

# Consumer's attitude and consumption of fish in Dhaka city: Influence of perceived risk, trust and knowledge

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***Dedicated to***

*My parents –  
Mr. Abdur Rauf Sarker & Mrs. Rashida Rauf*

*And*

*My parents- in-law –  
Alhaz Mr. Abdul Halim & Alhaz Parvin Sultana*

## **Executive Summary**

Fish is the main source of animal protein in Bangladesh. However, no previous studies I am aware of has analyzed or explored consumption and attitude toward fish in Bangladesh. In accordance with several studies in the area of food consumption behavior, this study use the Theory of Planed Behavior (TPB - Ajzen, 1991) a conceptual framework to explore the consumers attitude and consumption of fish in Dhaka city. Attitude, subjective norms, perceived behavioral control in the traditional theory is extended with perceived risk, trust and knowledge in order to explain intention and consumption of fish. The measures used to evaluate the constructs in the theories are adopted from previous studies.

The study employs the methods of descriptive analysis, test of reliability and means difference, factor analysis, and multiple regression analysis to analyze the data collected in Dhaka city.

The results show that fish as a meal is a common and broadly used food, and the people have high motivation and positive attitude toward consumption of fish. Perceived quality is revealed as the main determinant of consumers' attitude, while availability is the main determinant of perceived behavioral control. Bones and smells of fish are not considered as unpleasant and not found as a significant indicator of attitudes. Time consumed to cook and prepare fish also did not found as a significant indicator of perceived control.

It is also found people knew that fish are cultured in toxic environment and preserved with hazardous chemical, however the risk perception is less significant. This study found that people have much trust on food information from specialist like doctors and university scientist; but have low trust on Government and political parties.

In the area of theory testing this study found attitude and norms are good predictors of intention, while intention and attitude have good predictability on consumption behavior.

PBC did not find having effect on both intention and behavior. The cumulative variance explained by the data set is 73% for the constructs of TPB. In case of the extended model it is observed that intention, attitude, trust on information sources and product knowledge have significant effect on behavior, while attitude, norms and procedural knowledge is revealed as good predictor of intention. In the extended model it is also observed that there is no statistically significant relationship between risk, worry, trust on information sources, trust on sales outs with intention and behavior. However, while regressing intention with perceived risk (risk and worry) and trust (trust on information sources and on sales outlets) this study found statistically significant relationship.

**Key words:** TPB, perceived risk, trust, knowledge, fish consumption, attitude, and intention

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**-A.F.M. Jalal Ahamed**

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## 1 Introduction

Fish is the main source of animal protein in Bangladesh, it constitute 63% of protein supply in the national diet (DoF, 2006). Among a wide range of theoretical models or theories in explaining food and seafood consumption behavior, the theory of reason action (TRA) and the theory of planned behavior (TPB) (Fishbein & Ajzen, 1975; Ajzen, 1991) are probably the most popular model (Povey Rachel et al, 2000, Saba & Natale, 1998, Saba & Vassallo, 2002, Verbeke & Vackier, 2005, Tuu et al., 2008). These models explain intention and food consumption, including fish consumption by attitude, subjective norms and perceived behavioral control of individual toward the product (see Olsen 2004 for a review). Several studies have extended this model by including factors such as perceived quality (Olsen, 2004), moral norms (Shepherd & Raats, 1996; Saba & Vassallo, 2002, Steptoe et al., 1995), descriptive norms, social identity (Olsen, 2004; Rozin, 1995; Steptoe et al. 1995) and others factors such as incorporation of habit in the TPB model (Saba & Natale, 1998) in order to give a broader understanding of food attitudes and consumption.

The fish consumers in the country (especially in the Capital) witnessed adulteration in the fishes by the traders, through the process of culturing in toxic environment and using unhealthy preservatives. Examples can be cited from the prime daily newspapers of the country: “*The At least 80,000kg of formalin-treated fishes daily enter the country from Myanmar, posing serious health hazards to millions of consumers* (Source: Bangladesh News, 2nd March, 2007). “*There were about 16 lagoons of WASA on 236 acres of land to rectify the sewers from different areas of the city. These lagoons are unfit for fish farming as toxic effluent find way into the lagoon waters..... some local influential people have been farming fish in the lagoons for long. Everyday they collect fish from the lagoons and supply them to different markets in the capital city*” (Source: Bangladesh News 24, 7th July, 2007).

In Dhaka, city dwellers are now more conscious about fish consumption by understanding the current trend of the malpractices in fish trade, Hossain et al.,2008

found that among the respondents of their study 93.7% consumers are aware that various foods and foodstuffs contain hazardous chemicals, while 95.5% of them are aware that these adulterated foods and foodstuffs are harmful to their health (Hossain, et al. 2008). Trust and knowledge about the quality of food (fish) is suggested to be of importance for consumer's attitudes and consumption when food are perceived to be risky and cause negative consequences for themselves or their family (Lobb, 2005, Lobb et. al., 2007, Frewer et. al., 1998).

Thus, consumers over the world are now much concern about the risk and health issues related to food intake (Redmond & Griffith, 2005). In low income countries it is found that economic determinants such as income and price are crucial in forming food choice, however, evidence from empirical research suggests that due to social inequality some consumers in the developing world, who have the purchasing power almost similar to the developed world are more conscious about health issue regarding food intake (Petrovici, et al, 2004). Bangladesh is a country with higher social inequality; beside the hardcore poverty a large number of affluent consumers are found here (especially in the capital). This affluent group of consumers is more conscious about the health and nutrition issues of the food items, and tends to make purchase from supermarkets and chains shops (personal observation of the researcher). However, in comparison to meat, fish is treated as a food with lower chance in chronic diseases and health hazards (Verbeke & Vackier, 2005); but adulteration and fish cultured in toxic environment could cause serious health problem. It is well treated in consumer research that consumer's risk perception may not only be a physical issue, but also deal with other aspects such as social and financial consequences (McCarthy and Henson, 2005; Yuksel and Yuksel, 2007; Angulo and Gil, 2007, Tsiros and Heilman 2005). 'Trust' is another side of the risk coin; it is also more 'elusive' and 'contestable' concept than risk (Hansen et. al., 2003). Consumer knowledge is another concept which has immense role in shaping consumer behaviors, particularly with regard to information search and information processing (Klerck and Sweeney, 2007); the phenomenon of knowledge is closely related with trust as well as with risk, when consumers are uncertain, trust (about upon the information source and the outlet) is important in purchasing decision, however, trust under certainty is synonymous to

knowledge (Dierks and Hanf, 2006). In case of Bangladesh, people who are conscious and have the financial means are now used to purchase fishes from super markets and chain shops, which are seems to be more trustworthy. However, knowledge about the product is still unclear, even though in super stores.

Although fish is the main protein source in Bangladeshi diet, so far, no previous studies were found in the web to examine the fish consumption attitude in Dhaka as well as in Bangladesh. As far the concern of the researcher, this study will be the first of its kind to explore the fish (food) consumption behavior in Bangladesh. Including the importance of risk, trust and knowledge in such a study is an additional contribution to the literature.

### **1.1 Research issue and questions**

Risk perceptions and trust issues are successfully include within the TPB framework (Lobb et. al., 2007). On the other hand, consumer knowledge is a multidimensional as well as a powerful construct in explaining consumer's food behavior; hence, knowledge is closely related with risk perception and trust of the consumer (Klerck & Sweeney, 2007, Dowling & Staelin, 1994, Chen & Li, 2007). In this study along with the TPB constructs (attitude, subjective norms, PBC), perceived risk, trust and knowledge will be used as additional constructs.

Most of the relevant studies in examining the food / seafood consumption behavior are based on the context either European or American countries. A little work has been done in the context of Asia as well as other developing countries (Tuu et al., 2008). The first objective of this study is to investigate the general patterns of the behavior, attitudes and motivation toward fish consumption of the consumers in Dhaka city (Bangladesh). The measures designed to assess the model's constructs in the study are mainly from prior studies. The purpose of the study is to examine whether an extended version of TPB is more capable to explore consumers' attitudes and consumption of fish in Dhaka city in Bangladesh.

The precise research objectives of this thesis are as follows:

- i) To explore the consumers attitude and consumption of fish in Dhaka city by applying the Theory of Planned Behavior.
- ii) To understand if and how perceived risks, trust and knowledge influence attitude, intention and fish consumption in this area.

## **1.2 Method**

To investigate the attitude and motivation as per the conceptual model a survey was conducted in the Dhaka city. The sample size is 201. The questionnaire was constructed to assess attitudes towards the consumption of fish, and to measure perception of risks, trust, and knowledge. Questions on beliefs, attitudes, and intention of consumption are based on the Ajzen and Fishbein's model (1991). Upon the data collected through the consumer survey the reliability of the construct was tested. To analyze the datasets descriptive analysis was used and that will explore the general pattern. Then principle component analysis (PCA) and multiple regression analysis were used to draw the final conclusion and discussion. Statistical software SPSS and Minitab was used.

## **1.3 Structure of the thesis**

After this introduction chapter, in the Chapter 2 the theoretical and conceptual framework of the research is discussed. Chapter 2, briefly introduces the theory of planned behavior (TPB), and then discusses the different aspects of the constructs within the framework, and other factors, such as perceived risk, knowledge and trust. Data and method is discussed in the Chapter 3 focusing on the measures, techniques for testing reliability and mean difference and multiple regression analysis. Chapter 4 presents the results from data analysis and model establishments. Finally, Chapter 5 discusses issues related to the results, conclusion and suggestions for future research.

## 2 Conceptual framework

Food choice behavior is treated as a ‘complex phenomenon’ and as a combination of a number of variables; food consumption and choice do not depend only on the individual’s own actions, rather on other factors like family members and lifestyle (Saba & Natale, 1999). As discussed in the earlier chapter, in this study TPB (Ajzen, 1991) are used as conceptual framework; along with the TPB model the incorporation of risk, trust and knowledge will make the final conceptual model. This section will discuss the aspects of the constructs within TPB, and also the risk model. Brief introduction of TPB is presented at beginning and the detailed constructs are discussed there in after.

