Consumers' attitude toward participation in community-supported aquaculture: a case of Kurdistan province in the west of Iran

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Abstract

Considering the increasing importance of sustainable operations in the agricultural sector and the relationship between producers and consumers, the current study was to determine customers' attitudes on participation in community-supported aquaculture programs in Kurdistan province (in the west of Iran). The present study was a survey, non-experimental, applied, and descriptive–correlational research. Using a literature review and field studies, factors affecting consumers' attitudes have been extracted. Then, to determine validity, the questionnaire was given to a panel of subject matter experts. Furthermore, to assess the reliability of the research instrument, the Cronbach's alpha coefficient was calculated. The results showed the good validity and reliability of the research tool. Moreover, structural equation modeling was used to confirm the proposed model. The results showed that among the factors affecting the attitude of consumers, the price of aquatic products had the first place, which has been neglected in the previous studies. In this regard, it was suggested that by creating support funds and facilities for the participation of consumers in community-supported aquaculture programs, setting standards for healthy aquatic products, and producing programs related to the introduction of community-supported aquaculture programs on the radio and television, the attitude of the consumers can be improved.

Keywords Attitude · Participation · Sustainable exploitation systems · Sustainable development · Community-supported aquaculture · Blue revolution

Introduction

In the last two decades, marine aquaculture (MA) has experienced the highest growth among other food production sectors. In addition, global trends show that MA, as one of the fastest growing sectors of food production, is increasing continuously. Furthermore, this phenomenon is referred to as the "blue revolution" (Bradford et al., 2020; Bailey, 2020). According to the Food and Agriculture Organization (FAO), among 70 farming systems, MA has the greatest prospects for poverty eradication (FAO, 2020). The current global population expansion and increasing demand for protein necessitate the development of appropriate food supply systems. Thus, MA has a special role and can be one of the elements and strategies for protein production. Given the impact of carbon emissions and greenhouse gases on the planet and humans, disturbance of the ecosystem sustainability, the identification of species, and their impact on global warming show that MA has low carbon emissions. As a result, researchers should pay close attention to this topic (Dabbaghi and Choobchian, 2020). Moreover, the nutritional and medical value of fish has been recognized for many years, as few people are unaware of the nutritional value of fish and its crucial role in human life, especially with the COVID-19 epidemic. Several studies (e.g., Zhou et al., 2018; Zhang et al., 2019) have indicated that aquatic animals' consumption improves the body's immune system and resistance to the coronavirus (Aman & Masood, 2020a, b). However, statistics by Kansiime et al. (2021) showed a significant disruption in the food chain and regional and international agriculture. MA is also affected by COVID-19, and with the application of trade restrictions to protect domestic food, the global food supply chain has been

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severely disrupted, and this trend is still persistent. People who owned MA farms continued to operate during the crisis. Others who leased farms, meanwhile, faced financial crises and were forced to close (Zorriehzahra et al., 2020). Hence, the landholding systems should be expanded to maintain food security in the regions as well as to bring comprehensive benefits to both the consumer and the producer. Therefore, by taking these measurements, besides creating food security for consumers, producers can reduce their problems as they are considerably damaged and have problems making a living for their families (Giller et al., 2021). The scientific community has begun to wrestle with several critical challenges, including MA's environmental effects (Ahmed et al., 2019; Fruehe et al., 2021). Furthermore, MA farms are frequently located in congested coastal zones, where they compete with a variety of other land and water users. Consequently, there are a lot of stakeholder conflicts on land and water (Bohnes and Laurent, 2021). Even where there is no direct disagreement, there is evidence of public uncertainty on matters ranging from MA quality and safety to environmental implications (Fruehe et al., 2021). Stakeholder disputes and public perceptions are major concerns for MA operators and regulators.

The influence of coastal environmental MA and the repercussions of water pollution on MA growth are regarded as developing contradictions in the use of natural resources in Kurdistan province, which can be mitigated through resource allocation and management in this province (Bohnes and Laurent, 2021). MA farming continues to have several environmental implications, including fertilizer and chemical emissions into water, interactions with local biodiversity, energy usage, and dependency on capture for feed production (Ottinger et al., 2016). These contribute to environmental issues such as eutrophication, climate change, biodiversity destruction, and depletion of resources (Bohnes et al., 2019).

Water quality, modification or loss of natural habitats, and the introduction and spread of aquatic animal diseases are the most common negative environmental impacts associated with MA (FAO, 2020). The absence of supply and use of adequate equipment will worsen these problems (Salin and Ataguba, 2018).

As a result, the environmental perspective of MA producers and the demand and attitude of consumers can be considered important in preserving the environmental aspects of this activity. In this regard, community-supported agriculture (CSA) is used as one of the important forms of sustainable agriculture in MA. This approach helps to build a more indigenous and equitable agricultural system and allows farmers to focus on good farming practices while ensuring their profits at the same time (Soley et al., 2019). The most salient goals of CSA are to address concerns about the quality of the food supply and the survival of small farms. The CSA developed an innovative approach to food safety and sustainability that builds customer trust and ensures that products are safe, sometimes organically grown, and manufactured in an environmentally sustainable manner (Krul and Ho, 2017). Families run some CSA farms, while others involve groups of producers to supply additional goods. Many CSA farms ask members to commit time and labor to the operation, which not only lowers costs but also allows members to learn more about what it means to grow MA.

The primary goal of developing closed systems is to reduce nutrient emissions in open waters, which cause eutrophication. However, in order to recreate an environment favorable for MA growth, energy requirements are typically high, contributing to increased climate change impacts when that energy is derived from fossil-based sources (Bohnes et al., 2019). Furthermore, the feed has been discovered to be the most significant contribution to the environmental implications of MA sources (Bohnes et al., 2019). Farmers may select from a wide range of feed components, such as fishmeal, soybean meals, or even insect-based meals, each of which has a distinct environmental effect (see, e.g., Boissy et al., 2011; Little et al., 2018).

CSA is a different way of distributing agricultural goods, containing MA, which is compatible with the food supply chain shortening concept. It goes beyond the usual profit maximization strategy to increase local relationships with food customers. As a result, it is critical to study methods that will allow pond farms to be more profitable while simultaneously increasing the MA economy's pro-social and pro-environmental function. MA is undeniably important for the socio-economic development of rural communities. The state of this business will thus be determined by a variety of critical factors but also by intangible interactions that ensure the relationship between producers and customers. As a result, it is essential to develop a direct cooperation formula that generates specific benefits for both parties: producers increasing their competitive capacity on the market in times of increasing uncertainty and consumers' access to specific products, as well as the opportunity to learn about the MA. Such patterns of collaboration are evident in the concept of CSA, with innovative solutions allowing direct sales to expand. The purpose of explaining the CSA in this study is to assist us to understand why a behavior model occurs rather than how frequently it occurs. Both are critical questions to ask and answer, but descriptive data from CSA is the greatest way to determine under what conditions the behavior happens. Despite the growing importance of MA, no study has been conducted on people's attitudes toward participating in community-supported MA programs. In addition, limited research on consumer attitudes has often been based on outdated behavioral models in which there is no news of influential variables on attitudes to participation in such projects' example giving price and health, environmental concerns, and lifestyle, which this research attempts

to fill this theoretical gap. However, very little research has been done on community-supported MA programs, and no attention has been paid to consumers' attitudes in this regard. Therefore, identifying factors affecting consumers' attitudes toward participation in such programs is one of the main objectives of the present study, as this issue has received less attention in previous studies.

According to the above description, it is vital to investigate solutions facilitating higher profitability of MA but also strengthening the pro-social and pro-environmental role of the MA economy. MA is of indisputable significance for the socio-economic development of rural areas. Therefore, the state of this business will not be only determined by a variety of critical factors (e.g., infrastructure, sales market size, processing scale, and so on), but also by non-material factors such as the quality and longevity of reciprocal relationships between MA producers and consumers. Therefore, it becomes extremely important to develop a context of direct cooperation which generates specific benefits for both parties, i.e., producers (by increasing the competing capacity on the market in the times of increasing uncertainty) and consumers (by access to specific products and the identification of their source of origin, along with the possibility of learning about the actual reality of MA). Such cooperation patterns can undoubtedly be found in the concept of CSA with innovative solutions supporting the development of MA. Bearing in mind that so far, to our knowledge, the CSA model was not reflected in MA; the discussion was focused on the potential identified on the supply and demand side of the MA. The analysis was conducted from the perspective of a selected group of consumers and local MA producers. Therefore, the main aim of this study was to determine customers' attitudes toward participation in community-supported aquaculture programs in Kurdistan province in the west of Iran.

