. Hangzhou is one of the most progressive cities in China, and due to the economic status of the city

and the level of development housing prices have become representative of these factors, with prices in downtown Hangzhou already reaching \$12,000 per square meter. This city was chosen as a sample base to better represent the new forces in China and the attitude of progressive thinking towards the consumption of artificial meat. And the main constituents were university students.

4.1. Distribution and collection of questionnaires

The questionnaires are posted on the author's personal social networking software (QQ, WeChat) in the form of an online third-party [24] website. The questionnaires are automatically collected by the third-party platform and aggregated into a tabular form.

I sent out a total of 100 questionnaires in this survey and received 83 valid responses. Due to the new virus, I used my personal social network and asked my friends to forward the questionnaire to their peers in the same city. This questionnaire is a non-profit academic survey aimed at understanding Chinese consumers' willingness to consume artificial meat. All personal information will be kept confidential and used for survey purposes only.

In this study, the questionnaire was designed based on the hypothesis to investigate mainly the willingness of young Chinese citizens to consume artificial meat and environmental behavior of young Chinese consumers, as well as questions about their knowledge. Of course, the questionnaire also asked some basic factors, such as consumers' meat preferences, consumers' age, consumers' income, and consumers' education level, all of which may be factors affecting consumption intentions. With these questions, I can cross-reference them and find out the relationship between young Chinese consumers' environmental philosophy and their willingness to consume artificial meat.

4.2. Data and Samples

4.2.1. Sample

The main age group of this sample is young people, with a relatively even gender distribution. In terms of education level the main group is college students, accounting for 62.65%.

Table 1. Demographic information of the response of my survey(83 responses total)

Question	Response Option	No.	%
Age	12-16	4	4.82
	17-21	24	28.92
	22-26	33	39.76
	27-31	14	16.87
	Older than 31	8	9.64
Gender	Male	40	48.19
	Female	43	51.81
Education Level	Primary education	2	2.41
	Secondary education	9	10.84
	High School Education	12	14.46
	University	52	62.65
	Master	5	6.02
	Dr.	2	2.41
	Above	1	1.2

4.2.2. Consumption characteristics

In order to understand the factors shaping, I also asked about social-economic backgrounds and diets. Most of the tested samples, the average monthly food consumption expenditure is higher than the national per capita food consumption expenditure level. In 2020, the national per capita food, tobacco and alcohol consumption expenditure is 6397 yuan. And in this survey, 73.49% of the population has a monthly food consumption level higher than ¥1000 [25]. The sample has a high dependence on meat consumption. Meat has become a daily recipe. Because the promotion of artificial meat can bring great improvement to the environment, the idea of protecting the environment can also be an important factor influencing the consumer's idea of artificial meat consumption.

Table 2. Sample food consumption characteristics, consumption frequency and environmental aspects.

Question	Response Options	No.	%
personal monthly food	○0-500	2	2.41
	○501-1000	20	24.1
	○1001-2000	33	39.76
	○2001-3000	18	21.69

consumption level	<input type="radio"/> 3001 or above	10	12.05
How often do you consume meat products on a daily basis	<input type="radio"/> No meat at all	1	1.2
	<input type="radio"/> Eat once a week or less	12	14.46
	<input type="radio"/> Take it once every 2-4 days	19	22.89
	<input type="radio"/> Every day.	37	44.58
	<input type="radio"/> Every meal.	14	16.87
environmental aspects	<input type="radio"/> No concern.	7	8.43
	<input type="radio"/> Have environmental intention but little or no action	29	34.94
	<input type="radio"/> Have an environmental intention and can take action in life	38	45.78
	<input type="radio"/> Have a strong sense of environmental protection and organize or participate in some environmental activities on their own initiative	9	10.84

4.3. Data Analysis and Key Findings

The population was mainly concentrated in the age group of 17 to 31 years old, the ratio of male and female subjects was relatively even, and the education level of the sample was mainly concentrated in university education.

My findings suggest that young Chinese consumers are not well aware of artificial meat. People are more inclined to buy artificial meat when its safety and hygiene are guaranteed. People will buy and use artificial meat because of its sustainability but this is very dependent on the level of knowledge about artificial meat. There are only a few people who have good artificial meat knowledge and are willing to purchase more as a response to the environmental crisis. If the government wants to increase the desire of young Chinese consumers to consume artificial meat, it must do so by increasing the awareness of artificial meat, while at the same time improving the safety and sustainability of artificial meat in terms of productivity and reducing the price of artificial meat.