### 2.1 Theory of Planned Behavior (TPB)

The theory of planned behavior (TPB) was introduced as an extension of Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975, Ajzen, 1991, Petrovici, et al, 2004). The underlying concept of TPB says that person’s intention to perform certain behavior, which is defined as people’s motivation, including the willingness to perform; is a latent variable and this variable is dependent on attitude and subjective norms (Ajzen, 1991; Petrovici, et al, 2004; Saba & Vassallo, 2002, Bonne et al. , 2007). The perceived behavioral control (PBC) as the third construct is the extension of the TRA model to develop the TPB model. The unique nature of TPB model is that it considers the non-economic factors, which are overlooked in traditional economic models (Petrovici, et al, 2004). The components of TPB model as well as their relevance with food consumption issue are discussed in the following paragraphs of this study (see Figure 1 for an overview of the constructs and their relationships)



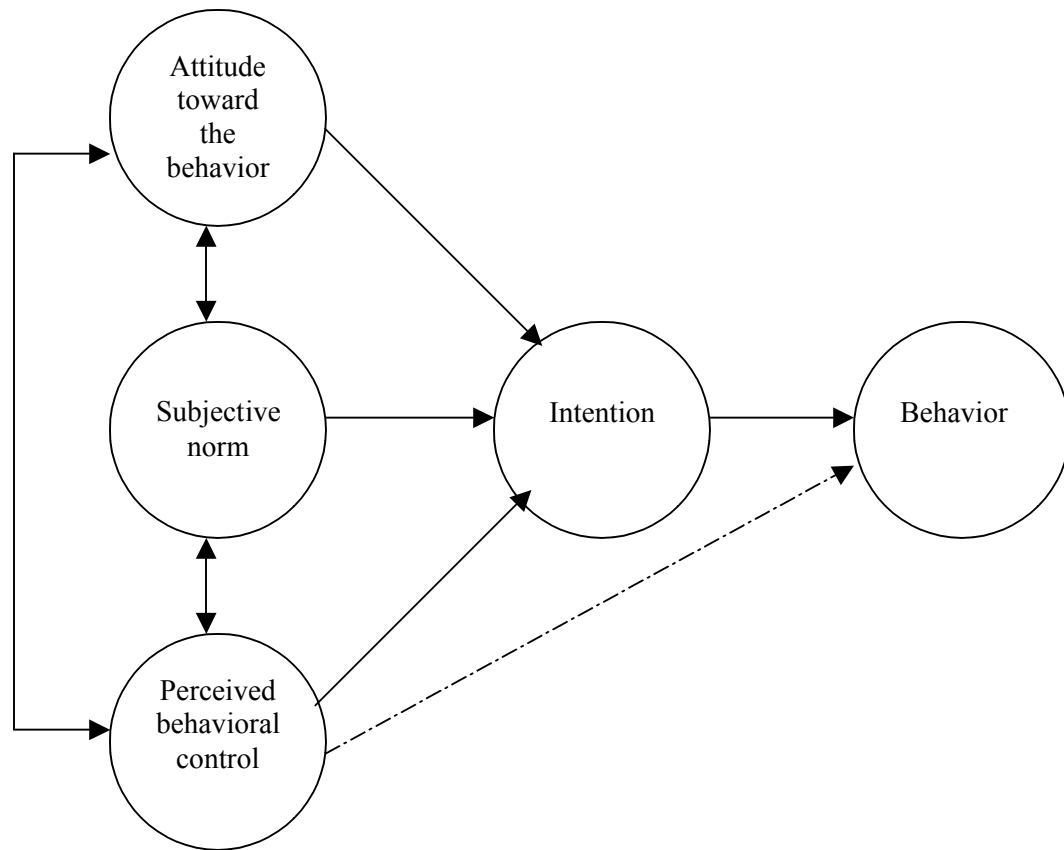


Figure 1 Theory of Planned Behavior (Ajzen, 1991)

### 2.1.1 Attitude

There is no well-accepted definition of attitude (Olson & Zanna, 1993); still ‘attitude’ is considered as Allport’s (1935) statement “the single most indispensable construct in social psychology” (Petty, et. al, 1997). However, it is well agreed by most attitude theorist that evaluation is one of the fundamental aspects of attitude (Olson & Zanna, 1993). Ajzen views attitude as a “summary of evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful –beneficial, pleasant-unpleasant, and likable-dislikable” (Ajzen, 2001). Hence, in the literature attitude is explained as psychological tendency with certain degree of polarity; ranging from favor to disfavor, like to dislike, satisfaction to dissatisfaction, positive to negative, and good to bad (Olsen, 2004; Pawlak and Malinauskas, 2008).

In contrast with the earlier simplistic idea of *one and only one attitude towards a given object*; now a days it is understood that people can hold more than one attitude towards a given object (Ajzen, 2001). People might have attitude towards all and everything surrounded us (Fabrigar et al., 2005). However, in case of measuring attitude the researcher should clearly focus on a particular entity or object, rather than all objects and situations, which it is related with (Fabrigar et al., 2005). The dominating properties of attitude are *evaluative* property, *attitude strength*, and *informational base* of attitude. The evaluative property perhaps the most dominating property in attitude research refers to how positively or negatively the person feels toward the object (Fabrigar et al., 2005, Ajzen, 2001). Strong attitude is defined as they are stable over time, to be resistant to persuasion and to predict manifest behavior (Fabrigar et al., 2005, Ajzen, 2001), while, the informational base of the attitude refer the extent to which they are based on different type of information i.e. cognition and affect base of attitude (Fabrigar et. al., 2005). Hence, three components of attitude has been identified by researchers as such, i) cognitive component, which says about the perceptual responses and verbal statements of the belief, ii) affective or emotional component refer to sympathetic nervous responses and verbal statement of belief, and iii) behavioral or cognitive component refers clear actions and verbal statement about the behavior (Fishbein & Ajzen, 1975).

In its core the theory of planned behavior (TPB) deals with the antecedent of attitude, subjective norms, and PBC (Ajzen, 1991). In searching the antecedents Icek Ajzen mentioned “behavior is a function of salient information, or beliefs, relevant to the behavior” (Ajzen, 1991). Hence it is clear that *salient beliefs* are considered as the main determent in forming the general attitude towards an object (Fishbein & Ajzen, 1975, Ajzen, 1991). Salient beliefs are defined as “the subjective probability of a relation between the object of the belief and some other object, value, concept, or attribute” (Fishbein & Ajzen, 1975). Salient beliefs are categorized in three distinct groups as – i) *behavioral beliefs* refer the influence attitudes toward the behavior, ii) *normative beliefs* constitute the underlying determinants of subjective norms, and iii) *control beliefs* provide the basis for perceptions of behavioral control (Ajzen, 1991). In marketing

literature perceived quality of products, product preferences and acceptability, general likeability, satisfaction and affects are treated different attributes of attitude or product evaluation (Olsen, 1999).

It is well argued that human food consumption behavior is very complex (Evans & Cox, 2006). There are a number of factors considered as influential in general food choice as – health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity (Steptoe et al., 1995), impression management, ethical concern (Martins & Pliner, 1998), ecological welfare, environmental protection, political values and religion (Lindeman & Vaananen, 2000, Bonne et al., 2007) (Evans & Cox, 2006 for review). In transitional economies (e.g. Czech Republic, Bulgaria, Rumania) it is found that freshness and price are the most important attribute in food choice (Pertovici et al., 2004).

In explaining food consumption as well as in seafood consumption behavior attitudes are treated as fundamental concept (Olsen, 2004, Tuu et al., 2008). Olsen in 2004 found four salient beliefs reasonable in forming seafood / food consumption attitude as: taste, distaste (negative affect), nutrition (Steptoe et al., 1995) and quality / freshness (Olsen, 2004). Taste (also distaste) issues perhaps the most important criteria in forming food /seafood attitude especially among young consumers; in contrast with health and nutrition preference of the elder consumers (Shepherd, 1989, Olsen, 2001, Olsen, 2004, Roininen et al., 1999). Seafood / fish is considered as a healthier food but at the same time treated as less tasty food in comparison with meat (Olsen, 2004, Verbeke & Vackier, 2005). However, there are several attributes (i.e. unpleasant smell and bones) contributes only negatively in forming food attitude (Olsen, 2004). After the taste issues the nutritional aspects are the second prominent factor that affect consumer's food attitude, it is directly related to health and healthy eating behavior (Olsen, 2001). Concerning the quality of the fish/seafood freshness is the prime determinate. In this regards frozen fish are treated as “non-fresh” “bad quality” “tasteless” “watery” “boring” (Olsen, 1998).

Other attributes like price and convenience also have impact on fish consumption attitude formation. However, Olsen in 2004, found price, value for money and household income

are not barrier in seafood consumption, while Verbeke & Vackier, in 2005, reported that price negatively affect the fish consumption attitude. Because of complex preparation and cooking procedure fish is also treated as an inconvenient food item (Gofton, 1995). This study will define and assess attitudes as both a general evaluation of attitudes toward consuming fish. This study also will assess different beliefs about fish such as perceived quality, taste, distaste, smell, nutrition, healthiness, appearance/appeal, risk, convenience, perceived price and value.

### **2.1.2 Social Norms**

Social norms are characterized as the perceived social pressure or expectation of the society (subjective norms) or from specific groups or individual (normative beliefs) (Fishbein & Ajzen, 1975; Olsen, 2004). Normative beliefs are the salient feature in forming subjective norm (Ajzen, 1991). Researches found that that subjective norm is the weakest predictor of intention and behavior (Ajzen, 1991; Armitage & Conner, 2001, Tuu et al., 2008). Due to inadequacy and rare predictability some researchers deliberately remove or suggest removing from analysis (Armitage & Conner, 2001 for a review). In order to mediate the weakness, distinction between normative (social, subjective or injunctive) and informational (descriptive) social influences has been made by some of the researchers (Armitage & Conner, 2001; Sheeran & Orbell, 1999, Tuu et al., 2008). In order to enhance the predictability of this construct within the TPB model, it is suggested to identify the dimensions of the subjective norms such as descriptive norms and moral norms (Armitage & Conner, 2001; Donald & Cooper, 2001; Sheeran & Orbell, 1999, Tuu et al., 2008 for a review). It is also proved by empirical researches that, descriptive norms have contributed to the prediction of intention independently of subjective norms (Tuu et al., 2008 for a review). Thus, the underlining concept of subjective norms emphasize on the possibility of gaining approval or disapproval from significant others for one's intentions and actions, while descriptive norms refer to perceptions of other people's behavior in the domain (Sheeran & Orbell, 1999).

In case of food/seafood consumption family expectation, moral obligations, and health involvements are determined as the main antecedents of social norms (Olsen, 2001, Olsen, 2004, Verbeke & Vackier, 2005). It is found that social factors are more liable in forming individual food preference than genetic factors (Rozin, 1995). Food items that are rejected by most of the family members are not usually served in family dine. In some countries it is observed that some particular species of fish consumption is treated as part of culture or part of religion [e.g. Hilsa (*Tenualosa ilisha*) consumption in Bangladesh / India in the New Year or Hilsa used in *Saraswati Puja* (the worship of the Goddess of Learning and Beauty)]. In this study, subjective norms are defined as social pressures and family expectations that determine the behavioral intentions in consuming fish. However, in this study the concept will be assessed by global measure; will not focus on normative beliefs.

### **2.1.3 Perceived Behavioral Control (PBC)**

Perceived Behavioral Control (PBC) refers the person's beliefs about the easiness or difficulty in performing the behavior (Ajzen, 1991, Olsen, 2004, Pawlak & Malinauskas, 2008). If the individual is supposed to have more resources and opportunities, it is assumed that s/he has grater control over the behavior (Olsen, 2004). The control beliefs are the third group of salient beliefs that result perceived behavioral control (Ajzen, 1991, 2001, Pawlak & Malinauskas, 2008). Control beliefs refer the extent of hardness perceived by an individual to perform a desired behavior (Pawlak & Malinauskas, 2008). Ajzen, 1991 refers that the PBC construct is synonymous to self –efficacy concept (Conner & Abraham, 2001). According to Ajzen, 1991, PBC together with behavioral intention can be used directly in predicting behavioral achievement; thus the PBC affect both intention and behavior (Ajzen, 1991). PBC is more important in influencing person's behavior, when the behavior is not wholly under volitional control (Ajzen, 1991, 2001, Chiou, 1998). Two main components of PBC have been identified: the first component says about the availability of resources required to engage in the behavior (e.g. money, time, and other resources); while the second component refers the person's self-confidence in performing the certain behavior (Ajzen, 1991, 2001). As the TPB

conceptualize that the predictability of the TPB constructs varies across situations and behaviors; so as the magnitude of PBC-intention relationship could be varied as per the situation and behavior (Armitage & Conner, 2001). As per Ajzen, the control factors can be internal or external to the person. Internal to the person can be skills, knowledge, lack of abilities, willpower, compulsion; while the external to the person can be time, opportunity, situation, dependence on others (Ajzen, 1991).