This study introduced the concept of consumer–producer interactions (CPI). In this context, interaction is a mutually aligned, direct relationship of the CSA stakeholder groups that is characterized by participation, information, negotiation, and common contractual arrangements. Interactions are subject to a dynamic, ongoing process of mutual matching and balancing of the interests of both groups of actors. Thereby, interactions can be determined by rational decisions, affected by the emotions of the stakeholders, or based on traditions or habits (Turner, 1988, referring to Weber et al., 1976). CSA farmers use a diversity of strategies, narratives, and practices adapted to the specific situation of the farm environment or the stakeholder group to balance community-based and market-based agendas (Mars and Schau, 2017; Papaoikonomou and Ginieis, 2017). Compared to that, the CPI concept covers the range of practices, agreements, and rights between consumers and producers in CSA. Not

considered are strategies at the interface between farms and markets, e.g., as distribution diversification.

Despite the fact that CSA farms are in existence, there has been little research on the influence of CSA on MA globally, as well as in Iran. Thus, there is a deep research gap in introducing the subject of CSA in the national and international literature as a more informative approach. For instance, Raftowicz et al. (2021) investigated the CSA model in the Polish carp market and discovered that it might be a source of unique advantages in the economic, social, and environmental aspects for the supply chain's major players (i.e., carp producers and consumers). According to Campbell et al. (2014), community-supported fisheries (CSF) and CSA initiatives share the goals of minimizing the social and physical distance between consumers and producers and re-embedding food systems in social and environmental settings. CSA is a rising local food consumption pattern. The current study is an attempt to extend this concept to MA which is one of the innovations of the current research. Hence, the main aim of the current study is to assess the attitudes of consumers toward participation in CSA programs by answering the following questions:

1) What factors affect the attitude of consumers?

2) What is the status of consumers' attitude toward participation in community-supported aquaculture programs?

Theoretical background and hypothesis development

Community-supported agriculture (CSA)

CSA is one of the alternative forms of agriculture (Mert-Cakal & Miele, 2020). The exact history of this agricultural approach is not clear from its evolution aspects, but according to some sources, it began in the early 1960s in Germany, Switzerland, and Japan to deal with food health concerns (Schilicht et al., 2012). CSFs decrease the distance (physical and/or social) from "boat to bowl," much like community-supported agriculture programs reduce the distance from "farm to fork." But optimality has diverse dimensions that reflect Fishadelphia's five objectives. For instance, optimality can be defined relative to seafood species diversity in the marketplace (maximizing purchasing options for customers), delivery efficiency (minimizing customers' average distance traveled), and customer safety (social distancing during the pandemic). This means that because the conditions are under the control of aquaculture and consumers, it can observe social distance (Mert-Cakal & Miele, 2020). Community-supported MA includes a community of people living in urban and rural areas who support the MA and includes one or more MA units. It means people

living in urban areas can participate in a CSA located in rural areas and they can be linked easily.

The world population increase has led to increasing demand for agricultural products, especially in recent decades. Although significant advances in science and technology in the agricultural sector have provided useful solutions to meet the food requirement of communities, in many cases, these methods cause irreparable damage to the environment. Therefore, the need for using sustainable agriculture systems is felt more as they do not damage the environment. One of the sustainable and suitable agricultural approaches in this field is community-supported agriculture which can provide valuable results by involving consumers in agricultural issues (Birtalan et al., 2020). The global community challenges, including climate change and food safety, emphasize the need to establish sustainable relationships between production and consumption in various sectors (Hermans et al., 2016). Furthermore, civic institutions are being prioritized in the construction of sustainable chains that do not anticipate being profitable, as evidenced by community-supported agriculture (Smith et al., 2014). In this system, consumers' attention to the impact of food production on the environment and society is replaced by the traditional views that focus merely on food production (Vassalos et al., 2017). CSA is designed as a direct marketing strategy for small producers, as a way to develop positive relationships between small producers, and as a way to develop relationships between producers and consumers (Janssen, 2010). Community-supported agriculture is one of the landholding approaches in which the financial and human capacity and interest of individuals are used to develop and participate in the activities of small-scale landholding systems (Tabarsaz et al., 2018). With the consumers' membership in this program, in fact, they participate in the process of planning, goods production, product care, or harvesting, and a sense of empathy is created between the members of the group who are producers and consumers (Kotowich, 2017).

These relatively new organizational structures appear to suit customer needs while also ensuring direct access to production: newly harvested and locally produced items are free of artificial fertilizers, pesticides, and transgenic seeds. This channel is continually developing in the USA and Europe as mainstream consumption as an economic and cultural market grows. Consumers in community-supported agriculture have special motivations to become connected with local food, to be able to acquire high-quality and wholesome commodities, and/or to be concerned about the environment (Bernard et al., 2020; Birtalan et al., 2020).

Community-supported agriculture: directions for MA development

Community-supported MA

Fisheries and community-supported MA programs are designed based on an agreement between fish farmers and consumers, where consumers, as shareholders, provide financial support for the given MA, and in return, they receive a weekly share of aquatic products. Fisheries and community-supported MA create communities of consumers who buy fish and aquatic products directly from local fish farmers. In addition to providing food safety for consumers, this can lead to a sustainable livelihood for fish farmers and their families (Krul and Ho, 2017).

Members gain access to their own source of aquatic food, through community-supported MA, and in turn, fish farmers establish face-to-face relationships with the people who buy their products. Community-supported MA creates mutual learning opportunities (Zhang et al., 2019). Consumers can be aware of how they perform MA farming, and their concerns about how to keep and rear their desired aquatic products by MA will be resolved. This will increase consumers' demand for aquatic products, and thus, an important and effective source of income for MA is created. Community-supported fisheries and MA are a way for fishermen and fish farmers to enter the local food market. By prioritizing sustainable MA, this system addresses consumers' need for affordable, fresh, and healthful aquatic items; on the other side, a steady market for MA is established (Cumming et al., 2020). Achieving sustainable environmental development is one of the most important global MA challenges that require stability between economic, social, and environmental benefits, and this system is an effective step in this direction. It is generally believed that this industry also has economic benefits for remote rural areas (Vasquez et al., 2017). It has been suggested that this issue can be examined in future studies to determine whether rural areas are more prone to this system than urban areas from the perspective of fish farmers.

Previous studies (e.g., Van Oers et al., 2018; Opitz et al., 2019) and approaches have focused more on community-supported agriculture, while the community-supported agriculture practices can also be generalized to MA. This approach is based on cooperation resulting from mutual commitments between a production unit or MA pond and a group of consumers, based on which a direct link is established between the production and consumption of aquatic food (Jia et al., 2021). According to this agreement, consumers buy some of the products via the financing of MA ponds, and this finances the farm, reduces the risk, and guarantees the products' sale. Consumers help fish farmers at the beginning of the season by providing part of the cost of purchasing primary inputs and during the season, providing current costs (Soley et al., 2019). This can help improve the economic sustainability of MA operations and result in the production of MA that has a lower cost than the retail market and is healthier in terms of quality. In addition, a safe sale market is created

for MA. Community-supported MA programs are a type of fisheries and MA support programs that use direct and innovative marketing for aquatic products (Zorriehzahra et al., 2020). This program is modeled after the successful implementation of community-supported agriculture programs (Cumming et al., 2020).

According to the research done by Salladarre et al. (2018), in a community-supported fishing program, a periodic fixed amount is paid to fish farmers by consumers, and producers are committed to delivering seafood and MA products to consumers to shorten the production and consumption chain.

