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Consumers Demands on Organic Aquaculture Product in Bangladesh: A review from an Emerging Market perspective

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Review

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ABSTRACT

The main purpose of this paper is to review the performance of fisheries sector and consumers demand on Organic Aquaculture Product in an Emerging Market perspective of Bangladesh. Data and information were sourced from the several types of publications related to fisheries sector. Bangladesh being a lowland country have rich water resources in and around the country, is predominantly an agrarian economy, and is naturally endowed with a huge sweet water resources and the world's longest continuous sea beach. Bangladesh is considered as one the most suitable region for aquaculture and fisheries in the world. The country has an inland water area of about 45,000 km^2 and about 710 km long coastal belt. Given this extensive water resource, it is evident that fisheries play an important role in the economy and the diet of the population. Major portion (97%) of the total harvested fish is marketed internally for domestic consumption. About 50% of the inland fish production are consumed in fresh form due to the strong consumer preference. The fish marketing system in Bangladesh is traditional, complex, and less competitive but plays a vital role in connecting the fish producers, and consumers, thus contributing significantly in "value add" process of the fish which otherwise would have been unused or underused and consequently in the earnings of the fisherfolk. Hence, this study was conducted to understand the salient feature of fish marketing system and consumers demand in Bangladesh.

Keywords: Consumers Demands on Organic Aquaculture Product; Fisheries sector; Nutrient Content; policy aims of the Government

INTRODUCTION

Nowadays, there is a basic relationship among the consumer's demands in today's marketplace, food safety and quality, in aquaculture. In recent years, the fishing industry plays an important role in worldwide. Bangladesh is located between India and Myanmar and it is considered one of the most suitable countries in the world for farming of freshwater prawn aquaculture, because of its favorable resources and agro-climatic conditions [1]. About 371,309 ha of freshwater ponds with 3.08 million farmers are involved in inland aquaculture [2] and fish is the second most valuable agricultural crop in Bangladesh and its production contributes to the livelihoods and employment of millions of people [2].

Bangladesh has the third greatest aquatic fish biodiversity in Asia, due to the contributions of the three main rivers systems that flow from the Himalayas into the Bay of Bengal along with the world's largest flooded wetland, the Bengal Delta [3]. Bangladesh's wild fisheries represent almost 7% of the world's inland fish production and account for 52% of the country's fish production [3,4]. There are two types of aquaculture practices are going on in Bangladesh-freshwater and coastal aquaculture. There is no marine aquaculture currently practiced in the country and no marine/coastal fin finfishes are farmed. Freshwater aquaculture comprises mainly pond farming of carps–(indigenous and exotic), Mekong pangasid catfish, tilapia, Mekong climbing perch and a number of other domesticated fish though in lesser scale [5]. The country also has a coastal area of 2.30 million ha and a coastline of 714 km along the Bay of Bengal, which supports a large artisanal and coastal fisheries [6]. Coastal aquaculture is comprised mainly of shrimp and prawn farming in ghers (coastal pond or enclosures). In Bangladesh, aquaculture production systems are mainly extensive and improved extensive, with some semi-intensive and in very few cases intensive systems. The present unit area aquaculture productions (MT/ha) are 3.6, 1.5, 0.95 and 0.71 for pond, seasonal waterbody, baor (oxbow lake) and shrimp gher, respectively. Inland pond culture represents the mainstay of aquaculture in Bangladesh, accounting more than 80% total recorded aquaculture production and presently dominated by carps (indigenous and exotic), Mekong pangas and tilapia [5].

Status of Organic Aquaculture in an emerging Market of Bangladesh

Global aquaculture production reached 60 million tonnes in 2010 of which Asia accounted for 89% of world aquaculture production [2]. The fisheries sector represents a significant portion of the national economy; the total production in 2009-10 was almost 3m tonnes, valued at around USD 2.5bn and supplying 58% of the total national animal protein demand, its share in the Gross Domestic Product (GDP) and value of the agricultural sector amounted to 3.74% and 22.23% respectively. Fish and shrimp is the third largest export item in Bangladesh and contributed 2.70% to the country's total export [7]. Fisheries sector plays a significant role in Bangladesh economy by contributing to national income, export earnings, food and nutritional security and employment generation [8]; about 10% of the total population (14.50m) is directly or indirectly engaged in the fisheries sector for their livelihood. Among this group, around 1m people are employed in the shrimp sector. By implementing new fishery and aquaculture activities the Department of Fisheries of the Ministry of Livestock and Fisheries expects that this sector will facilitate the creation of full-time employment opportunities for an additional 462,000 mainly unemployed people and part-time employment opportunities for 991,000 during the financial year 2012-13 [7].