Olsen (2004) found the most important control factors that influence consumers' seafood purchasing include price/cost, convenience/availability and knowledge. Being a high valued product in many parts of the world the intention of buying food/fish is affected by the price issue (Olsen, 2004, Verbeke & Vackier, 2005, Pertovici et al., 2004). However, empirical researches in Finland, Norway and UK found that price and value is not a significant factor in consuming seafood (Honkanen et al., 1998, Leek et al., 2000, Olsen, 2004). Gofton, 1995 reported that inconvenience and scarcity are significant barriers to consuming fish. However, it is found that because of their experience, comparing with younger consumers the elder consumers consider seafood more convenient (Olsen, 2003, 2004). Knowledge, an important factor in seafood choice and consumption; is a vast area of discussion. Knowledge is linked from evaluation the quality of the fish in the market place to cooking/preparing procedure to final meal serving (Olsen, 2004).

In this thesis the PBC construct is defined as an integrated component of internal, external control and contextual factors that consumers may perceive its easiness or hardships in performing their intention to consume and engage in fish consumption. In more detailed investigation, price/cost, availability, and convenience are assumed as the main determinants of personal control over eating fish in Dhaka city. It should be worthy to mention that some of these beliefs also affect attitude, thus they affect both the attitude and PBC. However, here price/cost refers the actual cost, while price/cost in the attitude refers the individual's perceptions about consuming fish.

#### 2.1.4 Intention and consumption

The intention construct is in the center of the TPB concept (Ajzen, 1991). Intentions are described as “the motivational factors that influence a behavior and to indicate how hard people are willing to try or how much effort they would exert to perform the behavior” (Ajzen, 1991, Armitage & Conner, 2001). There are three antecedents of intention: subjective norms and attitude towards the behavior (Fishbein & Ajzen, 1975) and PBC (Ajzen, 1991, 2001, Armitage & Conner, 2001). It is also well accepted that “the stronger the intention to engage in a behavior, the more likely should be its performance” (Ajzen, 1991). Intention is usually measured in terms of ‘will’, ‘expect’, ‘should’, ‘wish/intend’, ‘determined’ or ‘want’ with the probability estimates such as “unlikely and likely” in social science (Armitage & Conner, 2001) and also in food consumption context (Sparks et al, 1992; 1995; Verbeke & Vackier, 2005).

Fundamentally within the concept of TPB, intentions are considered as *behavioral plans* with the presence of appropriate opportunities and resources intentions enable in performing a behavioral goal successfully (Conner & Armitage, 1998). Normally it is considered that Intentions are generally good predictors of the behavior. It is found that that the overall correlation between intentions and behavior was 0.53 (Sheeran 2002, Honkanen et. al., 2006 for a review). In the domain of marketing and consumer behavior, intention is often substituted for buying behavior, choice and loyalty (Honkanen et. al., 2006). However, from various meta-analyses it is shown that intentions do not always lead to successful enactment of the behavior; such as intentions in the context of the TRA account for only 38% of the variance in behavior, while meta-analyses of the TPB indicate that intentions and PBC account for only 34% of behavior (Conner & Armitage, 1998).

It is observed that there are a limited number of researches in explaining the relationship in between the behavior intention and the behavior measured by observation of actual food consumption (Saba & Natale, 1998). However, Similar to prior researches (e.g. Olsen, 2001), Tuu et al., in 2008 found that intention have a significant effect on

behavioral frequency (Tuu et al., 2008). This study defines intention as motivation of individuals toward eating fish and assumes intention is positively affected by attitude, subjective norms, and PBC. It also assumes that intention of buying fish has a positive relationship with buying and fish consumption behavior. The behavior in common is measured as self –reported consumption (Saba & Natale, 1998). In this study, behavior is defined and measured as the individual’s frequency of fish consumption- as a self reported indication of past behavior. It is also needed to mention that this study does not differentiate the actual and perceived behavior/frequency.

## **2.2 Perceived Risk**

The concept of risk is one of the main propositions in the study of consumer behavior (Conchar, et. al, 2007). However, studying risk as one of the leading thoughts in consumer theory emerged in 1960’s in the field of marketing (Dowling and Staelin, 1994). Risk is being defied as “a combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence” (HMSO, 1995 as cited in Angulo and Gil, 2007). Risk is being said as a multidimensional construct (Yuksel and Yuksel, 2007). Although risk is being conceptualized differently in different field of studies; in the marketing literature it is being conceptualized as involving two distinct elements; as uncertainty and consequences (Conchar, et. al, 2007).

Three main theoretical approaches are associated with consumer’s risk decisions; they are as follows (Lobb, 2005):

- 1) technical approach or risk assessment,
- 2) political approach or risk management, and
- 3) social process approach or risk communication

These three approaches define the concept of risk differently, in order to examine the risk concept; it is worthy to review these definitions from different approaches



- a) The technical approach defines risk as “an objective, essentially value-free assessment of the probability of negative consequences” (Sapp, 2003)
- b) Risk management is the decision-making process involving political, social, economic considerations with relevant risk assessments to develop, analyze and compare regulatory options and to select the optimal regulatory response (Lobb, 2005)
- c) Social process approach defines risk as, “risk arises from public discourse about the technology and the political and economic conditions that influence expert assessments” (Sapp, 2003)

In modern consumer studies perceived risk has been used frequently as an explanatory variable (Dowling and Staelin, 1994). It is worthy to mention that there is no widely accepted definition of perceived risk in the literatures of consumer behavior; researcher defines perceived risk as per the situation and context of the research (Conchar, et. al, 2007). However, in many cases consumer researchers defines perceived risk as risk in terms of the consumer’s perceptions of the uncertainty and adverse consequences of buying a product or a service; consequently it is being assumed that the probability and the outcome of each purchase events are uncertain (Dowling and Staelin, 1994). Hence, two dimensions of perceived risk have been identified, as such uncertainty and negative consequences (Yuksel and Yuksel, 2007; Grewal, et. al. 2007; Klerck and Sweeney, 2007; Dowling and Staelin, 1994). So far, different types of perceived risk have been identified in acquisition and consumption of products that includes, functional (the product does not perform as expected), financial (losing or wasting income), performance (does not meet the need / the product does not meet the standards of the quality), physical (personal illness or injury), psychological (damages of self-esteem or endangers guilt) and social (unfashionable or lower status) (Klerck and Sweeney, 2007; McCarthy and Henson, 2005; Yuksel and Yuksel, 2007; Angulo and Gil, 2007, Tsiros and Heilman 2005).

The importance of consumers risk perception is very much crucial as the more risk the consumers will perceive the less likely they will purchase, thus it will directly affect the

purchase and purchasing intention (Yuksel and Yuksel, 2007). However, in examining consumer's perceived risk the price/cost of the product also bear higher significance, empirical studies suggested that higher price tends to higher perceived risks (Angulo and Gil, 2007).

From the view of social approach, Frewer in 1999 define risk perception in relation to media and food issues, as “risk perception is socially constructed, and that it is psychological elements which guide peoples’ responses to a particular hazard rather than the technical risk estimates” (Frewer, 1999 as cited in Lobb, 2005). Thus, in case of the food choices studies it is suggested that psychological properties (e.g. perception of food safety risk) have greater effect than that of physical properties of the product (Angulo and Gil, 2007).

Worry and perceived risk are sometimes discussed together in health belief models, although it has been unsought in many health belief models including the popular TPB. However, the specialty of the constructs (worry and perceived risk) deserves distinction. Worry has been identified as an emotional response to a threat (e.g., affective responses), on the other hand perceived risk has been described as a cognitive assessment (e.g., perceptions of vulnerability) (Sjöberg, 1998, Schmiede et. al., 2009).

This study will showcase the direct impact of risk and worry perception on the intention to purchase/consume fish. For modeling purpose the perceived risk construct will be divided as risk and worry.

### **2.3 Trust**

Being a multidisciplinary concept definition of trust varies across disciplines. Trust, in broader aspect can also be said as ‘general trust’, defined as “the extent to which one believes that others will not act to exploit one’s vulnerabilities” (Morrow et al, 2002, p 6 as cited in Lobb, 2004). Hence, researches conceptualize trust as a combination of rational thinking (cognitive process) and feelings, instinct and intuition (affective

influences) (Lobb, 2004). Individual's past experience is the base for trust formation (Lobb, 2004)

In late 80's and early 90's risk research emphasis the concept of risk communication. Evidence from empirical studies suggests that trust and credibility in the food supply chain play a vital role towards consumer's risk perception. *As people do not trust the messenger, they will not trust the message* (Hansen, et. al. 2003, Lobb, A.E., et al. 2007).

Since it is difficult for general consumer to assess the risk associated with the food through normal investigation and judgment; they have to depend on other informational sources like media and institutions, which is refereed as 'social trust', while 'social trust' is defined as the people's willingness to rely on experts and institutions in the management of risk and technologies (Chen and Li, 2007). Thus, the phenomenon of trust is more discussed in risk and food safety related media and information researches. However, in consumer behavior related studies the interaction of trust in 'institutions' or individuals (suppliers of food or government/regulators) on consumers purchasing behavior is the main focus of research. (Lobb, et. al. 2007, Lobb, 2004)

Renn and Levine (1991) found five distinct components of trust as such the degree of perceived expertise of the source, lack of biases in information, fairness, consistency over time and good faith. However, Lobb (2005) identified several sources of information on food safety available for consumers as follows: (a) labels; (b) advertising; (c) other point-of-purchase information; (c) word of-mouth; (d) diet and health guidelines from the medical profession, government, independent authorities, consumer groups; (e) media news. Other forms of information (e.g., outcome of scientific research) are usually conveyed through one of the above channels (Lobb, 2005). Reporting bias and knowledge bias are two perception factors in measuring trust. The reporting bias defined as the specific trust in the honesty of the source of information, while knowledge bias is associated to the (perceived) degree of knowledge (expertise) of the source.

Study on European consumers found that information obtained from consumer association is more trustworthy to then that of other food related people and institutions; simultaneously tabloid newspapers, government ministers are less trustworthy as they are assumed to have personal/group interest for the safety information (Lobb, 2005). The influence of these sorts of consumer associations & other organizations is subject to further research in developing countries. This study will define trust from the both perspective as the consumers trust on different fish vendors at different fish trading spots; and the trustworthiness of various food safety information sources such as the food industry, friends, Government officers and organizations, medical doctor, supermarket information leaflet, quality newspapers, television programs and news, university scientist. As consumer associations in Bangladesh are not so active regarding the food safety issue this study will exclude the public trust on them. However, this important issue will be kept for further research. Thus, in this study for modeling purpose the trust construct is divided as trust on information sources and trust on sales outlets.