Today, consumers have different options for buying food: using the Internet and low-cost shopping. However, recently, joining community-supported fisheries or MA complements various methods of the relationship between the sellers and buyers in the seafood value chain (Ateweberhan et al., 2018). Inspired by the farmer-developed community-supported agriculture model, community-supported MA denotes the agreements between MA and customers, particularly in the current situation when physical distance is a concern. By choosing their trusted MA and their favorite product, consumers can enjoy their aquatic package according to the previous agreement, for example, weekly without the need for a personal visit, and this leads to the stability of the production, distribution, and consumption system. In the meantime, the motivations of the consumers participating in the community-supported MA program include risk reduction, healthy products, sustainability, direct contact with producers, and fair pricing (Ateweberhan et al., 2018). In a study on using the community-supported agriculture model for fisheries, Campbell et al. (2014) consider one of the main goals in community-supported agriculture to be a community and how to create, sustain, or enhance it. Traditionally, there has been anxiety over the loss of community as a result of changes in rural land use, especially the loss of family farms. Furthermore, community concerns were matched in community-supported fisheries (CSF) and were linked to declining commercial fishing.

Due to the globalization of the fish trade and new capitalization, seafood prices have declined. These broad issues are inextricably linked to notions of culture, family, and the destiny of small towns.

The community-supported fisheries and MA can reduce the gap between production and consumption. Due to the variability of breeding and fishing periods and unpredictable cases, the interaction between producer and consumer is difficult. Due to the unique characteristics of fisheries, an intermediary is needed to facilitate the transport of aquatic creatures. Creating community-supported fishing and MA may be different from creating community-supported agriculture (Campbell et al., 2014).

On the other hand, the motivation of fish farmers to participate in the community-supported MA allows them to operate in a situation where there is much emphasis on human characteristics, and this production system improves the quality of life of small and medium fish farmers and the quality of life of the consumers. In addition, the organizational structure of the community-supported MA enables fish farmers to share the inherent risk of MA activities with consumers, especially in low-yield years and the high profits made in high-yield production years. From the consumers' perspective, the community-supported MA increases the contact between consumers and the aquatic sector, and as a result, residents give more value to aquatic products and establish a friendly relationship with the source of aquatic food production. CSA is an approach to aquaculture that has the potential to address many environmental, social, economic, and other problems. CSA describes a community-based organization of producers and consumers. The consumers agree to provide direct, up-front support for the local growers who will produce their food. As mentioned by Vasquez et al. (2017), communication within direct CSA schemes can be important for two reasons. First, effective communication between producers and consumers can underpin the kind of understanding that leads to long-term commitment and tolerance among consumers. Second, communication between consumers can spur them to consider their wider environmental behavior and practices, perhaps leading to more radical changes to production–consumption relationships. This is because CSA describes a community-based organization of producers and consumers. The consumers agree to provide direct, up-front support for the local growers who will produce their food (Vasquez et al., 2017). Community-supported MA includes a community of people living in urban and rural areas who support the MA and includes one or more MA units. Hence, these units can legally or philosophically become a community farm in which producers and consumers, by mutual support, share the risks and benefits of aquatic production operations (Ostrom et al., 2007).

Indeed, the main essence of community-supported MA is not only the change of exploitation patterns, but also includes the new socio-economic patterns, cooperation, assistance, altruism, and justice in access to food. Based on this approach, consumers, in addition to gaining access to fresh, healthy, and nutritious food, make new friends, have a place to have fun, and connect with the main sources of food, and they themselves and their children learn a lot about the nature and processes of food production (Kondo, 2021). They also acquire a new sense of community by helping fish farmers and local communities, show more satisfaction and happiness in their lives, and share that happiness with fish farmers as much as possible. This approach is a new socio-economic model in the production, sale, and distribution of food to increase the quality of aquatic products (Mulokozi et al., 2020). Due to the environmental sensitivities of

consumers and producers of aquatic products and increasing attention to the quality of food products among members of society, with the shortening of the production chain of products with suitable prices, by promoting this system, it is possible to stabilize the job of MA farmers and promote sustainable livelihoods (FSLC, 2007).

Iran was one of the earliest countries to undertake agriculture, but land exploitation has caused soil erosion and the desiccation of major water sources. Iran has steadily become a dry and drought-prone country, falling presently inside Asia's arid/semi-arid zone. Iran has long pursued catch fisheries in its waters, owing to its about 2700 km of coastline. During the years 1973–1998, output from both southern and northern seas rose 15-fold (Ghorbanian and Zibaei, 2021). MA began in 1922 with sturgeon breeding to generate fry for stocking in the Caspian Sea. Today, Iran's key MA operations are diverse. Low rainfall in recent years has resulted in decreased fish productivity. When comparing current fish productivity from natural and semi-natural waterways with that of 1998, there is a 34% decrease. As a result, drought has had a significant influence on the Iranian MA business since a decrease in freshwater intake enhances water salinity in ponds, which is detrimental to MA (Madani, 2014; Khanjani and Sharifinia, 2020). There is no awareness or discussion of this problem or how the specific design of the Iran MA is done in Kurdistan, and this would be key to just how destructive it is given the specific ecological conditions, which must be important because Iran is landlocked. Despite the importance of drought in the development of the MA industry, there is not much awareness or discussion about this problem or how to design specific MA in Iran. This is a key issue and is very important given the ecological conditions and the occurrence of drought in Iran.

On the other hand, according to the Global Carbon Project (GCP) in 2018, Iran is one of the ten most polluted countries in the world, as it has been shown that one of the factors increasing methane, pollution, and environmental instability is the high number of heavy livestock for red meat production. Hence, according to agricultural statistics in 2017, the number of heavy livestock in Iran is estimated at 8.1 million, out of which 252,900 are the share of Kurdistan Province (https://www.maj.ir/).

Because of its border location, the necessity of sustainable living in this region, and numerous socio-economic issues, Kurdistan province has seen an increase in difficulties such as migration and smuggling. Most consumers in this province work as cross-border labor for making a living, which causes insecurity and hardship for these people. The vast majority of studies and research on this social harm indicate that the increase in the number of cross-border labor is directly affected by the increase in unemployment and incomplete employment in the country. According to the report on the employment program, it was found that the unemployment rate of the provinces affected by cross-border labor (West Azerbaijan, Kurdistan, Kermanshah, and Ilam provinces) is higher than the average unemployment rate in the country (https://www.mporg.ir/en). The high unemployment rate in border areas can naturally offer three ways for young people living in these provinces as the largest unemployed province: they must either migrate from their own province to those with better employment conditions and live as marginalized immigrants in these provinces or suffer from problems such as depression and addiction and involve in illegal activities such as theft, or finally, they are forced to work in their own province in jobs such as peddling, cross-border labor, fuel carrier, etc.; these jobs can also be considered as a kind of social harm (https://www.mporg.ir/en).

Kurdistan is one of the provinces with high potential in the agricultural sector, but despite the high potential, it has not developed well. Kurdistan is one of the provinces where people's economic condition is dependent on agriculture. However, the droughts of the last few years and the uncontrolled consumption of water in the agricultural sector have caused numerous and acute problems in the water supply sectors. Therefore, in the last decade, there has been a shortage of water for the agricultural sector in this province. The only source of water in this province is Lake Urmia, located in northwestern Iran, which has faced drought in recent years for various reasons, including mismanagement. Therefore, the environmental conditions of special agricultural and MA projects in this province need serious attention (Madani, 2014).

Production of aquatic products in this province has increased from about 1000 tons in 1978 to more than 9816 tons of cold and warm water fish (https://www.maj.ir/). The industry has directly established employment for about 2000 people in different cities of Kurdistan province, relying on water resources, including 12 dams under operation and 17 permanent rivers in the form of farms and various fish farming complexes. Considering that Kurdistan province with about 6 billion cubic meters of runoff is one of the watershed provinces of the country and has 11 executive dams and 14 study dams, it is possible to draw a bright future for the development of the fishery industry in this province by implementing various MA projects. However, the important thing is that the province has undergone climate change in recent years, and drought has become a major problem in its agricultural sector (Bahrami and Separi, 2021). The average annual consumption of about 6 kg of fish by each Kurdish person and the increase in per capita to reach global statistics are other incentives for the importance of developing fisheries activities, and this highlights the need to focus on the present study. It is worth noting that the per capita consumption of MA in Iran is about 11.2 kg per year, which is

lower than half of the global per capita consumption (https://www.maj.ir/).