Over the last three decades, aquaculture in Bangladesh has expanded rapidly. Aquaculture has increasingly been playing a major role in total fish production (3.26 million tons) of the country and presently more than half of the total production (52.92 %) comes from aquaculture (1.73 million tons) [9]. Production of aquacultured shrimp and prawn also increased significantly from a mere 14773 MT to 137,175 MT in 2011. The % contribution of farmed shrimp and prawn in total production is more than 60% and in recent years the wild catch has been gradually decreasing. The unit area production of farmed shrimp (300-700 kg/ha), however, is very low compared to fish produced in culture ponds. Mostly ex-

tensive form of culture is practiced to produce shrimp in gher and very few farmers practice even improved extensive method [5].

An estimated 1.2 million people of Bangladesh are fishers and earn their livelihood from fishing. The number of fish farmers and shrimp/prawn farmers presently are 13.86 millions and 0.83 millions, respectively. Among the people involved in the sector 10% are women. During 1960s, the inland capture fisheries contributed about 90% of the country's total fish production. Production from inland capture fisheries has declined significantly over the years and in 2010-11 it accounted only about 42%. During 1960s, production from inland capture fisheries was almost 20 times higher compared to the then aquaculture production of the country. However, aquaculture production both in fresh water and brackish water has significantly increased during the last two and a half decades with development of technology. Due to the rapid increase of aquaculture production and sharp decrease of capture fishery production, in 2010-11, the aquaculture contributed (about 53 %) more than inland capture fisheries in total fish production of the country [5].

Nutrient Content of Organic Aquaculture Product in Bangladesh

Currently, the fisheries sector in Bangladesh already contributes 60% of the total national demand for animal protein consumption, representing a crucial source of micro-nutrients. Aquaculture is also considered to have the potential of food security in Bangladesh [2, 7]. Seafood is a vital food supply for the human diet [10]. According to the EU, there are 75 EU-approved seafood export establishments in Bangladesh. EU - approved processing establishments are concentrated in Chittagong and Khulna [7]. Market demand for shrimps in the EU is strong. Demand for shrimp products has increased during the past few years, and despite the financial crisis the EU demand remained strong. In the near future, it is expected that competition between different shrimp species (especially between Pacific White and Black Tiger shrimp) will increase. The main result is likely to be that in Western Europe Black Tiger shrimp becomes more of a niche product because it is more expensive than Pacific White shrimp. However, in Southern Europe Black Tiger shrimp will remain a mainstream product because Black Tiger is preferred to Pacific White shrimp for reasons of taste and size. The market for captured shrimp is expected to remain stable [7]. The most important regions for shrimp production, both captured and cultured, are Chittagong and Khulna, which together account for 96% of total production. While Black Tiger shrimp and wild shrimp are produced in both regions, the production of Giant River Prawn is concentrated in Khulna [7]. Bangladeshi people are popularly referred to as **"Mache Bhate Bangali" or "fish and rice makes a Bengali"** [6]. Moreover, it is ranked 5th in global aquaculture production after China, India, Vietnam and Indonesia (FAO, 2012). The total fish production in 1998-99 was 1552 thousands tonnes of which 80% were from inland fisheries and 20% from marine sources [8]. Then, the total annual fish production has gradually increased from 1.78 million tonnes in 2000-01 to 3.06 million tonnes in 2010-11 fiscal year, of which 1.46 million tonnes (48%) were obtained from inland aquaculture, 1.05 million tonnes (34%) from inland capture fisheries and 0.55 million tonnes (18%) from marine fisheries, an average annual growth rate of 7% during the last decade (FRSS, 2012) [2].

Nutrition has social and cultural extensions, since the personal choices that concern it are now influenced more and more by personal values and symbols (Beharrell and Crockett, 1992) [11]. Given the continuous occurrences of food safety incidents and food-related diseases [12], food safety has been identified as the top concern among consumers [13]. Food safety concern, in its broadest sense, indicates the degree to which people are worried about pesticide residues contained in food as well as about food scares [14]. Essentially, consumers often associate food safety issues with the use of pesticides, fertilizers, antibiotics, artificial additives and preservatives in the food production process [15, 16]. Organic production methods are considered as being free of these undesirable chemicals [17]. Van Loo et al. [18] point out that habitual buyers of organic chicken strongly believe that such a product has fewer residues. Michael-

idou and Hassan [16] assert that food safety concern is the most relevant factor explaining consumer attitude towards organic food.