## **2.4 Knowledge**

In explaining consumer behavior *consumer knowledge* is one of the main constructs (Klerck and Sweeney, 2007). Empirical researches found two different categories of knowledge as such subjective knowledge and objective knowledge. Subjective knowledge can be defined as “ person’s perception of the amount of information about a product class stored in his or her memory ” while objective knowledge is defined as “ pertains to the actual amount of accurate information stored in his or her memory” (Klerck and Sweeney, 2007; Chiou, 1998). Although these two categories are related each other, their difference are significant because of two aspects. Firstly, subjective knowledge can be over or under estimated. Secondly, subjective knowledge can be thought as including in the person’s degree of confidence in his/her knowledge. On the other hand objective knowledge only refers only to the actual level of knowledge of the person (Chiou, 1998).

In case of seafood consumption it is widely accepted that knowledge is one of the main important factors in seafood choice, (Olsen, 2004) as knowledge about unsafe food-handling practices could lead to change in consumer behavior (Redmond & Griffith, 2005). Knowledge about how to prepare or use seafood in home-meals is identified as a barrier for seafood consumption; however, it requires further investigation (Olsen, 2004). Studies suggests that the negative perceptions about food items originate from beyond the individual's experiences; while the positive perceptions closely related to the individual's daily life experiences. Negative feelings are constructed on the basis of the individual's knowledge of the issue (e.g. Genetically Modified Foods). In case of Genetically-modified food (GM food); and other food items it is proven that if the consumer has more correct knowledge about the food item they will perceive fewer risk (Chen and Li, 2007).

In Bangladeshi family structure in household foods are prepared by women; and still in most of the families' women are housewives. They have ample time to prepare foods, cooking is treated as a symbol of art for women in most of the families (so called traditional view in large families). Thus, it is assumed that the procedural knowledge (preparing and cooking) might not be a barrier in consuming fish in most of the families in Bangladesh. However, day by day the number of unit and working families are growing, in these families both the partners are busy; thus the impact of the knowledge of preparing and cooking fish as well as the convenience issue in consuming fish demand further research and exploration.

In this study knowledge will be defined as the product and the procedural knowledge of the consumer. The product knowledge will include knowledge about the origin of the product i.e. fish (e.g. imported / local, catch /cultured, cultured is safe / hazardous place); quality of the product (e.g. fresh / not fresh); about the preservatives (chemical used or not as preservative) while the procedural knowledge include the preparing and cooking of the fish (Olsen, 2004). Because knowledge is expected to be highly correlated with consumption or expertise (Pieniak Z, et. al., 2008), this study will include knowledge after testing the influence of the other variables.

## **2.5 The conceptual model**

Theory of Planned Behavior (TPB) is one of most influential theories in explaining consumer behavior (Ajzen, 1991). The predictability attribute of the model made TPB so powerful. TPB is also served as a useful framework in explaining the determinants of fish consumption behavior (Verbeke & Vackier, 2005). The concept of TPB says that behavior can best be predicted through individual's intention, which is an indicator that how hard people are willing to perform, and how much effort the individual plan to exert toward performance of behavior (Ajzen, 1991; Chatzisarantis et. al, 2006). A meta-analytical review conducted by Armitage and Conner found the TPB model accounted for 27% variance in behavior and 39% variance in intention (Armitage & Conner, 2001; Conner & Abraham, 2001). Parallel reviews found TPB accounts for an average of between 40% and 50% (Ajzen, 1991) of the variance in intention across applications (Conner & Abraham, 2001). Also PBC accounts for an average of 6% of the variance over and above attitudes and subjective norms; this is the research justification of inclusion of PBC variable in the model (Fielding, et. al. 2008). However, the TPB model seems more predictive in food and seafood studies, the models explained on an around of 40% and 52-63% variance respectively of behavior and of intention (Olsen 2004; Verbeke & Vackier, 2005).

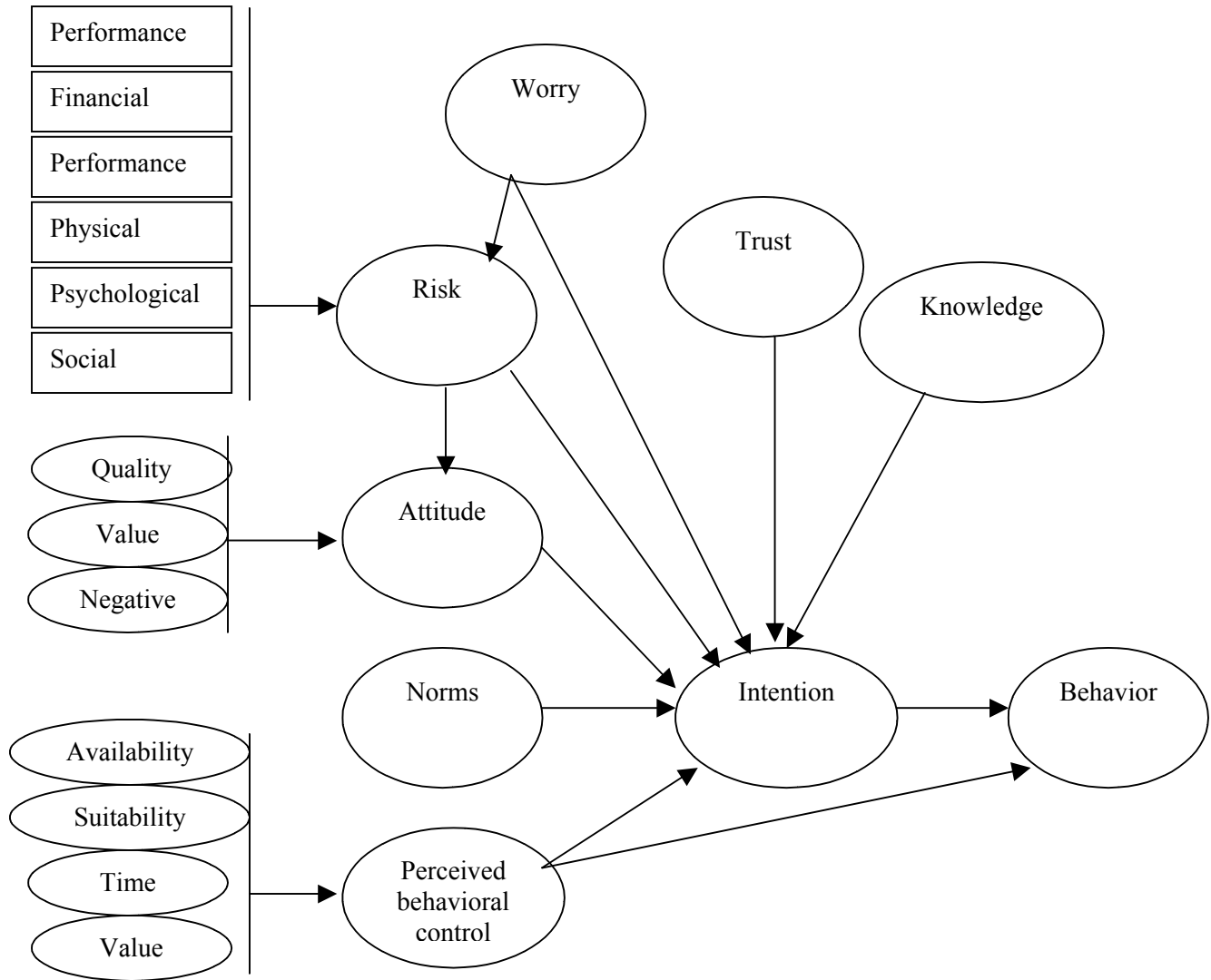


Figure 2 The analytical model

Over the last couple of decade the TPB model has been extended by many researchers, the inclusion of habit construct (Armitage & Conner, 2001) is one of the some examples. Similarly, TPB has also been extended by Mazzocchi et al. (2004) towards the inclusion of trust, as an additional predictor of consumer behavior (Dierks & Hanf, 2006). However, the introduction of trust and perceived risk into the TPB has not affected the consumer’s non-volitional beliefs, i.e. the perceived behavioral control and its direct influence on the consumer’s intention to perform a given behavior. The system is expected to model the *average* relation among the *global* variables and the behavioral

intention and ought to assess whether these relations vary according to other factors. (Mazzocchi et al., 2004 as cited in Dierks & Hanf, 2006)

Based on theoretical review, TPB will be used as the fundamental framework of this study; will showcase how different levels of risk perception, trust and knowledge influence purchasing intentions. The conceptual model is the combination of TPB model and the perceived risk, trust, and knowledge. Where, the TPB model of this study will explore the consumers' attitude and consumption of fish in Dhaka city (i.e. the 1<sup>st</sup> objective of the study) and the perceived risk, trust, and knowledge will clarify the role of perceived risks and its consequences on attitude and fish Consumption in Dhaka (i.e. the 2<sup>nd</sup> objective of the study). Thus, finally the constructs will be used as Risk, Trust, Knowledge and the attributes of TPB (attitude, norms and PBC). The economic analysis of food safety issues, with respect to risk and trust, is being popular among researcher over last decades (Lobb, 2004). As studies suggest that attitude towards food is driven by people's trust; therefore social trust will be included in the model to assess consumers' attitude and intention. Similarly knowledge will be included as it shapes the risk and intention of the consumers. Different types of risk category will be used to get the clear picture of the perceived risk. However, for modeling purpose the perceived risk will be divided in two sub-constructs, as risk, and worry; similarly trust and knowledge, will also be divided as trust on information sources and on sales outlets, product and procedural knowledge respectively. This study will also explore the attribute belief model, for attitude and control beliefs, as Ajzen, 1991, proposed that behavioral beliefs are the main determinants of attitude. Here perceived quality, value and negative effect of bones and smell are considered as determinates of attitude (Olsen 2001; 2004; Verbeke & Vackier, 2005); while availability, suitability, time and value is considered as the important control factors that influence consumers' purchasing decision (Olsen, 2004),



In testing the basic model, it is assumed that all relationships within TPB are significantly positive, which were confirmed by many empirical researches (Ajzen, 1991; Fishbein & Ajzen, 2005; Verbeke & Vackier, 2005). More specifically, the following relationships are expected:

- (1) Fish consumption is significantly determined by intention and personal control;
- (2) Intention is significantly determined by attitude, social norm, personal control, trust, risk and knowledge.
- (3) The beliefs about quality, negative effects, value, healthiness, availability, convenience, and risk have a significant impact on general attitude;
- (4) Beliefs about value, convenience, and availability have significant impact on personal control.
- (5) Six facets of risk perception and the worry perception of the consumers determine perceived risk.
- (6) Trust is determined by the trust on the information sources, as well as trust on the sales outlets
- (7) The knowledge construct involves both product and procedural knowledge.

### **3 Methodology**

The data collection process, questionnaires and analysis methods are discussed in this section of the thesis. In this part, the emphasis was given for designing items to measure the constructs. Factor analysis, multiple regression analysis and testing for the reliability of constructs are the methods discussed here.

#### **3.1 Survey and procedure**

The research was conducted in the Dhaka city (the capital of Bangladesh) on a convenience sample size of 201; thus the results are not necessarily representative of the whole population. The respondents were personally interviewed at their residence or work place and to complete a questionnaire it requires about 30 minutes of their time. First the researcher explained this motive and importance of the research to the respondent. After that the interview was conducted question by question. While explaining the questionnaire the researcher was careful about not to being biased or not to influence the respondent. Some of the respondents are reported that they are very busy so they need to take the questionnaire to home and after fulfilling the questionnaire they return it. It was very tough to collect information from people who are completely unknown; in this case the respondents were unwilling to give their response. It was also difficult to collect some demographic information like house hold income and designation. The respondents were not wanted to disclose these sorts of information. Being a tropical country there are a wide range of fresh water fishes are consumed in Bangladesh, thus it was the respondents report that it is difficult for them to give a general opinion. One of the important experiences of the researcher is that most of the respondents reported that they never thought so minutely about their food / fish consumption.