Therefore, due to unemployment and livelihood instability in the mentioned province, with irreparable damage to communities, community-supported MA can play a vital role in the economy of the province, improve the employment situation, prevent migration, and increase the welfare of consumers in Kurdistan province. Therefore, the present study was aimed to investigate the effective factors of consumers' attitudes toward participation in the community-supported MA programs in Kurdistan province. Hence, we can pave the way for generalizing the model to other areas by the identification of factors affecting consumers' attitudes in the province and by providing a model in this regard.

Consumers' attitude

In this regard, an overview of studies based on people's attitudes seems necessary.

Attitudes are important determinants of behavior. The term "attitude" has several equivalents such as opinion, feedback, mental state, manner, and tendency. The term "attitude" is generally accepted and defined in different ways (Rao, 1986) (Turkan and Kajbaf, 2008). Attitude is an assumed construct, as it is not directly observable but is more associated with verbal and behavioral statements (Azarbayjani et al., 2006). In another definition, attitude is the long-term organization of motivational, emotional, perceptual, and cognitive processes according to some aspects of the environment in which the individual is placed (Azarbayjani et al., 2006). In a general conclusion, attitude is a multidimensional concept that includes cognitive, emotional, and interactive elements that determine how people behave. Attitude is probably the most prominent and essential concept in social psychology (Gawronski, 2007).

Various studies have been performed on people's attitudes, some of the most relevant of which are presented in Table 1, which lists the variables, findings, and limitations of the respective models.

It is worth noting that in this study, the framework of attitude toward organic food by Yadav and Pathak (2015) and the framework of attitude toward the consumption of organic agricultural products by Baha and Shamsudin (2017) were used as the main basis for the process of consumers' attitude toward participating in community-supported MA. In the framework of Yadav and Pathak (2015), the variables of lifestyle, health, and environmental concerns, and in the framework of Baha and Shamsudin (2017), the variables of health and environmental concerns as well as price were considered. As shown, in the Yadav and Pathak (2015) model, the price variable was not considered, and in the framework of Baha and Shamsudin (2017), the lifestyle variable was not

considered. However, the variables of these models are not adequate for the present study. The field of this research (the attitude of consumers in Kurdistan province to participate in the community-supported MA) requires other important variables, including price and lifestyle variables. Therefore, it is necessary to develop an integrated model in the field of consumers' attitudes toward participating in community-supported MA. By adding price as an important variable to the Yadav and Pathak (2015) model and adding lifestyle variable to the attitude toward organic products in the Baha and Shamsudin (2017) model, the models are significantly improved. The main reason for choosing Yadav and Pathak (2015) and Baha and Shamsudin (2017) models as the basic research models was that these models could best explain consumers' attitudes toward participating in community-supported MA based on the limitations of previous models and field studies (Fig. 1).

Therefore, the first part of the survey investigates overall consumers' attitudes toward participating in community-supported MA programs. The second part of the survey focuses on the most important factors affecting the attitude of consumers toward participating in community-supported MA programs. The findings of the research are anticipated to fill the existing research gap concerning the attitude of the consumers toward participatory approaches and how to establish useful intervention plans and policies that improve the attitude of consumers toward sustainable consumption of aquatic products for the future. Therefore, the research hypotheses are specified in Table 2.

Materials and methods

The present study is a survey study, non-experimental in terms of control of variables, applied in terms of purpose, and cross-sectional as it is performed at a certain time. It should be noted that survey research is quantitative and non-experimental, and measures such as questionnaires and interviews are used for data collection. The statistical population in the present study was consumers in Kurdistan province. To select the sample size, a multi-stage random sampling method was used. Table 3 shows that 384 individuals were selected as consumers in Kurdistan province. Out of 384 consumers in Kurdistan province, 297 samples were obtained from the urban population and 87 from the rural population of the province (Krejcie and Morgan 1970). The statistical population included ordinary households who lived in urban and rural areas of selected cities in Kurdistan province. For the sampling of this study in households of each province, a stratified random sampling method was used. The reason for choosing this sampling method was the high variance of aquatic consumption in different cities of the province, and one city from each floor was selected

Table 1 Studies on attitude

Subject	Researchers	Variables	Findings
Consumer attitudes toward food consumption	Uçar, et al. (2012)	Food hygiene; food safety and health; nutritional value and proper food preparation; price and quality	Middle-aged educated women had a higher score attitude than their peer There was a positive and significant relationship between age and attitude
Young consumers' attitude	Yadav & Pathak (2015)	Lifestyle, organic knowledge, health consciousness, environmental concerns	Attitude toward organic food and perceived behavioral control were effective significantly on consumer's intention to buy organic food, but subjective norm couldn't show significant effect on intention to buy In addition, consumer's intention to buy organic food was determined based on his attitude toward the organic food. This indicated the importance of positive attitude toward organic food among buyers. The subjective norms didn't show important impact on intention to buy organic food. This means that buying organic food is not turned into a social norm yet The health concerns were important variable in examining the attitude to food in India, but environmental concerns had no significant impact on intention to buy organic food
Attitudes of UAE customers toward organic food	Basha & Shamsudin (2017)	Health; consciousness; environmental factors; safety concern; convenience; price	There is a positive and significant relationship between health consciousness variables, environmental factors, and safety and health concerns with attitudes toward the consumption of organic agricultural products There is no positive and significant relationship between convenience and price variables with attitudes toward consumption of organic agricultural products
Consumers' awareness of sustainable seafood	Hori et al. (2020)	Frequency of seafood consumption; frequency of cooking at home; frequency of consumption of seafood at home; frequency of consumption of seafood outside the home; frequency of purchasing at a grocery store; frequency of purchasing at a fish store; reason to buy fishery products; quality and taste; freshness expiration date; country of origin; food safety; price; eco-friendliness; unknown	Eco-friendliness scored higher than price Consumers willing to pay more for eco-labeled products
Modes of consumption & CSA	Plank et al. (2020)	Institutions, values, and materiality	CSA's face lots of institutional, communal, and physical challenges, and in order to develop these programs, mentioned challenges must be seriously considered
Consumers' food preferences	Li et al. (2020)	Food shape, processing, attitude	There is a positive and significant relation between food shape, processing, and attitude or intention to buy
The relation between knowledge, attitude, and practice	Soon et al. (2020)	Knowledge, attitude, practice	The relation between food care knowledge and attitude and their straight influences on practices have been confirmed

as a sample (please see Table 3). The number of samples was selected based on Morgan table 384 samples that were selected between urban and rural areas of selected cities in proportion to the size of the statistical population. On each floor, sampling was done by starting sampling in residential located in the southwest of the study area and listing households in a clockwise (right hand) direction inside each region and completing the questionnaires. In case of listing all the households in the study area and the eligible number of households and individuals could not be provided, with reference to the adjacent area located on the right side of the origin area and continuation of sampling from southwest of the region, the task of completing the questionnaire from households was continued until the required number of samples was provided. The required data in this study was gathered through a structured questionnaire and interviews with eligible individuals were done. It should be noted that at the time of distribution of the questionnaire, the researcher and the trained team were present at the site and orally tried to clear up the ambiguity and items of the questionnaire for the respondent. All questionnaires were completed face-to-face with interviews to explain the community-supported aquaculture programs to the respondents and to collect more accurate data. Each questionnaire took about half an hour to complete. It should be mentioned that no interview was other than completing the questionnaire, and interviews were used to complete the questionnaire to collect more accurate information.

For data analysis, structural equation modeling methods are used. In this research, the content and face validity of the research instrument were reviewed and modified using the panel of subject experts.

In the present study, 21 items were used to measure the consumers' attitudes (Fami et al., 2010a, b; Bai et al., 2019; Kheirollahi, 2016), 13 items were used to measure health concerns (Basha & Shamsudin, 2017; Tarkiainen & Sundqvist, 2005; Yadav& Pathak, 2015), 4 items were used to measure the price variable (Fami et al., 2010a, b; Gan et al., 2016; Basha & Shamsudin, 2017), 9 items were used for environmental concern variables (Roberts & Bacon, 1997; Basha & Shamsudin, 2017; Yadav& Pathak, 2015), and 12 items were used for lifestyle variables (Gan et al., 2016; Yadav& Pathak, 2015). For measuring all items, 5-point Likert scale was used (1 = very low, 2 = low, 3 = medium, 4 = much, 5 = very much).