Health consciousness reflects individuals' thoughts on health issues and their readiness to undertake actions to ensure their health [19, 14]. Consumers have been increasingly concerned about health and nutrition in food [20]. There is a general belief that organic foods are healthy to eat because such products are rich in nutrition and are chemically free [21]. Bryła [22] asserts that Polish consumers perceive healthiness as being the most important characteristic of organic food. A consumer survey conducted by Tsakiridou et al. [13] demonstrates that 87.6% of respondents perceive organic products to be healthier than conventional alternatives. Health consciousness is therefore a key determinant of organic food consumption [17]. Although Tarkiainen and Sundqvist [23] surprisingly find that health consciousness is not relevant in predicting attitude towards purchasing organic food, the majority of prior studies confirm a significant and positive relationship between these variables [16,24]. Importantly, Yadav and Pathak [25] assert that health consciousness is the strongest predictor of attitude towards organic food. Kafka and Alvensleben (1998; cited in Lumbers et al., 2003) found that Greeks are ranked third in the EU and among 17 developed countries (after Germany and Austria) in terms of their concern about food-related hazards and the risks they incur for their health. Moreover, Lumbers et al. **(**2003) maintain that Greek consumers are significantly less confident about their food supply and significantly more fearful of pesticide residues compared to the British consumers in their survey [26]. In light of these findings, the present survey examines a number of consumers' willingness to pay (WTP) for organic food products, which reflect consumers' concern about the "ethical" production of food in terms of its quality/safety, as well as environmental friendliness.

The policy aims of the Government of Bangladesh

The policy aims of the Government of Bangladesh are to enhance fishery resources and production, to alleviate poverty through self-employment, to improve the socio-economic position of fishermen, to meet the country's huge demand for animal protein, and to contribute to foreign exchange. At present the Ministry of Fisheries and Livestock focuses on increasing the availability of animal protein from fish and other seafood products. The policy lays emphasis on meeting local demand while also complying with international standards. The priority of the Ministry of Fisheries and Livestock is to enhance food safety conditions in the fisheries sector. Important to note is that currently all seafood exports are receiving a 10% export subsidy from the government of Bangladesh. This subsidy has a positive impact on the competitiveness of Bangladesh seafood products in the international market [7]. Virtually there is no fish price fixation policy in Bangladesh provided by the government, fisheries cooperatives or by the trade associations. The prices of fish are basically influenced by supply and demand and varies with species and size of fish, season of the year and location. The prices of fish have been increasing faster than the other agricultural commodities in Bangladesh and doubled during last ten years [8]. The marine fish catching areas and landing centers of Bangladesh are located in the south and south-eastern parts of Bangladesh and freshwater fish are landed in river sides, haor areas, Beels and Kaptai lake. The North-west part of Bangladesh e.g. Dhaka, Chottogram, Rongpur area lack such catching area and landing centers which results frequent fish scarcity in those zone. It is therefore important to know the distribution paths of the fish which influence the quality, supply and price of the products [27]. The two main exported cultured species are Black Tiger shrimp or Giant Tiger Prawn (*Penaeus monodon*) and Giant River Prawn (*Macrobrachium rosenbergii*). The two main exported wild species are Speckled shrimp (*Metapenaeus. monoceros)* and Indian White shrimp (*Penaeus indicus)*. The total value of Bangladeshi shrimp exports in 2011 was almost USD430m. The EU was the most important market, accounting for 75% of the total export value. In contrast to other shrimp exporting countries in the region, Bangladesh is traditionally oriented towards the EU market and less towards other markets in the US and Japan. This would suggest that Bangladesh has a good position in the EU mar-

ket. However, it seems that the main reason that Bangladesh is so popular among EU buyers is the comparatively low price of cultured shrimp - which is mainly caused by the 10% export subsidy from the Government of Bangladesh - and the limited supply from other countries [7].