## 3.2 Measurement

This part of the thesis discusses the measuring procedure of the constructs and attributes. In most of the cases 7-point Likert scale and semantic differential scales were used. However, some true false questions were also used. Developed by Rensis Likert, the Likert scale “requires the respondents to indicate a degree of agreement or disagreement with each of a series of statements about the stimulus objects” (Malhotra, 2006); whereas, the Semantic Differential (SD) measures people's reactions to stimulus words, this type of scale have endpoints with bipolar labels that have semantic meaning (Malhotra, 2006). The measurement items used in this study were usually either taken or adopted from previous scientific research.

### 3.2.1 General attitude and attribute beliefs

Attitude toward a behavior is defined as a person’s overall evaluation of performing the behavior in question (Ajzen, 2002). This study defines and assesses attitudes as general evaluation of attitudes toward consuming fish. Attitude toward fish consumption was firstly assessed as global evaluation without any specificity in product items, times or context when the consumption occurs. The semantic differential scales are the most commonly used in measuring attitude (Ajzen, 2002, Ajzen & Madden 1986); in this study a 7-point semantic differential scale was used. As analogous to previous studies, the respondents were asked to rate their feelings as “In the following we would like you to think about how you feel when you eat fish as meal”; the scale range from 1 (negative feeling) to 7 (positive feeling), (Olsen, 2003, Tuu et. al., 2008, Verbeke & Vackier, 2005). The bipolar adjectives used were bad/good, unsatisfied/satisfied, unpleasant/pleasant, dull/exiting, and negative / positive (Chiou, 1998, Olsen, 2003, Bogers et. al., 2004, Elliott et. al., 2007, Tuu, et. al., 2008).

*In the following we would like you to think about how you feel when you eat fish as a meal. Please indicate for each row which word best describes how you feeling by putting one mark on each line.*

When I eat fish, I feel.....	1	2	3	4	5	6	7	
Bad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Good
Unsatisfied	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Satisfied
Unpleasant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pleasant
Dull	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exiting
Negative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positive

Within the paradigm of Theory of Planned Behavior (TPB) attitude toward an objective or behavior is assessed by salient beliefs (Fishbein & Ajzen, 1975, Ajzen, 1991). In case of fish consumption, Olsen in 2004 identified four salient beliefs reasonable in forming attitude as: taste, distaste (negative affect), nutrition and quality / freshness (Olsen, 2004). This study assessed different beliefs about fish such as perceived quality, taste, distaste, smell, nutrition, healthiness, appearance/appeal, risk, convenience, perceived price and value. The items were coded in semantic differential formats with 7-points scale from “very bad” to “very good”.

*How would you evaluate fish as a meal along several different attributes? The evaluation is from very bad (1) to very good (7).*

	1	2	3	4	5	6	7	
Bad taste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Good taste
Bad texture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Good texture
Bad appearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Delicate appearance
Unhealthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Healthy
Not nutritious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Nutritious
Expensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cheap
Low value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High value for money

There are several attributes like unpleasant smell and bones, which contributes only negatively in forming food attitude (Olsen, 2004). In this study, the researcher also assumed that bones and smell are negative effects on fish consumption. The items of “unpleasant smell” and “unpleasant bones” were presented on a Likert scale from “totally disagree” (score of 1) to “totally agree” (score of 7), a neither disagree nor agree at midpoint of 4. In addition another item “It is difficult to remove all bone out of fish” is used to measure the negative effects.

*We are now suggesting several properties related to bones and smell of fish as a meal. For every proposition please indicate your agreement or disagreement.*

	Totally disagree		Neither agree nor disagree			Totally agree	
	1	2	3	4	5	6	7
Fish has an unpleasant smell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The bones in fish are unpleasant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult to remove all bone out of fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.2.2 Social norms and family expectation

Social norms are defined as the perceived social pressure or expectation of the society (subjective norms) or from specific groups or individual (normative beliefs) (Fishbein & Ajzen, 1975; Olsen, 2004). In consistence with the definition, this study defines subjective norms as social pressure and expectation that impact on people’s seafood / fish preference and choice. In case of food/seafood consumption; family expectation, moral obligations, and health involvements are determined as the main antecedents of social norms (Olsen, 2001, Olsen, 2004, Verbeke & Vackier, 2005).

The measuring questions were adopted from previous studies (Ajzen and Madden, 1986, Bogers et. al., 2004, Chiou, 1998, Elliott et. al., 2007, Olsen, 2003, Tuu et. al., 2008).

Subjective norm was measured by asking “People who are important to me want me to eat fresh fish regularly”, “People who are important to me expect me to eat fresh fish regularly”; “My family want me to eat fish regularly” and “My family expect me to eat fish regularly” to measure the family expectations. In addition to incorporate the religious and cultural effect, the respondents were asked “My culture/religion want me to eat fish regularly”. Here, the respondents were required to answer on a 7-point Likert-scale anchored from totally disagree (1), to totally agree (7), and at the midpoint neither disagree nor agree (4).

*For every proposition stated below please indicate your agreement or disagreement.*

	Totally disagree			Neither agree nor disagree			Totally agree
	1	2	3	4	5	6	7
People who are important to me want me to eat fresh fish regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My family want me to eat fish regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My family expect me to eat fish regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People who are important to me expect me to eat fresh fish regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My culture/religion want me to eat fish regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.2.3 Personal control and control beliefs

According to Ajzen (1991) perceived behavior control is the individual’s perception on the difficulties or easiness to perform behavioral intention and engage the behavior (in this case; fish consumption) (Ajzen, 1991). This research assessed both external and internal factors that may be inferred from the performance of the act of consumption

(Ajzen, 1991, Tuu et. al., 2008). The respondents were asked three questions, as : (a) “How much personal control feel you have over eating fish?”, ranging from No control (1) to Complete control (7)”, (b) “For me, eating fish is’’: ranging from Very difficult (1) to Very easy (7)”, and (c) “If I want I can easily eat fish tomorrow” with endpoints from Very unlikely (1) to Very likely (7). The combination of these sorts of items are frequently used to assess the perceived behavioral control within domain of consumer psychology and/or social psychology (Tuu et. al., 2008) and food or nutrition behavior (Olsen, 2007; Tuu et. al, 2008)

*There can be several reasons for not eating fish as a meal: availability of fresh fish, lack of time, price, knowledge of how to prepare fish, etc. will some examples. Could you please evaluate your general ability or inability to have or eat fish as a meal?*

	No control						Complete control
	1	2	3	4	5	6	7
How much personal control you feel you have over eating fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Very difficult						Very ease
	1	2	3	4	5	6	7
For me to eat fish is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Very unlikely						Very likely
	1	2	3	4	5	6	7
If I want, I can easily eat fish tomorrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olsen (2004) found the most important control factors that influence consumers’ seafood purchasing include price/cost, convenience/availability and knowledge. In more detailed investigation of this study; price/cost, availability, and convenience were assumed as the main determinants of personal control over eating fish in Dhaka city. The items of availability and convenience constructs were presented in a 7 points bipolar scale ranging from very bad to very good pole.

How would you evaluate fish as a meal along several different attributes? The evaluation is from very bad (1) to very good (7).

	1	2	3	4	5	6	7	
Difficult to buy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Easy to buy
Unavailable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Available
Much time to cook	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fast to cook
Much time to prepare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fast to prepare
Difficult to store	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Easy to store
Not suitable to cooking delicious meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Suitable to cooking delicious meals
Not suitable to prepare many dishes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Suitable to prepare many dishes

Adopting from Steptoe *et al* (1995), this study used four items about perceived value of fish consumption to assess the attributes of price and cost. The items are depicted in the following table:

*We are now suggesting several properties related to price and value. For every proposition please indicate your agreement or disagreement.*

	Totally disagree			Neither agree nor disagree		Totally agree	
	1	2	3	4	5	6	7
Fish is not expensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eating fish is good value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I choose to eat fish because it is economical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eating fish is suitable for my budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



### 3.2.4 Intention to consume fish

In the paradigm of theory of planned behavior, intention is said as a measure of the likelihood that a person will engage in a given behavior (Fishbein & Ajzen, 1975, Ajzen, 1991). In this study, the researcher considers that behavioral intention reflects the individual's willingness to eat fish and the construct intention is also assumed as a mediator of the relationship between behavior with attitude, norms, personal control, perceived risk, trust and knowledge. It is also consider that intention is measured as motivation to consume fish in global level. Here similar to previous studies intention to consuming fish was measured by a 7-point Likert scale involving three items, "plan", "expect" "want" and "desire" (Armitage & Conner, 2001; Verbeke & Vackier, 2005, Tuu et. al., 2008). These measures indicate how likely the respondent to eat fish as a meal during the three coming days. The respondents were asked to score the probability of their intentions coded from 1 (very unlikely) to 7 (very likely), and the mid point 4 was the neutral estimation.

*Could you please estimate how many times during the 3 coming days you plan, expect, or you want to buy or eat fresh fish as a meal – including today? Please mark only one answer in each row.*

During the 3 coming days	Very unlikely		Neutral estimation		Very likely		
	1	2	3	4	5	6	7
I plan to eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I expect to eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I want to eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I desire to eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.2.5 Consumption and behaviors

In this study, behavior is defined and measured as the individual’s frequency of fish consumption- as a self reported indication of past behavior. This self –reporting measure is parallel with previous studies (Olsen, 2003). It is also needed to mention that here no specificity was given in species or product, context and time that the behaviors occur. In order to measure the frequency of the behavior, measures were adopted from previous researches; here the researcher used a 1-year time frame with a 7-point scale in response to the question: “How many times in average during the last year you have consumed fish as a meal?”: 7 = 12 times or more a week, 6 = 9–11 times a week, 5 = 7–8 times a week, etc., down to 1 = never (Raats, Shepherd, & Sparks, 1995, Olsen, 2003, Verbeke & Vackier, 2005, Tuu et. al., 2008). This study assumed that fish consumption frequency is correlated positively and linearly with attitudes. Which implies the higher fish consumption frequency is a symptom of the higher favorable attitude toward the product in this case fish.

*Please make a  for each alternative on how many times in average during the last year you have consumed fish / food as a meal. Please mark only one answer in each row.*

	Never	1– 2 times a week	3 – 4 times a week	5 – 6 times a week	7 – 8 times a week	9 – 11times a week	12 times or more a week
How often do you eat fish?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Could you please estimate how many times you have eaten fish during:*

\_\_\_\_\_ times during the last three days not included today

\_\_\_\_\_ times during the last 7 days not included today

\_\_\_\_\_ times during the last 14 days not included today

**3.2.6 Perceived Risk**

This study defined and measures the direct impact of risk perception on the intention to purchase/consume fish as well as the influence of risk perception on attitude. Similar to previous works on consumers behavior, here the six facets of perceived risk were discussed, as: functional, financial, performance, physical, psychological, and social (Klerck and Sweeney, 2007; McCarthy and Henson, 2005; Yuksel and Yuksel, 2007; Angulo and Gil, 2007, Tsiros and Heilman 2005). Questions were adopted from previous studies from the broader arena of food consumption research e.g. from GM foods (Klerck and Sweeney, 2007) and from beef (McCarthy and Henson, 2005). As Klerck and Sweeney, (2007) stated that reliable and valid measures of perceived risk can be achieved by asking respondents to state how much risk they perceive; in this study, respondents were asked to rate their risk perception in a 7-point Likert scale, where 1 denotes total disagreement of the statement and 7 denotes total agreement.