Reliability and validity

Thirty copies of the designed questionnaire were completed in a pilot test among consumers in the Western Azerbaijan region to examine its dependability. Cronbach's alpha coefficient was determined for the completed questionnaire using SPSS26 software. Cronbach's alpha values

for all components of the questionnaire were 0.7 or above (Table 4). In addition, because Cronbach's alpha assigns the same value to all items of a construct, the composite reliability and average variance extraction techniques were utilized in this work. The questionnaire was judged to be very reliable based on the coefficients obtained. The values of the average variance extracted (AVE > 0.5) and the composite reliability (CR > 0.6) of the variables also indicated that the research instrument had good convergence validity (Table 4) (Mohsenin and Esfidani 2014).

Structural equation (SEM) is one of the types of statistical models that measures the relationships between several variables. SEM examines the structure of internal relations in a set of equations, such as a set of regression equations. It is also one of the main methods of analyzing the structure of cause and effect data. It means complex analysis and is one of the new methods for examining the causal relationships of different variables that in a theory-based structure shows the simultaneous effects of variables. In SEM, we are faced with two types of variables. Latent variables and observed variables. Latent variables are variables that are not directly visible. Consider the "attitude toward participation." One's attitude cannot be directly observed and measured. For this purpose to measure latent variables, items that make up the questionnaire are used. These items are the observed variables. In this study, 21 items that form the items of the questionnaire were used to measure the latent variable "attitude." Also to see how well these items were measured, the latent variable (attitude), CR (composite reliability), and AVE was calculated which is depicted in Table 4. The CR index is calculated based on the structural equation modeling factor loadings. Composite reliability has more advantages than Cronbach's alpha. In calculating the Cronbach's alpha coefficient for each structure, all indicators are entered with equal importance in the calculations. For calculating CR, indicators with higher factor loading are more important. This makes the CR values of the structures more realistic and accurate than their Cronbach's alpha. Formula (1) is used to calculate composite reliability:

$$CR = \frac{\left(\sum_{i=1}^{p} \lambda i\right)^2}{\left(\sum_{i=1}^{p} \lambda i\right)^2 + \sum_{i=1}^{p} V(\delta)} \tag{1}$$

where:

λi = completely standardized loading for the ith indicator.

$V(\delta i)$ = variance of the error term for the ith indicator.

p = number of indicators.

And in this research, CR for attitude was equal to 0.94 which shows the high reliability of the research tool. Also, average variance extracted (AVE) was calculated. AVE
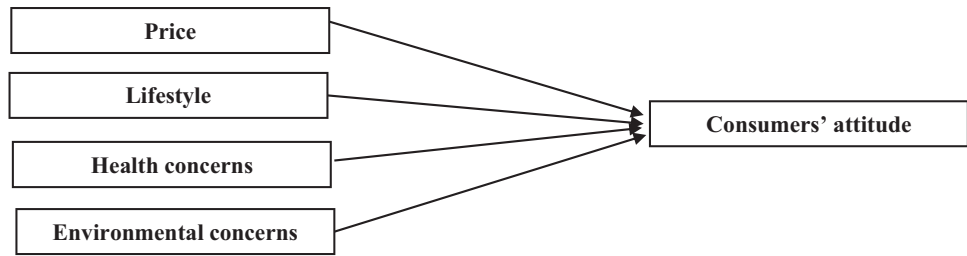
Fig. 1 Conceptual framework of research

Table 2 Research hypotheses

Hypotheses	Mathematical model	Test
1. There is a significant relationship between consumers' health concerns with their attitude toward participation in the community-supported MA programs	H_0: $r=0$ H_1: $-1 \leq r < 0, 0 < r \leq +1$	Pearson
2. There is a significant relationship between prices of MA products with their attitude toward participation in the community-supported MA programs		
3. There is a significant relationship between consumers' environmental concerns with their attitude toward participation in the community-supported MA programs		
4. There is a significant relationship between consumers' lifestyles with their attitude toward participation in the community-supported MA programs		

Table 3 Number of samples

Town	Urban population	Rural population	Town population	The number of consumers sample	Urban sample	Rural sample
Bijar	56,857	32,305	89,162	33	21	12
Saghez	168,359	58,092	226,451	86	64	22
Sannandaj	414,069	87,331	501,400	190	155	35
Marivan	151,188	44,074	195,262	74	57	17
Total	790,473	221,802	1,012,275	384	297	87

Table 4 Cronbach's alpha values and validity and reliability of the studied structures

Variables	Number of items	Cronbach's alpha coefficient	Average variance extracted (AVE)	Composite reliability (CR)
Attitude	21	0.931	0.541	**0.940**
Health concerns	13	0.914	0.597	**0.925**
Price	4	0.730	0.587	**0.837**
Environmental concerns	9	0.871	0.529	**0.899**
Lifestyle	12	0.911	0.511	**0.925**

Source: research findings

measures the level of variance captured by a construct versus the level due to measurement error; values above 0.5 are considered acceptable. To establish discriminant validity, there is a need for an appropriate AVE analysis. In an AVE testing, one checks to see if the square root of each AVE value fit into each latent variable is much higher than any correlation among any pair of latent variables. AVE measures the explained variance of the variable. When comparing AVE with the correlation coefficient, we truly want to see if the items of the variable explain more variance than do the items of the other variables. AVE, which is a test of discriminant validity, is calculated as Formula (2).

$$AVE = \frac{\sum [\lambda i^2]}{\sum [\lambda i^2] + \sum [\text{Var}(\varepsilon_i)]} \qquad (2)$$

where λi is the loading of each measurement item on its corresponding variable and εi is the error measurement. The guideline says that the square root of the AVE of every variable should be much superior to the correlation of the particular variable with any of the other variables. The value of AVE for each variable should be at least 0.50 (Fornell and Larcker, 1981), and in this research, for attitude, it is 0.541 which is represented in Table 4.

Results

The results of descriptive statistics showed that according to Table 5, among 384 respondents, 102 (26.6%) were female and 282 (73.4%) were male. In addition, 257 consumers were born in the city. Most of the respondents had a bachelor's degree, and in terms of income status, 52 people (13.5%) had no monthly income, 233 people (60.7%) had a monthly income below 89 dollars, 54 people (14.1%) had a monthly income between 89 and 117 dollars, and 45 people (11.7%) had a monthly income above 117 dollars. Ninety-three of respondents (24.2%) were willing to pay for aquatic products as a whole, and 291 (75.8%) were willing to pay for aquatic products in several steps.

Ranking of consumers' attitudes toward participation in community-supported MA

To investigate the attitudes of consumers toward participation in community-supported MA, 21 items were used in this study. The ranking of items based on the mean showed that the following items, respectively, had the highest ranks (based on average) in the consumers' attitude toward participation in community-supported MA:

- Participation in this project helps the water, environment, and human health.
- I like the idea of buying a product in this program.
- Buying aquatic food through this program is a wise choice.

Furthermore, the items "Participation in this project cannot change the social interaction of fish farmers and consumers" and "Participation in this project has economic risk" were among the lowest ranks. The total average in the ranking of the attitude of the consumers toward participation in the mentioned program was 3.9 (Table 6).

Ranking of independent variables

Based on the results of Table 7, it is observed that in order to investigate factors affecting the attitude of consumers in Kurdistan province toward participation in community-supported MA programs, 35 items were used. In the investigation of consumers'

health concerns, 13 items were used, which were ranked based on the average value. The highest rank is assigned to the item "My health is valuable and I don't want to lose it," and the lowest rank was assigned to the item "I read health-related articles in newspapers, magazines, and books." The total average in this factor was 3.88. To evaluate the effect of price from the perspective of consumers in this study, 4 items are used. The highest rank was allocated to "The price of aquatic products in the market is high," and the lowest rank was allocated to "I am interested in participating in this project due to the possibility of paying in several steps." The total average in the ranking of price factors is 4.08. To investigate the environmental concerns of the consumers in this study, 9 items were used. The highest rank was allocated to "Humans must protect the balance of the environment to survive," and the lowest rank was allocated to "I prefer to use recycled products." The total average in the ranking of items of environmental concern is 3.98. To investigate the lifestyle of consumers in this study, 12 items are used, the highest rank is given to the item "I try to have a planned life," and the lowest item is "I exercise regularly." The total average of lifestyle factor is 3.71.