Although there is legislation in place to manage fisheries, there is still a low level of compliance with and enforcement of fisheries management rules and laws [3, 28]. A study on the management challenges of small-scale fisheries found that sustainable management systems need to account for social, economic, and ecological factors and must have strategies in place that include enforcement of policies and laws, collaboration with relevant institutions, and community participation [29]. The USAID-funded Management of Aquatic Ecosystems through Community Husbandry (MACH) program serves as an example of a successful sustainable local fisheries management program. MACH implemented "a multi-disciplinary, multi-sector, and participatory process of planning, implementation, and monitoring for sustainable wetland resource management" [30]. The program led to improved food security and well-being for more than 180,000 of the poorest Bangladeshi citizens; from 1999 to 2006, fish catches in target villages increased by 140%, consumption by 52%, and average daily household incomes by 33% [30]. A recent study found fisheries in Bangladesh have low adaptive capacity and high vulnerability to climate change [31]. In addition to the challenges posed by climate change, wild fisheries are threatened by overexploitation due to poor management and habitat degradation [3]. In order to mitigate these challenges, one of the country's investment priorities in fisheries development is to improve the management of both inland and marine fisheries resources and to restore some open water wild fisheries [32]. The Department of Fisheries has a mandate "to enhance fisheries resources through enacting conservation and management measures [4].

Sustainable Management Plan & Consumer demands

In agriculture, the basic question is the link between intensive mass production and its environmental influences (Zilberman et al., 1999). Notably, food consumption is associated with environmental issues such as increased greenhouse gas emissions, water scarcity and pollution [33]. Most of the time, stricter environmental regulations are judged negatively by producers, who complain about cost increases, income reduction and product competitiveness in the new global environment (Kyriakopoulos and Oude Ophuis, 1997; Zilberman et al.,1999). On the other hand, consumers who claim to be environmentally conscious place additional standards on manufacturers, distributors, retailers and policy-makers [11]. According to Dunlap and Jones [34], environmental concern denotes "the degree to which people are aware of problems regarding the environment and support efforts to solve them or indicate the willingness to contribute personally to their solution". In general, consumers who are concerned about the environment tend to develop positive environmental attitudes, express willingness to pay more for eco-friendly products and exhibit pro-environmental behavior [35, 36]. Environmental concern therefore appears to be a driving factor of organic food purchase behavior, and this has been largely attributed to being environmentally friendly [37]. This is partly driven by consumers' socio-environmental responsibility in addition to their personal interest and choice [37]. Although there exist various definitions of organic food, it can be broadly defined as products which are "grown without the use of pesticides, synthetic fertilizers, sewage sludge, genetically modified organisms, or ionizing radiation" as well as products produced "free of antibiotics or growth hormones" [39]. The majority of consumers believe that organic food is eco-friendly, healthier, safer, cleaner, more nutritious, tastier and safer as compared to conventional food [40, 22, 37, 41]. A considerable number of studies on organic food have focused on consumers' personal factors that motivate attitude and purchase behavior associated with organic food [42]. Key personal factors include values, environmental concern, knowledge, perceived quality, emotions, health consciousness, concerns with respect to nutrition, food taste and food safety [43,17,43]. Squires et al. [45] suggest that organic food buyers express interest in protecting the ecology and natural production process.