*We are now suggesting several properties related to your risk perception upon buying fish in Dhaka city. For every proposition please indicate your agreement or disagreement.*

In case of buying fish from traditional markets.....	Totally disagree			Neither agree nor disagree			Totally agree
	1	2	3	4	5	6	7
When I buy fish I am concerned that it will not be as I expected ( functional risk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I were to purchase fish I would worry about losing / wasting money (financial risk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I were to purchase fish I would worry about the product not tasting as good as it should (performance risk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The thought of purchasing fish makes me feel psychologically uncomfortable (psychological risk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If I were to purchase fish I would become concerned about the potential long-term risks to my family, myself and others (physical risk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchasing fish is unfashionable or symbol of lower status (social risk)							

Two questions were asked to assess the respondents worry about food born diseases in this case diseases from fish consumption. Questions were adopted from Schmiede et. al., 2009. The respondents were asked to rank their worry in a 7-point Likert scale.

*We are now suggesting several properties related to your worry perception upon buying fish in Dhaka city. For every proposition please indicate your agreement or disagreement.*

	Not worried at all						Very worried
	1	2	3	4	5	6	7
How worried are you about your current level of risk form fish consumption?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How disturbed are you with your current level of risk for food born diseases from fish?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.2.7 Trust

In this study trust issue is highlighted the consumers trusts that vendors selling the fishes are free from chemical preservatives (e.g. formaldehyde) and cultured in safe condition. It is well argued that trust in information sources can influence people's perceptions and reactions to issues of food safety; analogous to previous studies (Frewer, 1998, Lobb, et. al., 2007, Mazzocchi et. al., 2008, Carvalho 2008), this study measure the trust in information sources. Respondents were asked to rate the trustworthiness of various food safety information sources, in response to the question “To what extent do you think information about food (in this case fish) related hazards from each of the following

sources are trustworthy” (adopted from Frewer, 1998). A 7-point rating scale was used coded from 1= *not trustworthy at all* to 7= *completely trustworthy*.

*To what extent do you think information about food-related hazards from each of the following sources is trustworthy for consuming fish?*

	Not trustworthy at all						Completely trustworthy
	1	2	3	4	5	6	7
Shopkeepers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supermarkets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic shop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specialty store	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Farmers / breeders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Processors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doctor / health authority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
University scientists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Political groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Television documentary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Television news	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Television advertisements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Newspapers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supermarket information leaflet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Note: Items are adjusted from Mazzocchi et. al., 2008*

Besides measuring trust on information sources this study also measured trust on the product itself (fish). The respondents were asked to rate on a 7-point Likert scale their trust perception on fish sold in different shopping outlets in Dhaka city. These outlets included both the traditional markets such as: karwan bazar, Mohammadpur or Mirpur bazaar and the supermarkets such as: Agora, Meena Bazar, PQS, Stop n' Shop.

*We are now suggesting several properties related to your trust upon buying fish from different outlets in Dhaka city. For every proposition please indicate your agreement or disagreement.*

I believe that fish sold in different markets in Dhaka city are.....	Totally disagree			Neither agree nor disagree			Totally agree
	1	2	3	4	5	6	7
Free from chemical preservatives ( e.g. formaldehyde)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cultured in toxin free environment (e.g. Lagoon of WASA etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free from additives and colors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.2.8 Knowledge

As discussed in the earlier chapter the knowledge construct is divided in two distinct categories as product safety knowledge and the procedural knowledge. Adapted from previous studies (Chen & Li, 2007) the knowledge was measured by two sub-scales, with one sub-scale measured by eight “true or false” questions another was a 7-point Likert scale coded from 1 = totally disagree to 7 = totally agree, while 4 = neither disagree nor agree. The “true or false” question items were given one point when the respondent’s answer was right and when the respondent’s answer was wrong no point was given (Chen & Li, 2007).

We are now suggesting several properties related to your knowledge upon buying fish. For every proposition please indicate your agreement or disagreement (Product knowledge).

I know that fish I normally purchase are.....	Totally disagree			Neither agree nor disagree			Totally agree
	1	2	3	4	5	6	7
Free from chemical preservatives ( e.g. formaldehyde)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cultured in toxin free environment (e.g. Lagoon of WASA etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free from additives and colours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not harmful for health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

We are now suggesting several properties related to your knowledge upon preparing / cooking fish. For every proposition please indicate your agreement or disagreement (Procedural knowledge).

	Totally disagree			Neither agree nor disagree			Totally agree
	1	2	3	4	5	6	7
I find it easy to prepare delicious and tasty meals with fresh fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compared to an average person, I know a lot about fresh fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My friends consider me as an expert on fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a lot of knowledge how to evaluate the quality of fresh fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compared to an average person, I know a lot about the risk for eating fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My friends consider me as an expert on the risky aspect with eating fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a lot of knowledge how to evaluate the if fish is risky to eat or not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.3 Analytical methods and procedures

This part of the thesis will discuss the analytical methods and procedures employed to accomplish the objective of the study. The analytical methods used are described in the following sections of this report.

#### 3.3.1 Exploratory factor analysis and test of reliability

In the domain of research factor analysis is done to determine the number of dimensions underlying the constructs (Churchill, Jr., 1979). Factor analysis can be achieved for the purposes of exploratory and confirmatory perspective. The reasons for using factor analysis are twofold as: a) to overall inspection of the convergent validity of proposed constructs by looking at the factor loadings of items and b) to explore the latent constructs (sub-construct) if occurred for further analysis. The factors that have high loading factors of items indicate the convergent validity and at the same time items that have high loadings in second factor should be considered if it may belong to different factors (Hair *et al*, 1995). Based on Bartlett test of sphericity, and measure of sampling adequacy (MSA) in this study first of all an overall test suitability of data was performed. Bartlett test of sphericity suggests that the p-value less than 5% while MSA index suggests high values (between 0.5 and 1.0) indicate the appropriateness of the factor analysis (Malhotra, 2006, pp. 561).

This study also performs the tests for the reliability of the constructs. After performing the exploratory factor analysis, some factors will be extracted then the value of Cronbach's alpha will be considered. Cronbach's alpha is the tool to investigate the internal consistency (i.e. reliability) of the measures, and Cronbach's alpha reliability coefficient normally ranges between 0 and 1. It is also hypothesized that there is actually no lower limit to the coefficient; the greater the internal consistency of the items in the scale will be proved with the closer Cronbach's alpha coefficient to 1.0. However, rule of thumb about the Cronbach's suggested by George and Mallery (2003) is as follows: “\_ > .9 – Excellent, \_ > .8 – Good, \_ > .7 – Acceptable, \_ > .6 – Questionable, \_ > .5 –



Poor and  $\lambda < .5$  – Unacceptable” (cited in Gliem & Gliem, 2003). After confirming the convergent validity (factor analysis) and reliability (Cronbach’s alpha) of the items used to measure the constructs, this study conducts principle component analysis to make composite items to move for further analysis in the modeling part.

### 3.3.2 Descriptive analysis

The motive of this study is to understand the causal relationships among constructs of the extended model, as well as to explore the general patterns of attitudes, and fish consumption behavior in Dhaka city. A full description of measures is performed to understand overall responses, general distribution and other aspect of scales. Within the paradigm of TPB theoretically it is assumed that variables external to the TPB (socio-demographic variables) are expected to influence intention and behavior indirectly through attitude, subjective norm, and perceived behavioral control (Fishbein & Ajzen, 1980, Ajzen, 1991).

In this present study the socio-demographic factors were not added into causal model tests. However, descriptive statistics were carried out using SPSS (Version 16.0) for the socio-demographic variables (sex, marital status, income, household size), studied with focus on mean and correlations.

In this research the data are discrete and not normally distributed, moreover most of data are ‘ordinal’. Thus, instead of using t-test this study will employ chi-square test, which is normally used to analyze these sorts of data. In some extend this research use gamma association instead of chi square test. Because when both the variables are ordinal then it is parsimony to look at the gamma association (here for the family income, family size and age). The gamma value is directional it means positive gamma value indicate positive association while negative gamma value indicate negative association of the variables. The chi-square and gamma value are significant at .05 levels.

### 3.3.3 Principal component analysis

After confirming the validity and reliability of the items used to measure the constructs, in this study principal component was performed. Through principal component analysis composite items were constructed, which is used for multiple regression analysis. Principal component analysis is variable reduction technique; is appropriate for the researcher when s/he have obtained measures on a number of observed variables and wish to develop a smaller number of artificial variables i.e. the principal components that will account for most of the variance in the observed variables. The principal components may then be used as predictor or criterion variables in subsequent analyses. Because of the nature of the analysis (variable reduction procedure), principal component analysis is some times confused with exploratory factor analysis. It is reality that the steps followed when conducting a principal component analysis are virtually identical to those followed when conducting an exploratory factor analysis. However, these two analyses are conceptually different. Factor analysis is used when the researcher believe that certain latent factors exist that exerts causal influence on the observed variables they are studying. Thus, the exploratory factor analysis helps the researcher identify the number and nature of these latent factors. However, in case of principal component analysis the researcher does not make any assumption about an underlying causal model. In conclusion, principal component analysis is simply a variable reduction procedure that (typically) results in a relatively small number of components that account for most of the variance in a set of observed variables.

A principal component is defined as “a linear combination of optimally-weighted observed variables”. The following formula is the general form to compute scores on the first component extracted (created) in a principal component analysis:

$$C1 = b_{11}(X_1) + b_{12}(X_2) + \dots + b_{1p}(X_p)$$

Where,

C1 = the subject's score on principal component 1 (the first component extracted)

$b_{1p}$  = the regression coefficient (or weight) for observed variable  $p$ , as used in creating principal component 1

$X_p$  = the subject's score on observed variable  $p$ .

### 3.3.4 Multiple regression analysis

In this study, multiple regression analysis was used to draw the path diagram and to confirm the relationship of the constructs. Multiple regression analysis is a statistical technique that allows us to predict the variance in an interval dependent, based on linear combinations of interval, dichotomous, or dummy independent variables. Through multiple regressions it could be established that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (through a significance test of  $R^2$ ), and can establish the relative predictive importance of the independent variables (by comparing beta weights). Using hierarchical regression, the researcher can see how most variance in the dependent can be explained by one or a set of new independent variables, over and above that explained by an earlier set.

The multiple regression equation could be written as follows:

$$y = b_1x_1 + b_2x_2 + \dots + b_nx_n + c.$$

Where,

$b$ 's = the regression coefficients, representing the amount the dependent variable  $y$  changes when the corresponding independent changes 1 unit.

$c$  = the constant, where the regression line intercepts the  $y$ -axis; representing the amount the dependent  $y$  will be when all the independent variables are 0.