Structural equation modeling (research model validation)

Correlation results between variables

To investigate the relationship between independent variables and consumers' attitudes toward participation in the community-supported MA programs, based on Table 8, the Pearson correlation coefficient was calculated.

Coefficients of determination

The coefficient of determination (R^2) is a statistic used in structural equation modeling to connect the measurement and structural parts and illustrates the influence of an exogenous variable on an endogenous variable. The R^2 value is determined exclusively for the model's endogenous (dependent) structures, and in the case of exogenous structures, the value is zero (Holland, 1999). The higher the R^2 value of the endogenous structures of a model, the better the fit of the model. Chin (1998) proposes three criteria values for weak, medium, and strong values: 0.19, 0.33, and 0.67. According to the results in Table 9, all of the model's endogenous variables have a reasonable coefficient of determination and indicate a good fit of the structural elements of the model.

Path coefficients

In ordinary least squares regressions, each route coefficient in the PLS structural equation model is comparable to a standardized beta coefficient. Structural paths whose sign is consistent

Table 5 Frequency distribution of residents of Kurdistan province

Variable	Categories	Frequency ($n=384$)	Percent
Gender	Male	282	73.4
	Female	102	26.6
Place of birth	Village	127	33.1
	City	257	66.9
Place of living	Village	87	22.7
	City	297	77.3
Education status	Illiterate under diploma educational status	81	21.1
	Diploma	128	33.3
	Bachelor	140	36.5
	M.Sc	33	8.6
	Ph.D	2	0.5
Monthly income	No monthly income	52	13.5
	Income less than 89 dollars	233	60.7
	Income between 89 and 117dollars	54	14.1
	Income above 117 dollars	45	11.7
Willingness to pay in some stages	One-time payment	93	24.2
	Stage payment	291	75.8

Table 6 Ranking of consumers' attitude items

Items	SD	Mean	Rank
Participation in this project contributes to the health of water, environment, and human beings	0.80	4.24	1
I like the idea of buying a product in this design	0.92	4.20	2
Buying aquatic food via this scheme is a wise choice	0.87	4.18	3
The product reaches the consumer at a lower price than the market price, so participation in this plan is useful	0.82	4.15	4
The implementation of this plan improves food health because the quality of the produced products is increased	0.84	4.15	4
Citizens' financial participation in this project will improve the employment situation in the region	0.97	4.09	5
By participating in this project, access to favorite aquatic products is easy	0.97	4.08	5
It is a good idea to buy aquatic food from MA ponds	0.94	4.03	6
Citizens' financial participation in this project improves the financial situation of fish farmers and consumers	1.08	3.97	7
By participating in this project, we have more access to nature, and we can spend our free time this way	0.97	3.93	8
MA activities can be promoted with participation	0.98	3.91	9
It is easy to implement this plan in this area	1.01	3.90	10
Access to MA products is easier in this plan	1.08	3.85	11
Participation in this project facilitates the financing of MA and only increases the producer's income	0.97	3.84	12
Participation in this project helps to increase social capital	1.07	3.84	12
Participation in this plan increases justice, equality, and trust in society	1.14	3.81	13
Participation in this plan helps with risk management	1.02	3.79	14
Participation in this plan merely is economic incentives	1.16	3.68	15
Individuals' adherence to mutual contracts between producer and consumer is low	1.16	3.48	16
Participating in this plan will not change the social interaction of fish farmers and consumers	1.13	3.48	16
Participation in this plan has economic risks	1.09	3.30	17
Total mean		3.90	

with the algebraic sign of the previous assumptions provide empirical validity to the theoretical assumptions about the relationships between latent variables, and paths whose algebraic sign is contrary to expectation do not confirm the previously formed hypotheses (Azar et al., 2012).

The results of the study of the present model, which is presented in Table 10, the results are at a suitable level both in terms of being consistent with theoretical issues and in terms of predictive power, and this shows the good fit of the structural model of the present study (Figs. 2 and 3).

Table 7 Ranking of independent variables of the study

Variable	Item	SD	Mean	Rank
Health concerns	My health is valuable and I won't miss it	0.89	4.28	1
	I am one of those people who care about my health	0.84	4.20	2
	I am often curious about what foods are good for health	0.86	4.19	3
	I think I pay a lot of attention to health in life	0.89	4.17	4
	I choose my food carefully to ensure health	0.86	4.08	5
	I often think about health issues	0.89	4.05	6
	In choosing foods, I make sure they are healthy	0.85	4.01	7
	The lack of preservatives in aquatic foods encourages me to participate	0.99	3.94	8
	I consider myself a conscious consumer of food health issues	0.93	3.94	8
	I'm worried that there are harmful chemicals in my food	0.98	3.80	9
	I do not eat foods with additives and preservatives	1.09	3.46	10
	I usually pay attention to the health label and the quality of the food I purchase	1.17	3.42	11
	I read health-related papers in newspapers, magazines, and books	1.33	2.88	12
Price	The price of aquatic products available in the market is high	2.22	4.29	1
	The price of transporting the products should be paid by the aquaculturist	0.94	4.09	2
	Due to the lower price of aquatic products compared to livestock products, I participate in the community-supported MA project	1.08	4.02	3
	I am interested in participating in this project due to the possibility of paying step by step	1.22	3.94	4
Environmental concerns	Humans must protect the balance of the environment for survival	0.98	4.31	1
	If we do not do something to save the environment, the damage will be irreparable	0.94	4.23	2
	Human intervention in the environment leads to dangerous consequences	0.98	4.23	2
	My job is caring for the environment	0.91	4.09	3
	Nature balance is very sensitive and it is destroyed easily	1.1	3.90	4
	I use aquatic products compared to livestock products to help reduce greenhouse gas emissions	1.13	3.8	5
	The current path of development is to destroy the environment	1.19	3.8	5
	I put the garbage in separate trash bins	1.15	3.77	6
	I prefer to use recycled products	1.19	3.68	7
Lifestyle	I try to have a planned life	0.99	4.09	1
	I try to balance personal and professional life	0.92	4.00	2
	I try to reduce my anxiety	1.08	3.99	3
	I often use fruits and vegetables	1.15	3.98	4
	I use aquatic products	1.17	3.72	5
	I don't eat eating processed foods	1.08	3.71	6
	I follow a low salt diet	1.04	3.66	7
	I use less red meat	1.16	3.63	8
	I avoid eating foods with additives	1.09	3.62	9
	I avoid snacks and fast food	1.14	3.61	10
	I check my health regularly	1.13	3.54	11
	I exercise regularly	1.35	2.91	12

Source: research findings

In addition, significant coefficients indicate the significance of all paths (Fig. 3).

The goodness-of-fit criterion

The GOF index takes into account both measurement and structural models and is used as a metric to forecast the model's overall performance. This index is calculated according to Eq. (1):

$$GOF = \sqrt{\overline{\text{communalities}} \times \overline{R^2}} \tag{3}$$

The coefficient of determination is the average of the coefficients for the determination of the endogenous constructs of the model as calculated for the present model (Table 11). Finally, the GOF of the present model was extracted.

$$GOF = \sqrt{0/553 \times 0/407} = 0/474$$

Wetzels et al. (2009) proposed three GOF values: 0.01, 0.25, and 0.36 as mild, medium, and strong. The GOF value for the model was determined to be 0.474, indicating that the model has a very strong and complete fit.

As shown in Table 8, the correlation coefficient between consumers' health concerns and consumers' attitudes was 0.371 which shows an average relationship and is significant at the 0.01 level. Thus, the first hypothesis of the research is supported, and this means that there is a significant relationship between consumers' health concerns and consumers' attitudes toward participating in the community-supported MA programs. Furthermore, as shown in significance coefficients in Fig. 3, the *t* value between the health concerns of consumers and consumers' attitudes was obtained to be 2.004, which is more than 1.96. It can be concluded that there is a significant relationship between consumers' health concerns and consumers' attitudes, and on the other hand, according to Fig. 2, as the path coefficient between consumers' health concerns and consumers' attitude is 0.121, it can be said that consumers' health concerns have a positive and significant effect on consumers' attitudes.