4.3.1. Knowledge and attitude towards artificial meat

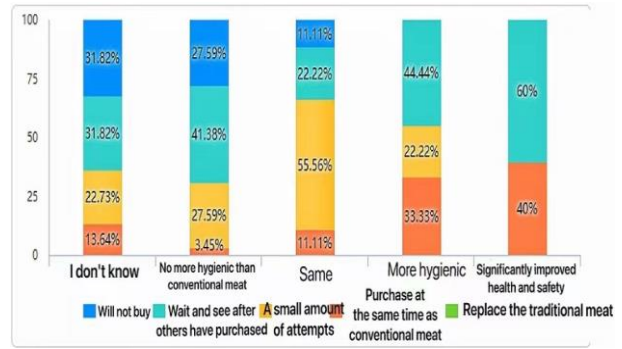
Chinese consumers know very little about artificial meat. Only 16% believe that artificial meat has an advantage over traditional meat in terms of hygiene. The other 84% have misconceptions about artificial meat, believing that its safety is not advantaged or that it is less reliable than traditional meat. This shows that Chinese consumers have a conservative attitude towards artificial people. 51% of the subjects believe that artificial meat will not bring significant positive changes to the environment. Even though the governments officially proved the artificial meat is harmless, only less than 20% of people show a positive view on artificial meat. On a positive view, over 45% of people who do not have a high level of knowledge of artificial meats but are interested in knowing more about the industry and the products.

Table 3. Artificial meat consumption factors

Questions	Response Options	No.	%
level of knowledge about artificial meat	<input type="radio"/> Never heard of it.	8	9.64
	<input type="radio"/> Few and disinterested	31	37.35
	<input type="radio"/> Few but interested in knowing	38	45.78
	<input type="radio"/> Understand most of the concepts in this area	6	7.23
	<input type="radio"/> Professional	0	0
Do you perceive artificial meat to be safer and more hygienic than conventional meat?	<input type="radio"/> I don't know	22	26.51
	<input type="radio"/> No more hygienic than conventional meat	29	34.94
	<input type="radio"/> Same	18	21.69
	<input type="radio"/> More hygienic	9	10.84
	<input type="radio"/> Significantly improved health and safety	5	6.02
In your opinion, how does artificial meat compare to conventional meat in terms of environmental performance?	<input type="radio"/> No Idea	21	25.3
	<input type="radio"/> No more environmentally friendly than conventional meat	22	26.51
	<input type="radio"/> Same	14	16.87
	<input type="radio"/> More environmentally friendly	18	21.69
	<input type="radio"/> Has the potential to help solve the problem of livestock pollution once and for all	8	9.64

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Questions	Response Options	No.	%
If the state approves artificial meat on the market, what would be your intention to consume and eat it?	<input type="radio"/> Will not buy	17	20.48
	<input type="radio"/> Wait and see after others have purchased	30	36.14
	<input type="radio"/> A small amount of attempts	25	30.12
	<input type="radio"/> Purchase at the same time as conventional meat	11	13.25
	<input type="radio"/> Replace the traditional meat	0	0
If artificial meat were legally introduced into the restaurant industry, would you make special requests for it when dining.	<input type="radio"/> I don't mind.	13	15.66
	<input type="radio"/> will ask but not mind	33	39.76
	<input type="radio"/> Require to reduce the use of artificial meat	24	28.92
	<input type="radio"/> No artificial meat	13	15.66



The percentage of people who do not know about the hygiene of artificial meat is 31.82%, and the percentage of people who think "artificial meat is no more hygienic than traditional meat" is 27.59%, a decrease of 4.2 percentage points. The percentage of people who believe that artificial meat is about as safe and sanitary as traditional meat is 11.11%, a significant decrease compared to the previous two. For both the more hygienic and substantially safer options, 0% of the population would not buy it. It is reasonable to believe that consumers are more likely to choose to buy artificial meat when they believe it is safer. On the other hand, young Chinese consumers are currently more cautious (conservative) in their attitudes towards artificial meat consumption. This is because none of the 83 people surveyed chose artificial meat as a replacement for traditional meat.

4.3.2.2. Price

Question 9. What is the pricing range that would cause you to buy artificial meat for a long time, given that safety and taste are guaranteed?

20% of people think the price of artificial meat has nothing to do with the willingness of consumption. The majority of people think that the price of artificial meat needs to be lower than traditional meat if they are going to purchase it in daily life.

4.3.2.3. Food budget

X: Question 17. What is your personal monthly food consumption level?