Interestingly, there exists mixed findings regarding the relationship between consumers' attitudes and their purchase of organic food [46]. While various studies demonstrate that consumers' attitudes towards organic food significantly enhance their purchase intention and behavior, several authors report that many consumers do not actually buy organic food despite displaying positive attitudes towards them [47,48]. Aschemann-Witzel and Niebuhr Aagaard [46] note that young consumers hold highly favorable attitudes about organic food, but their actual purchases remain low. According to Padel and Foster [49], such an anomaly can be explained by the complexity of the consumer decision-making process and the varied motives and barriers associated with different types of organic food. This finding is extended by Vermeir and Verbeke [38] who suggest that marketing factors such as price, product quality, convenient distribution and brand familiarity remain the most important criteria in the consumer decision-making process. These factors along with consumer habits of buying conventional produce may dilute the impact of attitudes toward organic food on actual purchase behavior. Hence, although consumers might believe that organic food offers environmental and health benefits and that the purchase of organic food is beneficial, they may be unable to buy, or they may decide not to buy the product owing to its high price, lack of availability, poor labelling and mediocre point -of-purchase display. Several authors assert that organic food retailers need to develop and implement effective green marketing practices to support consumers' decision-making process [37,50]. Various studies concerning consumer behaviour vis-a` -vis organic products have been conducted in many EU countries and the US (Davis et al., 1995; Roddy et al., 1996; Hutchins and Greenhalgh, 1997; Reicks et al., 1997; Latacz Lohmann and Foster, 1997; Kyriakopoulos and Oude Ophuis, 1997; Thompson, 1998; Thompson and Kidwell, 1998; Michelsen et al., 1999; Worner and Meier-Ploeger, 1999; Santucci et al., 1999; Govindasamy and Italia, 1999; Browne et al., 2000; Zanoli and Naspetti, 2001; Magnusson et al., 2001; Jones and Clarke-Hill, 2001; Wier and Calverley, 2002). Similar studies have also been conducted in Greece (Kyriakopoulos, 1996; Papastefanou et al., 1998; Zotos et al., 1999; Tzimitra-Kalogianni et al., 1999; Chryssochoidis, 2000; Chryssochoidis and Fotopoulos, 2000; Fotopoulos and Krystallis, 2001, 2002a, b; Fotopoulos et al., 2003). Most of the studies mentioned that how consumers perceive the organic concept, the issues related to the demand for organic produce, consumers' attitudes, and the factors that facilitate or hinder the acceptance of these products. They reveal that purchase motives are attributed to environmental and health consciousness, safety and quality concerns and exploratory food buying behaviour, as well as to specific product attributes such as nutritional value, taste, freshness, and price (Tregear et al., 1994; Grunert and Juhl, 1995; Davis et al., 1995; Roddy et al., 1996; Reicks et al., 1997; Zanoli, 1998; Zotos et al., 1999; Worner and Meier-Ploeger, 1999; Chryssochoidis, 2000; Browne et al., 2000; Fotopoulos and Krystallis, 2002a, b). Some studies also reveal a variety of other purchase motives that seem to reflect national interests, such as "support to organic farmers" for German consumers (Worner and Meier-Ploeger, 1999) or "animal welfare" for British consumers (Meier-Ploeger and Woodward, 1999). On the other hand, the reasons that account for a reversal in favourable attitude towards organic products are price and availability (Silverstone, 1993; Davis et al., 1995; Roddy et al., 1996; Latacz-Lohmann and Foster, 1997; Reicks et al., 1997; Worner and Meier-Ploeger, 1999), lack of some special value in the eyes of consumers (Tregear et al., 1994; Roddy et al., 1996) and doubts about product guarantees, lack of promotion and misunderstanding of organic ways of production (Worner and Meier-Ploeger, 1999). Regarding the socio-demographic profile of organic product buyers, all other studies agree that they are mainly women, who buy in larger quantities and more frequently than men. The age factor does not seem to play an important role, with younger consumers seeming slightly more willing to buy (more and expensive) due to their greater environmental consciousness. This willingness, however, does not translate into demand due to their lower purchasing power. Disposable income seems to affect mainly the quantity of organics bought and not general willingness to buy. However, despite high organic price pre-

miums, higher household incomes do not necessarily indicate a higher likelihood of organic purchases. Overall, although there is conflicting evidence, those who are more likely to buy organic are females with children, in younger age groups, of higher education and income levels (Govindasamy and Italia, 1999) [11] Govindasamy and Italia (1999) argue that, among the factors that were found to affect WTP internationally, demographic characteristics such as gender, age, income and education, are among the most important. Davis et al. (1995) suggest that slight differences between gender groups are observed as regards to their WTP: men would pay more at a percentage of 41 percent compared to 44 percent of women. Laroche et al. (2001) claim that most of the relevant studies have identified married females with children as being more willing to pay for environmentally friendly products. Additionally, Henson (1996) maintains that females and younger consumers are the most willing to pay for reductions in the risk of food poisoning, while results for income and education are conflicting. Moreover, Angulo et al. (2003) assert that only income is a key factor in explaining consumers' WTP a premium for traceability certified beef, with education, marital status, gender and age being insignificant [11].