As shown in Table 8, the correlation coefficient between MA products prices of consumers and consumers' attitudes is 0.462, which shows an average relationship and is significant at the 0.01 level. Hence, the second hypothesis of the research is supported, and this means that there is a significant relationship between the price of consumers' MA products and consumers' attitude toward participation in the community-supported MA. Furthermore, according to the significant coefficients in Fig. 3, as the *t* value between the price of MA products of consumers and consumers' attitude was 6.043, which is more than 1.96, there is a significant relationship between the price of MA products of consumers and consumers' attitude, and on the other hand, according to Fig. 2, as the path coefficient between the price of MA products and consumers' attitude is 0.283, we can say that the price of MA products of consumers has a positive and significant impact on consumers' attitudes.

As can be seen in Table 8, the correlation coefficient between consumers' environmental concerns and consumers' attitude is 0.417, which shows an average relationship and is significant at the 0.01 level. Therefore, the third hypothesis of the research is verified, and this means that there is a significant relationship between consumers' environmental concerns and consumers' attitude toward participation in the community-supported MA. Furthermore, based on significance coefficients in Fig. 3, as the *t* value between the environmental concerns of consumers and consumers' attitude was obtained 4.414, which is more than 1.96, it can be concluded that there is a significant relationship between consumers' environmental concerns and consumers' attitude. As shown in Fig. 2, the path coefficient between environmental concerns and consumers' attitudes is 0.209; it can be said that the price of environmental concerns of consumers has a positive and significant impact on consumers' attitude.

As can be seen in Table 8, the correlation coefficient between consumers' lifestyle and consumers' attitude is 0.507, which is an average relationship and is significant at the 0.01 level. As a result, the fourth hypothesis of the research is verified, which means that there is a significant relationship between consumers' lifestyles and consumers' attitude toward participation in the community-supported MA, and consumers' attitude was obtained 4.414, which is more than 1.96. It can be concluded that there is a significant relationship between consumers' lifestyle and consumers' attitude, and on the other hand, according to Fig. 2, as the

Table 8 Pearson correlation coefficient test results for residents

First variable	N	Second variable: consumers' attitude	
		Pearson correlation coefficient	Significance level
Health concerns of consumers	384	0.371	**0.01**
Price of MA products	384	0.462	**0.01**
Environmental concerns	384	0.417	**0.01**
Lifestyle	384	0.507	**0.01**

Source: research findings

Table 9 Coefficient of determination of the endogenous variables of the model

Variables	Coefficient of determination (consumers)
Attitude	0.407
Price	-
Lifestyle	-
Health	-
Environmental	-

Source: research findings

Table 10 Path coefficients of the structural model (sub-hypotheses)

Variables	On consumers' attitude
Price	0.283
Life style	0.224
Health concerns	0.121
Environmental concerns	0.209

Source: research findings

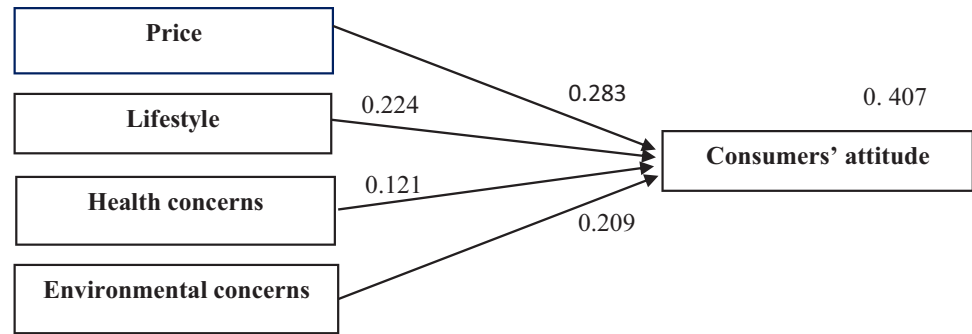**Fig. 2** Standardized coefficients of the research model for consumers' attitude

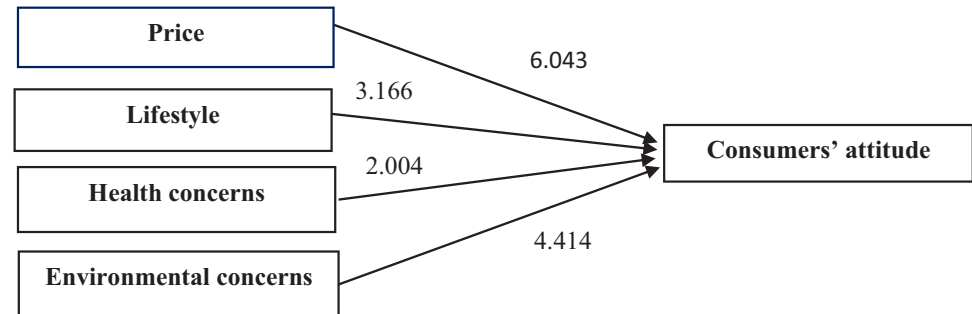**Fig. 3** Significance coefficients of the research model for consumers' attitude

Table 11 Communality values and coefficients of determination (consumers)

Variables	Communality	Coefficient of determination
Price	0.587	-
Attitude	0.541	**0.407**
Lifestyle	0.511	-
Health	0.597	-
Environmental concerns	0.529	-
Mean	0.553	**0.407**

Source: research findings

path coefficient between lifestyle and consumers' attitude was obtained 0.209, it can be said that consumers' lifestyle has a positive and significant impact on consumers' attitude.

Results of the compliance of the total measurement model with the fitness index

The results showed that all fitting criteria are higher than the desired values and the model has a good fit (Table 12). The goodness of fit was calculated for each of the measurement models, and all criteria were calculated above the acceptable level. In addition, the structural model also was evaluated for its goodness of fit, and all the desired criteria were higher than the ideal limit, which can be seen in Table 12. It is worth noting that the structural model shows the relationship between independent and dependent variables. The

results also confirmed the proposed model. One of the first fit measures proposed in the SEM literature is the normed fit index (NFI) or Bentler and Bonett index. It computes the Chi-square value of the proposed model and compares it against a meaningful benchmark. The recommended criterion for NFI is larger than 0.9, and in this research, it is equal to 0.97. Also, the SRMR is defined as the difference between the observed correlation and the model-implied correlation matrix. Thus, it allows assessing the average extent of the inconsistencies between observed and expected correlations as an absolute measure of the (model) fit criterion. The recommended criterion for SRMR is closer to 1, and in this research, it is 0.846. Henseler et al. (2014) propose the SRMR as a goodness-of-fit measure for smart PLS-SEM that can be benefitted to avoid model misspecification. As defined by Dijkstra and Henseler (2015), d_ULS (i.e., the squared Euclidean distance) and d_G (i.e., the geodesic distance) represent two different ways to compute this divergence. The bootstrap routine offers the confidence intervals of these divergence values. For the exact fit criteria (i.e., d_ULS and d_G), their original value will be compared against the confidence interval created from the sampling distribution. The confidence interval should contain the original value. Hence, the difference between the correlation matrix implied by a model and the empirical correlation matrix should be non-significant ($p > 0.05$). Otherwise, if the inconsistency is significant ($p < 0.05$), the model fit will not be established. The recommended criterion for both is less than 0.95 which in this research are 0.465 and 0.632, respectively.

Also, each model will present a value for Chi-square and degrees of freedom (df). After doing the difference between the values of the two models, we can see if the test is significant or not. The recommended criterion is > 0.05, and the result of current research was equal to 5534.984 which shows the goodness of fit of the measurement and structural model of the research.

Discussion

The Pearson correlation test findings revealed a positive and significant association between the price variable and customers' attitudes toward participating in community-supported MA. The results of this finding are consistent with Rana and Paul's (2017) research and are not consistent with the studies of Basha and Shamsudin (2017) and Hori et al. (2020). According to the preferences of aquatic products consumers in the current study, their financial and economic concerns play a vital role in their attitude toward participation in the community-supported MA. However, in the studies of Basha and Shamsudin (2017) conducted in the UAE on attitudes toward organic food, there was no positive relationship between attitudes toward organic foods and price, and in the study by Hori et al. (2020), eco-friendliness scored higher than price. This difference is due to the conditions created by the sanctions and the living problems of the studied people.