Renminbi (RMB)

Y: Question 4. If the state approves artificial meat on the market, what would be your intention to con

4.3.2. Analysis of factors

4.3.2.1. Safety

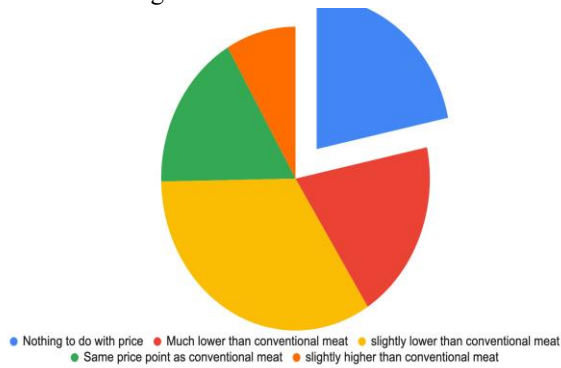
The safety of artificial meat affects people's willingness to buy it.

X: Question 7. Do you perceive artificial meat to be safer and more hygienic than conventional meat?

Y: Question 4. If the state approves artificial meat on the market, what would be your intention to consume and eat it?

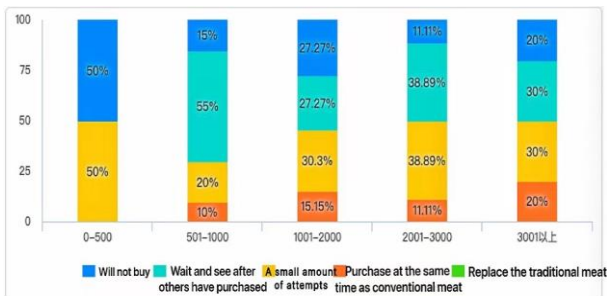
Chart 1. Artificial meat hygiene knowledge on the influence of artificial meat consumption willingness.

Chart 2. The effect of artificial meat pricing on willingness to consume artificial meat.



sume and eat it?

Chart 3. The effect of individual food consumption level on willingness to consume artificial meat.



0-500 as well as 501-1000 are very different from the rest of the option distribution. Among the 501-1000 monthly food consumers, 55% of the subjects chose to wait and see what others would buy. Fifty percent of those who chose 0-500 chose not to purchase artificial meat products. It can be seen that people with lower food expenditures are more likely to have a wait-and-see attitude toward artificial meat.

4.3.2.4. Environmental Impacts

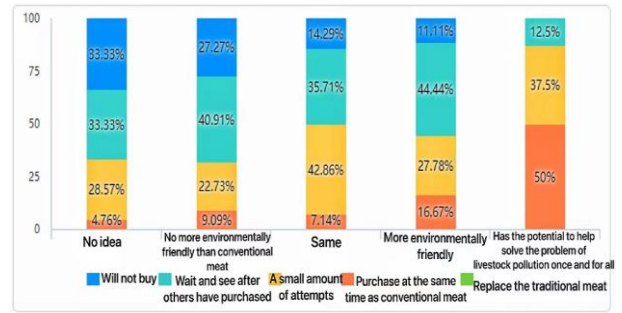
X: Question 8

In your opinion, how does artificial meat compare to conventional meat in terms of environmental performance?

Y: Question 4

If the state approves artificial meat on the market, what would be your intention to consume and eat it?

Chart 4. Artificial meat environment friendly effects on artificial meat consumption willingness.



The results show that the more people who think that artificial meat is more environmentally friendly, the more likely they are to buy it. Those who will not buy it range from 33.33% who do not know, to 11.11% who think that environmentally friendly artificial meat is more environmentally friendly, and finally to 0% who think that it has the potential to help solve the problem of pollution in the livestock industry. The results also show that the majority of Chinese consumers have a wait-and-see and conservative attitude towards artificial meat. Waiting for others to buy, wait-and-see, and a small amount of experimentation make up the vast majority of the group. The wait-and-see group is more evenly distributed among the four options of not knowing, not as environmentally friendly as traditional meat, about the same, and more environmentally friendly.

5.CONCLUSION

Due to the increasing awareness of the environment's importance, young consumers are more likely to eat meat that is produced without harmful chemicals. The price of artificial meat, the perceived safety of meat, and the environmental friendliness of artificial meat all have a significant influence on young consumers' desire for meat. The perception of safety of artificial meat increases, which leads to a decrease in the number of people who would not buy it. The willingness to consume artificial meat rises when the safety of the product is guaranteed.

Possible factors that could influence the consumption of artificial meat include income and education level. High-income individuals are more likely to try new food sources, while low-income households are more likely to avoid buying it. With the increasing awareness of the environment's importance, more people are willing to eat meat that is produced without harmful chemicals. Since the perception of the environment and safety of artificial meat are very important to Chinese consumers, the government should promote the use of various tools to stimulate the consumption of more artificial meat. This will help remove the doubts of the consumers and lower the prices of the product.

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