The literature on the assessment of Food safety management (FSM) at the farm level is sparse, especially for developing countries. Most studies focus on the intermediary level of the food chain, such as exporters (Jongwanich, 2009; Handschuch et al., 2013; Dou et al., 2015), processors (Jensen et al., 1998; Jensen and Unnevehr, 2000; Gould et al., 2000; Buckley, 2015), manufacturers (Antle, 1996), and retailers (Mortlock et al., 2000). One of the major concerns of smallholders is cost of compliance with safety and quality standards (Henson and Heasman, 1998; Trienekens and Zuurbier, 2008). Krystallis and Chrysohoidis [51] assert that price is the most important criterion considered by consumers when purchasing food. The high price of organic food has been identified as the most relevant barrier to organic food purchase and consumption [22, 38]. By focusing on an emerging market, the study examines whether or not the attitude-behavior gap previously identified in developed countries is relevant in the new research context. Standards however can confer benefits to small farmers in terms of better market access, higher prices, and technology upgrades (Handschuch et al., 2013; Asfaw et al., 2009). Sheperd (2006) found that the level of food quality in traditional markets of Asia depends on the economic benefits along the value chain. Overall, whether small farmers are hurt or benefited from compliance is debated (Henson and Heasman, 1998; Otsuki et al., 2001; Rotherham, 2003; Jaffe and Henson, 2004; World Bank, 2005; Swinnen and Maertens, 2007; Reardon et al., 2009; Handschuch et al., 2013) [52].

Due to globalization, rising incomes and other changes such as urbanization, interest in food safety and quality has intensified in recent years [52]. Despite having poor hygiene and sanitation, and with rising concerns about food safety from production to handling, traditional food markets remain a significant point of purchase in the developing world. However, it remains unclear how consumers arrive at their valuation of food quality attributes. Food safety and hygiene is a major issue at traditional market outlets in developing countries and a public health concern. Notably, consumers at traditional market outlets have been found to exhibit low levels of food health risk perception (Lagerkvist, Hess, Hansson, Okello, & Karanja, 2013), but at the same time exhibit willingness to pay for enhanced food safety (Alphonce & Alfnes, 2011; Lagerkvist, Hess, Okello, & Karanja, 2013), which taken together suggest the existence of market failure [53]. Several public and private standards have been developed in agri-food chains. Compliance with sanitary and phytosanitary measures is one among many factors influencing incomes, employment opportunities, and welfare of poor in developing countries (World Bank, 2005). The increased attention to food safety is partly driven by scientific advances but also by news of food scares and scandals publicized by the media (Angulo et al., 2005; World Bank, 2005; Lobb, 2005; Chan et al., 2008; Ingelfinger, 2008) Various studies illustrate that consumers are willing to pay a premium for labeled and safe food products (Shin et al., 1992; Hayes et al., 1995; Rozan et al., 2004; Wang et al., 2007; Hammitt

and Haninger, 2007).1According to a World Health Organization report (WHO, 2015), one in ten people in the world fall sick from consumption of contaminated food and 0.4 million die every year, resulting in loss of 33 million healthy life-years. The same report emphasized that safe food encourages trade and tourism, helps improve food and nutrition security, supports national economies, and promotes sustainable development. Maintaining safety along the entire food chain particularly when food is sourced from different parts of the world is a great challenge. Faced with this, many countries, especially developed ones, impose non-tariff barriers if they think that imported products do not follow good agricultural/manufacturing practices (process standards) or are not well-tested (product standards), certified, and labeled (Henson and Jaffee, 2006). Although food safety can fail at many points in the chain, many past outbreaks of foodborne hazards have originated at the production site itself, emphasizing the importance of measures at the farm level (Burton and Young, 1996; Gossner et al., 2009; Kouamé-Sina et al., 2012; Desissa et al., 2013) [52].

Several researchers extending the Theory of Planned Behavior (TPB) suggest that attitude affects actual behavior directly and indirectly via behavioral intention [54,55–57]. Zepeda and Li [58] develop the Alphabet theory by explaining consumers' motivations for organic food consumption by integrating key elements of the value-belief-norm (VBN) model and the attitude-behavior-context (ABC) theory with knowledge and habit. Given the important role of attitudes in enacting behavior, several authors stress the need for a better understanding of antecedents to organic food attitudes [17, 16]. On the other hand, another research strand questioning the importance of attitudes, emphasizes the necessity to explain why consumers' attitudes are not translated into their actual purchase of organic products [46]. The three antecedents of environmental concern, food safety concern and health consciousness have been identified as the most important determinants of organic food attitudes [17]. Organic food knowledge is also examined to provide further insight into the knowledge-attitude relationship, previously identified as a gap in the literature [59].