The Pearson correlation test findings revealed a positive and significant association between environmental concerns and customers' attitudes toward involvement in community-supported MA. This result is consistent with the study by Bashan and Shamsudin (2017) and is not consistent with the study by Yadav and Pathak (2015). This is because, in the study by Yadav and Pathak (2015), the research has been conducted in a developing country where the debate on environmental concerns has not become a common belief, and increasing this common belief should be on the agenda in planning and policymaking.

The Pearson correlation results revealed a positive and substantial association between health concerns and consumers' attitudes toward involvement in community-supported MA. The results of this finding are consistent with the studies by Basha and Shamsudin (2017) and Yadav and Pathak (2015). The

health concerns of consumers and aquatic products are normally integrated with their lives, and health issues have been taken into attention. The main purpose of community-supported MA is the development of ecological knowledge of consumers and producers of aquatic products. The community-supported MA at the individual and social levels helps producers and consumers to be sensitive to aquatic products and consumption (Shaban Ali Fami et al., 2008).

The results of the Pearson correlation test showed that there is a positive and significant relationship between lifestyle and consumers' attitude toward participation in community-supported MA. Therefore, consumers' lifestyle plays a role in their attitude toward participation in the community-supported MA. This result is consistent with the studies by Rana and Paul (2017), Yadav and Pathak (2015), and Paul and Rana (2012). The type of attitude toward the basics of life (food habits and leisure) among consumers of aquatic products clarifies that people who have certain frameworks in life and personal habits have a positive attitude toward the community-supported MA programs.

The results of the fitted model showed that the health concern factors, products price, environmental concerns, and prices affect the attitude of consumers toward participation in the community-supported MA. In the final fitted model, the variable of products' prices from the consumers' view on consumers' attitude toward participation in community-supported MA had the highest path coefficient (0.283). Then, lifestyle path coefficient (0.224), environmental concerns (0.209), and health concerns (0.121), respectively, were the most important factors affecting consumers' attitude toward participation in community-supported MA.

The results of this research are consistent with the studies by Rana and Paul (2017), Basha and Shamsudin (2017), and Yadav and Pathak (2015). As shown in the studies by Rana and Paul (2017) and Basha and Shamsudin (2017), the variables of health concerns and environmental concerns had the highest impact on young consumers of organic foods, respectively, and this shows different priorities in different age groups, but due to the weak economy of Kurdistan province, low income of consumers, their low financial ability, and other fundamental factors in this study, the price

Table 12 Results of the goodness-of-fit criterion for consumers' model

Fit index	Recommended criterion [*]	Results of research [**]	Source
Normed fit index (NFI)	≥ 0.9	0.97	Bonett & Bentler (1980)
d-ULS	< 0.95	0.465	Henseler et al. (2014)
d-G	< 0.95	0.632	Henseler et al. (2014)
The standardized root mean squared residual (SRMR)	The closer to 1, the better	0.846	Hu & Bentler (1999)
Chi-square	> 0.05	5534.984	Hu & Bentler (1999)

[**] Source: research findings

variable had the highest impact on the attitude of consumers' toward participation in community-supported MA.

The most important motivation for consumers to participate in community-supported MA can be access to healthier and cheaper food (Raftowicz et al., 2021). Considering these psychological backgrounds, facilitators and extension agents can provide the support for suitable and efficient interaction of the two sides in their programs, and by sharing the resources, both groups can achieve the goals.

Conclusion

This project is one of the participatory management methods that allow all stakeholders to participate more in the decision-making and implementation process. Due to the high attitude of consumers toward participating in the community-supported MA programs, it is expected that the project faces a high degree of acceptance.

According to the results of this study, environmental concerns, health concerns, and lifestyle are important factors influencing the attitudes of consumers of MA products. According to the findings of the study, there is a definite need to consider MA in the context of Iranian farms. So far, it has mostly referred to the ongoing development of short supply chains, which are becoming increasingly popular. Regrettably, they are mostly aimed at customers with ordinary or higher incomes who are conscious of their dietary preferences. In this market, the CSA may exist as an upgrade to the existing short supply chains rather than as a separate idea. Order subscription may prove to be a significant impediment to its full adoption. Furthermore, it suggests that the emphasized consumer–producer collaborative ties may be insufficient as a platform for more extended studies on CSA implementation in the MA business.

Although the CSA may constitute the desired sales support, entirely suitable conditions for its growth have not yet been achieved. In many situations, the transaction costs of the issues encountered by CSA (organization of deliveries to consumers, transport, storage, organization of short supply chains, processing, advertising, and so on) are expensive enough to deter many producers interested in participating in this form of sales group. The following activities should be undertaken while planning the deployment of CSA in the MA sector:

- Promoting the healthiness of MA products.
- Improving the identification of customer sentiments toward local producers. Education activities are considered at the national level via specialized seminars (for example, methods of MA development), and technical advice and training of citizens to increase aquatic per capita consumption and awareness toward this project, at the regional level, educating the community members and MA farmers should be taken

into attention, and in addition, extensive methods can be used to change the tastes of consumers to consume MA and their awareness of the benefits of aquatic consumption against livestock and poultry.

- Spreading awareness about MA producing traditions, habits, and methods. In this regard, institutions related to the extension of MA should act in knowledge management in this field. Meetings at national and regional levels and leadership training sessions can be very useful.
- There should be more focus on the price of MA products so that all segments of society can afford to buy and consume it highlighting the economic, social, and environmental benefits of CSA. Community supported MA can be a very good solution to ensure the food safety and livelihood of the target community.

Finally, according to the statistics of the National Statistics Center of Iran in March 2019, the 12-month inflation rate of Kurdistan province was 35.6%, which is in the top 5 in provinces of the country. Regarding the unemployment rate, with more than 40% unemployed people, it is among the first 4 provinces of the country. In addition, being cross-border labor is the only method to provide a livelihood for a large part of the border residents of Kurdistan province; this plan can be a very effective solution that requires serious attention of policymakers in this field. Encouraging job seekers to work in related jobs and allocating tax incentives and subsidies should be on the agenda of planners.

In addition, in COVID-19 conditions where people are more concerned about their food and considering that aquatic consumption can play an effective role in improving the consumer's immune system, this program can play a role in implementing pandemic protocols.

However, the effect of environmental factors on attitude has not been considered in the previous studies, which may be one of the directions of future studies. Therefore, studying the effect of environmental factors on the attitude of MA producers in future studies is important. The challenge of the MA industry certainly requires increasing public understanding of proper agricultural practices. Of course, this requires considering environmental strategies so that people who are currently reluctant to work in the industry due to environmental concerns can enter the production field. Therefore, it is suggested that in future studies, environmental adaptation strategies, environmental behavior, and attitudes and desires of individuals be examined.

Like other studies, this study had some limitations: for sampling, it is worth mentioning that in this study, residents were asked if they use aquatic products in their monthly share, and if the answer was yes, they had the opportunity to complete the questionnaire, and most of these people were educated people in the studied area. This was one of the limitations of the present study.

In addition, it is suggested to examine the factors affecting the attitude of fish farmers toward participation in the community-supported MA programs for further studies.

People who have not eaten fish before are more likely to develop diseases such as cholesterol, heart disease, and Alzheimer. Fish is a major food source for people who cannot afford chicken or red meat, especially for poorer people in poor countries. If seafood is not available as a food source, poverty, malnutrition, and hunger will increase. As a result, the effects of a fish-free society are felt by everyone, because removing people who do not use this product from the value chain and production may harm producers' economies, livelihoods, and development, as well as consumers' health. With this in mind, policymakers, growers, and breeders should highlight the benefits of consuming fish and other seafood on their agenda and enrich the culture of using this beneficial food in any community. Of course, this requires the serious support of the government and its regular consumers from the producers of this product. It is worth mentioning that this study has not examined the actual production processes as well as the species which is among the limitations of the present study that can be considered in future research.

While the adoption of the CSA model for MA may take some time, consumers' and producers' perspectives are changing, with little steps toward more sustainable and profitable models. By extension CSA models, particularly those including the use of MA products, should be researched further for the benefit of communities.

Declarations

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