The standardized versions of the  $b$  coefficients are the beta weights, and the ratio of the beta coefficients is the ratio of the relative predictive power of the independent variables. The sign of the  $b$  coefficient indicates the direction of the relationship for the data values. If  $b$  is greater than or equal to zero, the relationship is positive or direct. If  $b$  is less than zero, the relationship is negative or inverse. Associated with multiple regressions is  $R^2$ ,

multiple correlations, which is the percent of variance in the dependent variable explained collectively by all of the independent variables.

### 3.4 Sample

The majority of the sample was men (67.2 %) of various ages (86.6% were under 44 years). Of all the respondents 26.4% were single and 73.6% were married. The average household size is 4.17 which is comparable to the statistics of BBS (Bangladesh Bureau of Statistics) according to BBS the average house hold size in Dhaka city is 4.8 (BBS, 2001). The median of the sample income was in between BDT 300,000 – 400,000 (1 USD = 69 BDT) while according to BBS statistics the average annual income of households in Dhaka city is only BDT 53,424 (BBS, 2005). The following Table 1 depicted the socio demographic information (gender, age, marital status, education, and income) of the sample:

Table 1 Socio-demographic characteristic of the respondents (% of respondents, n = 201)

Gender	Male	67.2	Age	≤ 25 years	2
	Female	32.8		25-44 years	84.6
Marital status	Single	26.4	45-55 years	10.4	
	Married	73.6	> 55 years	3	
			Mean	34.84 years	
Household size	2-3 persons	38.8	Household income (Annual) in BDT	≤ 200,000	13.9
	4-6 persons	52.2		200,000-400,000	20.4
	≥ 6 persons	9		400,000-600,000	31.3
		≥ 600,000		34.3	
Education	SSC	2.5	Profession	House wife	12.9
	HSC	4.5		NGO	17.4
	Graduate (pass)	17.4		Banker	16.4
	Graduate (Hon's)	15.4		Companies	21.9
	Post Graduate	60.2	Others	31.4	

## 4 Results

### 4.1 Exploratory factor analysis and the reliability test

The complete conceptual model as depicted in Figure: 2 consists of eight constructs. Exploratory factor analysis was conducted for the constructs within the extended model, then attribute belief, reliability was tested by examining the Cronbach's Alpha.

#### 4.1.1 Construct within the TPB model

First of all, exploratory factor analysis was performed for constructs within the TPB model; where, 17 items were considered; of which 5 items for attitude, 5 items from norms, 3 items for control and 4 items for intention. Results of the analysis such as the factor loadings of items, explained variance and Cronbach's alpha of the constructs are showed in Table 2.

The results portrait in Table 2 says that factor loadings of all the items are greater than the standard level of 0.7; the only exception was "My culture/religion wants me to eat fish regularly" (0.68); however, still this loading is high as Hair et al. (1998) indicate factor loadings above 0.6 "high". The higher factor loadings indicate that the measures describe the same factor (e.g. convergent validity). The Cronbach's alphas also indicate the higher value except for the control component (0.67). However, the factor loading is still higher thus the low Cronbach's alpha and high factor loadings imply low correlations among items, but high convergent validity of the items within the construct. The cumulative variances of the four factors explain for 73% of the variance in the data. The value of the KMO statistics is also higher ( $>0.5$ ), thus it implies the appropriateness of the factor analysis (Malhotra, 2006).

Table 2 Factor loading, Cronbach's Alpha, and explained variance of the constructs within TPB

	Factor			
	Attitude	Intention	Norms	PBC
not satisfied / satisfied	.87			
unpleasant / pleasant	.87			
negative/positive	.87			
bad / good	.82			
dull / exiting	.77			
I expect to eat fish		.84		
I plan to eat fish		.83		
I desire to eat fish		.83		
I want to eat fish		.81		
Important people expect			.86	
Important people want			.81	
Family expect me			.79	
Family want me			.78	
Culture want me			.68	
Could easily eat fish tomorrow				.78
For me to eat fish is				.75
personal control				.74
<b>Cronbach's Alpha</b>	0.94	0.93	0.84	0.67
<b>Explained Variance (%)</b>	24.54	19.17	18.75	10.72
<b>Cumulative Explained Variance (%)</b>	24.54	43.70	62.45	73.17
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .87, Bartlett's Test of Sphericity <0.001, Rotation Method: Varimax with Kaiser Normalization.				

**4.1.2. Attribute beliefs**

In this study, twenty-one items related to fish attribute beliefs were used, of which six factors were extracted. All the constructs are extracted as per the expectation; however, the only exception was convenience construct. From the analysis it is observed that the 6 items related to convenience attributes describe two different latent constructs, namely “suitable to dishes” (or suitability) and “consuming time” (or time). Table 3 showcased factor loading of items, explained variance and Cronbach’s alpha for 6 latent constructs.

Table 3 Factor loading, Cronbach's Alpha, and variance of the attribute beliefs

	Factor					
	Quality	Value	Negative	Availability	Time	Suitability
bad / good texture	0.87					
bad / good taste	0.83					
bad / good appearance	0.81					
Not nutritious / nutritious	0.77					
unhealthy / healthy	0.76					
suitable for my budget		0.83				
because it is economical		0.81				
good value for money		0.72				
low / high value for money		0.53				
expensive / cheap		0.53			0.30	
The bones are unpleasant			0.86			
difficult to remove all bone			0.83			
has an unpleasant smell			0.78			
unavailable /available				0.85		
difficult /easy to buy				0.76		
Fish is not expensive		0.51		0.70		
much time / fast to prepare					0.88	
much time / fast to cook				0.31	0.78	
difficult / easy to store		0.42			0.51	0.39
not suitable / suitable to cooking delicious meal	0.33					0.84
not suitable / suitable to prepare many dishes						0.83

<b>Cronbach's Alpha</b>	.80	.80	.82	.78	.71	.65
<b>Explained Variance</b>	17.30	14.28	10.82	10.51	8.69	8.39
<b>Cumulative Explained Variance (%)</b>	17.30	31.58	42.40	52.91	61.60	69.99
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80, Bartlett's Test of Sphericity <0.001, Rotation Method: Varimax with Kaiser Normalization.						

(1) *Perceived quality* (factor 1) this factor involved five items related to taste, appearance, texture, health and nutrition. The factor loading is higher than the standard 0.70 level and the Cronbach's Alpha is also higher (0.80) than the critical level of 0.70. Thus the validity of items for describing the construct is justified.

(2) *Perceived value* (factor 2) included four items, of which the “Fish is not expensive” have the lowest factor loading of 0.51. Thus, this item needed to be excluded; however when excluding “not expensive” item the Cronbach alpha of perceived value was decreased at .79; although it is still well above than the critical level.

(3) *Negative effect* (factor 3) of eating fish was involved with three items, of which one item for unpleasant smell and 2 items are related with unpleasant bones. All the items have higher factor loading and the Cronbach's alpha (0.82) is well above the suggested level. Thus, it could be said that these items related to bones and smell are suitable to describe the negative effects.

(4) *Availability* (factor 4) involves two items related to fish is unavailable/available and difficult/easy to buy. Both the items have higher factor loading (0.76 & .85 respectively) and the Cronbach's alpha (0.78) is well above the suggested level. Thus, it could be said that these items related to availability are suitable to describe the construct.

(5) *Consuming Time* (factor 5) involves two items related to evaluation of time required to cook and prepare fish as meal. Both the items have higher factor loading (0.78 & .88 respectively) and the Cronbach's alpha (0.71) is well above the suggested level. Thus, it could be said that these items related to consuming are suitable to describe the construct.



(6) *Suitability or suitable to dishes* (factor 6) includes two items regarded to evaluation of fish suitability of fish for cooking and preparing and storing many dishes as well as delicious dishes. However, factor loading for “not suitable / suitable to cooking delicious meal” and “not suitable / suitable to prepare many dishes” is well above the standard level (.84 and .83 respectively). But, factor loading for “difficult / easy to store” is .39; thus exclusion is needed for this item. Cronbach’s alpha was .65, however when excluded difficult / easy to store the Cronbach alpha of suitability was improved at .83.

#### **4.1.3 Other constructs within the extended model**

Beside the TPB model there are three other constructs within the extended model as such perceived risk, trust, and knowledge. An exploratory factor analysis for these constructs is presented in the following.

##### **Perceived Risk**

An exploratory factor analysis was performed for the items associated with perceived risk and worry perception. Two factors were extracted named as risk and worry. In the risk factor there were six items, however “if I were to purchase fish .....potential long-term risks to my family, myself and others” item have higher cross factor loading thus needed to be excluded. And the item “purchasing fish is unfashionable or symbol of lower status” have lower factor loading (0.50) then the recommended level (Hair et al., 1995, 1998) also excluded. The Cronbach's Alpha is 0.76 and 0.82 respectively, however exclusion of the said two items improved the Cronbach’s Alpha, and the new score becomes 0.79 and 0.82 respectively for the risk and worry factor.

Table 4 Factor loading, Cronbach's Alpha, and explained variance of risk construct

	Factor	
	Risk	Worry
concerned that it will not be as I expected	.69	
worry about losing / wasting money	.78	
product not tasting as good as it should	.75	
psychologically uncomfortable	.80	
potential long-term risks	.32	.70
unfashionable or symbol of lower status	.50	
How worried ..... current level of risk form fish consumption?		.88
How disturbed .....current level of risk for diseases from fish?		.89
<b>Cronbach's Alpha</b>	<b>.76</b>	<b>.82</b>
<b>Explained Variance (%)</b>	<b>32.98</b>	<b>27.17</b>
<b>Cumulative Explained Variance (%)</b>	<b>32.98</b>	<b>60.15</b>

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .73, Bartlett's Test of Sphericity <0.001, Rotation Method: Varimax with Kaiser Normalization.

The result of the exploratory factor analysis reveals two sub-constructs. Thus, two composite constructs were made through principal component analysis, which will be used for multiple regressions analysis.

**Trust**

The ‘trust’ constructs have 22 items from the questionnaire (19 of the information sources, 3 of the sales outlets). Exploratory factor analysis suggests that there are six trust components, of which five components are related to trust on the information source and one is related to trust on the sales outlets itself. Factor loading, Cronbach's Alpha, and Explained Variance of the components are showed in Table 5. The components extracted are discussed below:

- 1) *Experts as an information source*: Four items are related in this component, as University scientists, doctors, environmental organizations. Factor loading and Cronbach's Alpha, is far above the critical level.
- 2) *Food chains as information source*: High factor loading and Cronbach's alpha indicates that these four items are good representative of the food chains.
- 3) *Sales outlets*: Three items were used to assess the trustworthiness of the sales outlets, where all the items have factor loading above .8 and Cronbach's alpha is also high. That summarizes as the items were well selected to describe the factor.
- 4) *Media and advertisement* : all media and advertisement related items are centered as factor-4, there were five factors identified, only one item (television advertisement) have lowest factor loading of 0.46. Thus the television advertisement item is needed to be excluded, in other words the remaining four items (i.e. Internet, product label, newspaper, and supermarket info leaflets are the well representative of the factor. After exclusion of television advertisement the Cronbach's alpha stand for 0.78.
- 5) *Farmers and processors*: Two items were selected, which have higher factor loading but lower Cronbach's alpha as shown in the following table.
- 6) *Politics and Government*: Here also two items were selected and they have higher factor loading but lower Cronbach's alpha as shown in the following table.