Regular consumption of fish is associated with health benefits, especially the consumption of saltwater fish with polyunsaturated fatty acids, iodine and selenium (DGE., 2013). It is therefore recommended to consume one to two servings fish per week (FAO/ WHO, 2010; WHO., 2006). However, satisfying the global demand for fish is a challenge given the boundaries of natural resources and fish stocks (Jacquet & Pauly, 2007; Nesheim, Oria, & Yih, 2015). Natural fish stocks have decreased drastically since the increase in worldwide fisheries in the 1950s (Sumaila, Bellmann, & Tipping, 2016). Aquaculture developed as an alternative way to produce fish without decreasing wild fish stocks. Since the 1990s aquaculture has made a significant contribution to the worlds' fish supply (Sumaila et al., 2016); half of the seafood consumed comes from aquaculture (FAO., 2014; Fry et al., 2016). Nonetheless, the rapid increase of aquaculture production and its industrialization has led to a number of environmental problems (Edwards, 2015; Sumaila et al., 2016) due to eutrophication (Edwards, 2015) and emission of substances like hormones, antibiotics and biocides (Bergleiter & Meisch, 2015) [60].

Choice experiments (CE), known as choice modelling, are a stated-preference approach that is widely used to estimate the value impacts of environmental changes (Alpı´zar et al. 2001; Bennett and Blamey 2001). In a CE, individuals are given a series of questions (choice sets), in which the outcomes of alternative (hypothetical) policy scenarios are displayed. The outcomes of each scenario are described by different characteristics, or levels of attributes. Respondents are asked to choose their preferred option from the array of alternatives. In choosing between alternatives, consumers are expected to make tradeoffs between the levels of the attributes. This allows observing the relative importance of the different attributes. Where a monetary attribute (cost to the consumers) is included in the choice set, the researcher is able to calculate the average individual's marginal willingness-to-pay (WTP) or 'implicit price' for a change in each of the other (non-marketed) attributes

by dividing the estimated coefficient for the non-marketed attribute by the estimated coefficient for the cost attribute (Bennett and Blamey 2001) [61].

Attitudes associated with organic food and organic purchase have been central to research on organic food purchase and consumption [41,13]. It is a common belief that consumers' awareness and knowledge about organic food play an important role in their organic purchasing decisions [62]. Several researchers regard the lack of knowledge concerning organic food as a barrier to organic food purchase [63]. Organic food knowledge entails what consumers know about organic food and their ability to judge the quality and unique characteristics of organic food products. Aertsens et al. [59] find that knowledge are positively related to attitudes towards organic food consumption. Likewise, de Magistris et al. [62] confirm a positive association between consumers' self-reported organic knowledge and their attitudes towards organic produce. Consumers' attitudes towards buying organic food denotes their favorable or unfavorable evaluation towards purchasing organic food. Consumers who hold positive attitudes towards organic food believe that purchasing organic food is important and is a good choice [41]. Using the probit model analysis, Aertsens et al. [42] find a significant positive relationship between consumers' attitudes about organic food consumption and the proportion of organic food consumed by them. Similarly, a regression analysis conducted by Dahm et al. [39] indicates that students who hold positive attitudes toward organic food actually consume more organic food at home, on campus and at restaurants. Additionally, a structural model developed by von Meyer-Hofer et al. [54] demonstrates a significantly direct relationship between attitude towards purchasing organic food and purchase behavior among German consumers.

The past 15 years have seen a large proportion of organically certified aquaculture products is produced in developing countries where it is processed and then shipped to their markets overseas. In 2008, total organic aquaculture production globally was around 53 500 tonnes with a total market value of 300 million USD. Organic aquaculture products usually fetch a price premium over the conventionally produced products, yet with varying dimensions and durability. The trend is for continued steady growth of the organic aquaculture sector accompanied by the establishment of more national standards and labels, in addition to existing global standards [64]. The fish marketing system in Bangladesh is traditional, complex, and less competitive but plays a vital role in connecting the fish producers, and consumers, thus contributing significantly in "value add" process of the fish which otherwise would have been unused or underused and consequently in the earnings of the fisherfolk. Fish marketing is almost entirely managed, financed and controlled by a group of powerful intermediaries who played a big role in fish marketing channel. The marketing infrastructure including cold storage, ice, insulated transport facilities, landing centres and wholesale markets is generally inadequate, unhygienic and in disrepair. They need to be fully developed to reduce the waste, lower the marketing costs, stabilize the prices and over all improve the marketing efficiency [8]. Sustainable food products have become significantly more important over the last decades. One example is the constant growth in the market for organic food. However, market shares for sustainable aquaculture products remain small. Parallel to emerging markets for sustainable foods, consumers' interest in the geographical origin, in particular domestic and local food production evolved. Marketers of sustainable aquaculture products are advised to source products from countries of origin that consumers prefer, and prominently declare the country of origin. Price barriers constitute the critical hindrance to increasing consumer demand for organic food [22, 44, 65]. Price barriers refer to consumers' perception of organic food price and their ability and willingness to buy such a product despite the high price [66]. In a consumer survey carried out by Xie et al. [67], about 82% of the respondents indicate that high price premium is the reason for not buying organic products. In general, the majority of consumers are not willing to pay a price premium above 10–20% for organic food [68,69]. Van Doorn and Verhoef [70] argue that the high price of organic food negatively affects consumer-perceived. Nowa-

days, sustainability labels are used widespread in the seafood industry (Jacquet & Pauly, 2007; Madin & Macreadie, 2015; Stoll & Johnson, 2015). Several studies have shown that consumers are interested in sustainability criteria when buying fish (Honkanen & Young, 2015; Honkanen & Ottar Olsen, 2009; Hoogland, Boer, & Boersema, 2007; Verbeke, Vanhonacker, Sioen, van Camp, & Henauw, 2007). In terms of seafood from aquaculture, these include higher animal welfare standards and the reduction of environmental impacts (Olesen, Alfnes, Røra, & Kolstad, 2010). Nonetheless, consumers' use of sustainability labels in the context of food choice decision (Grunert, Hieke, & Wills, 2014). Since it is of environmental and societal concern to foster alternative procedures of aquaculture, it is important to understand and turn consumers' global concern about sustainability into sustainable food choice behavior (Bergleiter & Meisch, 2015; Grunert et al., 2014). So far little was known about consumers' understanding and acceptance of sustainability labels for aquaculture products [60].

CONCLUSION

For the consumer, organic products are considered better for health and environmental reasons. It also gives assurance that the food is produced without adverse effects on nature or the environment and lessens food scares, such as mad cow disease, pesticide contamination, antibiotic inclusion and other residues. It also ensures against consumption of genetically modified foods. Organic aquaculture is sustainable and ecofriendly. The fish marketing system faces various problems including heavy losses and waste and poor quality of fish. Due to the lack of public sector fish marketing organisation the fishermen or pond fish farmer are compelled to hand over their harvest to the commission agents at a price determined by the latter. Majorities of low-income people who do not have strong purchasing power were the major buyers of low cost fish species. There are different methods used in settings fish prices in markets in the study areas like bargain, auction, and whisper. Bargain is the common methods practice of settings fish prices in retail markets between retailers and the consumers. It is rarely practiced in wholesale markets. When the fishermen, fish farmers or the beparis sell fish to wholesalers or retailers, the price is usually set through auction by an *aratdar.*

There are no separate quality control measures for domestic marketing of fish in Bangladesh. The quality or grade of fish, namely freshness of large fish is roughly assessed by looking at the reddish hue of gills, sinking of eyes, general appearance of fish pressing fingers in different parts of the fish body and sometimes by smelling. Being aware of the desire of consumers, the retailers or the fishermen often put artificial colours on gills or the body of fish and persuade buyers to buy inferior quality of fish by giving a false appearance of freshness to fish. There are also a lack of knowledge on the part of the fishermen, pond fish farmers and other intermediaries, fish traders, with respect to proper handling, preservation, transporting, and marketing of fish causing spoilage of fish and rendering a considerable quantity of fish unsuitable for consumption.

The fish market intermediaries are performing an indispensable role in the marketing of fish and by bridging the gap between the fishermen, fish farmer of remote villages and the consumers, particularly those living in the city centres. However, the efficiency of the market intermediaries is retarded because of various problems they have faced in the process of fish marketing operations. Poor road conditions, lack of quick modes of transport facilities, inadequate cold storage and ice supply facilities, poor marketing infrastructure facilities, harassment by law enforcing agencies and local hoodlums under pressure, unstable market price, lack of market information, all affect their business adversely and increasing their marketing cost.

By developing modern marketing facilities at fish assembly centres, and retail fish markets, increasing cold storage facilities, refrigerated transport vehicles, and adequate supply of ice, increasing competition and providing stability to wholesale and retail markets etc. both the primary producer and consumer interest might be protected.

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