Table 5 Factor loading, Cronbach's Alpha, and explained variance of trust

not trustworthy at all / completely trustworthy	Factor					
	Experts	Food Chain	Sales outlets	Media	Producers	Govt. & Politics
Television news	0.80					0.30
University scientists	0.75				0.31	
Env organizations	0.74				0.36	
Doctors	0.73				0.46	
Television documentary friends	0.72		0.40			
Supermarkets		0.84				
Organic shops		0.73			0.47	
Shopkeepers		0.65	0.36			
Specialty store		0.62			0.53	
sold in .....free chemical preservatives			0.88			
fish sold.....cultured in toxin free environment			0.87			
fish sold .....free from artificial colors			0.80			
Internet				0.77		
Product label		0.40		0.74		
Supermarket info leaflet		0.48		0.67		
Newspapers	0.48			0.61		
Television advt	0.41			0.46		0.44
Farmers					0.71	
Processors					0.63	
Political groups						0.80
Government						0.77
Cronbach's Alpha	0.85	0.82	0.87	0.78	0.58	0.69
Explained Variance (%)	17.07	12.43	12.31	11.14	9.43	8.75
Cumulative Explained Variance (%)	17.07	29.51	41.82	52.96	62.39	71.14

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .81; Bartlett's Test of Sphericity <0.001; Rotation Method: Varimax with Kaiser Normalization.

Among 19 items used to measure the trust on information sources 15 items were extracted, by using principal component analysis a composite construct was made namely trust on information sources. And, using principal component analysis also another composite construct was made as trust on sales outlets. Thus, this study intended to measure trust construct as trust on food information sources and trust on sales outlets. Finally, this research has two sub-constructs of trust, which will be used for regression analysis in the later parts of this report.

### **Knowledge**

Exploratory factor analysis was conducted for 11 items associated with knowledge construct, of which 4 items are for product knowledge and 7 items for procedural knowledge. All the items associated with product knowledge have factor loading well above the recommended level of 0.7; thus it could be said that items used in this study are suitable to describe the product knowledge factor. In case of the procedural knowledge, all items also have higher factor loading; but the only exception is “I find it easy to prepare delicious and tasty meals with fish” (0.55). Thus, this item was excluded from the procedural knowledge factor. In other words, the rest 6 items are successfully represents the procedural knowledge factor. The Cronbach’s Alpha is 0.90 and 0.92 respectively for the procedural knowledge and product knowledge. However, after removing “I find it easy to prepare delicious and tasty meals with fish” Cronbach's Alpha for the procedural knowledge component improved at 0.91; high Cronbach’s alphas imply the high inter-correlations among the items.

Here also, instated of using one knowledge construct, as per our theory this study will use two sub-constructs as product knowledge and procedural knowledge. These two types sub-constructs are also made through principal component analysis and used for multiple regression analysis.

Table 6 Factor loading, Cronbach's Alpha, and explained variance of knowledge construct

	Factor	
	Procedural Knowledge	Product Knowledge
know fish sold are free from chemical preservatives		.91
know fish sold are cultured in toxin free environment		.92
know fish sold are free from artificial colors		.90
know fish sold are not harmful for health		.81
easy to prepare delicious and tasty meals with fish	.55	
know a lot about fresh fish	.83	
friends consider me as an expert on fish	.80	
Knowledge how to evaluate the quality of fresh fish	.84	
know a lot about the risk for eating fish	.77	
consider an expert on the risky aspect with eating fish	.86	
knowledge to evaluate the if fish is risky to eat or not	.86	
<b>Cronbach's Alpha</b>	<b>.90</b>	<b>.92</b>
<b>Explained Variance (%)</b>	<b>40.53</b>	<b>29.87</b>
<b>Cumulative Explained Variance (%)</b>	<b>40.53</b>	<b>70.40</b>
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .87, Bartlett's Test of Sphericity <0.001, Rotation Method: Varimax with Kaiser Normalization.		

## 4.2 Descriptive analysis

A descriptive analysis was carried out to understand the general pattern of fish consumption of Dhaka city. Socio demographic variables and income variable were used to explore differences between groups. Results of the descriptive analysis are presented in followings. In order to reduce the reporting to a more general level, this study use one or few of the main indicators (questions) within each construct (factor). For example describe attitude by satisfaction, which is often used as a single indicator of product evaluation marketing ( Olsen, 2002).

### 4.2.1 Fish consumption

In this study the fish consumption behavior was assessed by the self-reported frequency of past behavior, i.e. fish consumption. The respondents were asked to record the number of times on average during the last year they consumed fish as meal; also they were asked to report how many times they consumed fish in last three, seven, and fourteen days. The results are as below:

Table 7 Fish consumption frequency

*Please make a  for each alternative on how many times in average during the last year you have consumed fish / food as a meal. Please mark only one answer in each row.*

	Never	1 – 2 times a week	3 – 4 times a week	5 – 6 times a week	7 – 8 times a week	9 – 11 times a week	12 times or more a week
How often do you eat fish? (%)	1	10	19.4	21.4	22.4	18.8	7.5

While asking about the average consumption in a week during last year the average consumption was recorded in between 7-8 times in a week. And, while asking about the present year consumption, the responded recorded that in an average people ate 3.57

times during last three days, and 7.24 times and 13.28 times during last seven and fourteen days respectively they consumed fish.

The chi-square table shows that the fish consumption frequency does not depend on gender. However, marital status influence fish consumption frequency. The gamma values indicate that there is no significant association with consumption frequency and family income, age, and family size (remembering the rule of thumb gamma value .00-.24 = No relationship, .25-.49= weak relationship, .50-.74 = moderate relationship, and .75-1.00 = strong relationship).

In order to check the extended model this research used a composite score of fish consumption frequency in last three, seven and fourteen days.

**4.2.2 Intention of fish consumption**

From the descriptive analysis it is showed that the people of Dhaka city moderately intended to consume fish in upcoming three days. Most of the respondents ranked that they plan, expect, want and desire to eat fish are very likely in coming three days. In the Table 8, I present the frequency of their expectations to consume:

Table 8 Intention towards fish consumption

During the 3 coming days	Very unlikely			Neutral estimation	Very likely			Mean
	1	2	3	%	4	5	6	
I expect to eat	5.5	6.0	8.0	14.4	23.4	17.4	<b>25.4</b>	4.98

However, the chi-square test derived from the cross tab analysis found that there is no significant difference in fish consumption intention between different gender and marital



status. The gamma vale shows that there is no association of intention with different family income, age, and family size groups.

### 4.2.3 Attitude, perceived quality and value of fish

The descriptive analysis shows that people have a positive attitude towards in fish consumption. Most of the people ranked highly their positive feelings about fish consumption.

Table 9 Attitude towards fish consumption

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	Mean
When I eat fish, I feel: not satisfied / satisfied	1	2	5	8	16.4	26.9	<b>40.8</b>	5.80

There is no statistically significant difference in fish consumption according to gender. However, the chi-square value shows that only one item “ *When I eat fish, I feel: negative/positive*” is differ according to the marital status. The gamma value shows that family income and family size are not associated with attitude. However, age is positively associated (weak association) with the item “When I eat fish, I feel: not satisfied / satisfied”. It could be said that elderly people are more satisfied with fish then the younger one.

While evaluating the perceived quality most of the responded ranked fish as a healthy and nutritious food. It is also observed that most of the people in Bangladesh like the taste, texture and appearance of the fish as a meal. The percentage loading and the mean of the items shows that people moderately believe that eating fish is good value for money and it is economical and suitable for budget. The observed results showcased a high disagreement among respondents for judgment that bone and smell of fish are unpleasant. However, a moderately high amount of people agreed that it is difficult to remove all the bones out of fish. People responses on the availability issue moderately. The results show

that people think that fish could be cooked moderately fast. However, most of the people respond that it requires much time to prepare fish as a meal. It is also observed that the respondents are highly agreed for the suitability of fish in preparing delicious and variety meals. The following Table10 will show the attribute evaluation of the respondents regarding the perceived quality, value, negative effect and convenience.

Table 10 Summary of attribute evaluation regarding perceived quality, value, negative effect and convenience

	1	2	3	4	5	6	7	Mean
Bad / good taste	2	2	1	8.5	16.9	27.4	42.3	5.88
Unhealthy / healthy	1	0	1.5	3	10.9	24.9	58.7	6.32
Eating fish is good value for money	3.5	7.5	11.4	22.4	19.9	24.4	10.9	4.64
Fish has an unpleasant smell	19.4	13.4	14.9	17.9	14.9	11.4	8	3.61
Attribute evaluation: unavailable /available	3.5	5	13.4	12.9	19.9	30.8	14.4	4.91
much time / fast to cook	3	7.5	15.4	16.4	31.8	20.9	5	4.49
not suitable / suitable to cooking delicious meal	2	1	4.5	10.9	20.4	31.8	29.4	5.60

#### 4.2.4 Norms of fish consumption

From the collected data it is observed that their family, important people, and culture influence people moderately, of which culture has slightly lower mean then the other influential factor.

Table 11 Norms for fish consumption

	1	2	3	%	5	6	7	Mean
People who are important to me want me to eat fish regularly	2	2	3.5	20.4	23.4	<b>28.4</b>	20.4	5.28
My culture want me to eat fish regularly	5	5.5	9	<b>25.4</b>	13.4	21.9	19.9	4.82

The chi-square test shows that there is no significant difference in between gender, marital status. The gamma vale shows that there is no statistically significant association in between the norms and the family income, age, and family size.

#### 4.2.5 Control for fish consumption

While investigating the control factor, it is found that in Dhaka city people feel higher control in fish consumption. The highest mean was recorded for “If I wanted to, I could easily eat fish tomorrow” at 6.01; in this item most of the people answered the highest rank as per their evaluation.

Table 12 Controls for fish consumption

	1	2	3	%	5	6	7	Mean
How much personal control you feel have over eating fish	.5	0	1.5	17.9	<b>34.3</b>	25.9	19.9	5.43
If I wanted to, I could easily eat fish tomorrow	.5	0	1	7	17.9	34.3	<b>39.3</b>	6.01

#### 4.2.6 Risk perception for fish consumption

In general people have lower perceived risk in fish consumption in Dhaka city. In particular financial and psychological risk has lower mean of risk perception while purchasing fish. However, the mean result indicate that people are moderately concerned

about functional risk and performance risk. It is also found that people are worried about their current level of fish consumption and food born diseases.

Table 13 Risk perceptions for fish consumption

	1	2	3	%	4	5	6	7	Mean
If I were to purchase fish .....potential long-term risks to my family, myself and others	14.4	5	12.4	<b>27.9</b>	19.9	12.4	8.0		4.03
How worried are you about your current level of risk form fish consumption?	9.5	10.9	10.4	16.9	<b>23.4</b>	18.9	10		4.30

The chi-square test of the items of perceived risk says that there is no dependency between gender, marital status, family income, age and family size. The gamma value shows that family income is negative (weak relationship) with the performance risk and psychological risk. The negative sign indicates the negative direction.

**4.2.7 Trust for fish consumption**

The mean table shows that people have higher trust on information gathered from the specialist sources, thus doctors, environmental organization, university scientists are more trustworthy. On mass media and advertisement people trust moderately. However, people have little trust on political parties and on shopkeepers; supermarket, organic shops, specialty store and moderately trustworthy in the category of food chain. People don't believe that fish sold in the different markets are free from chemical preservatives, cultured in toxin free environment and are free from artificial colours. In other words people have lower faith on fish sold different markets.

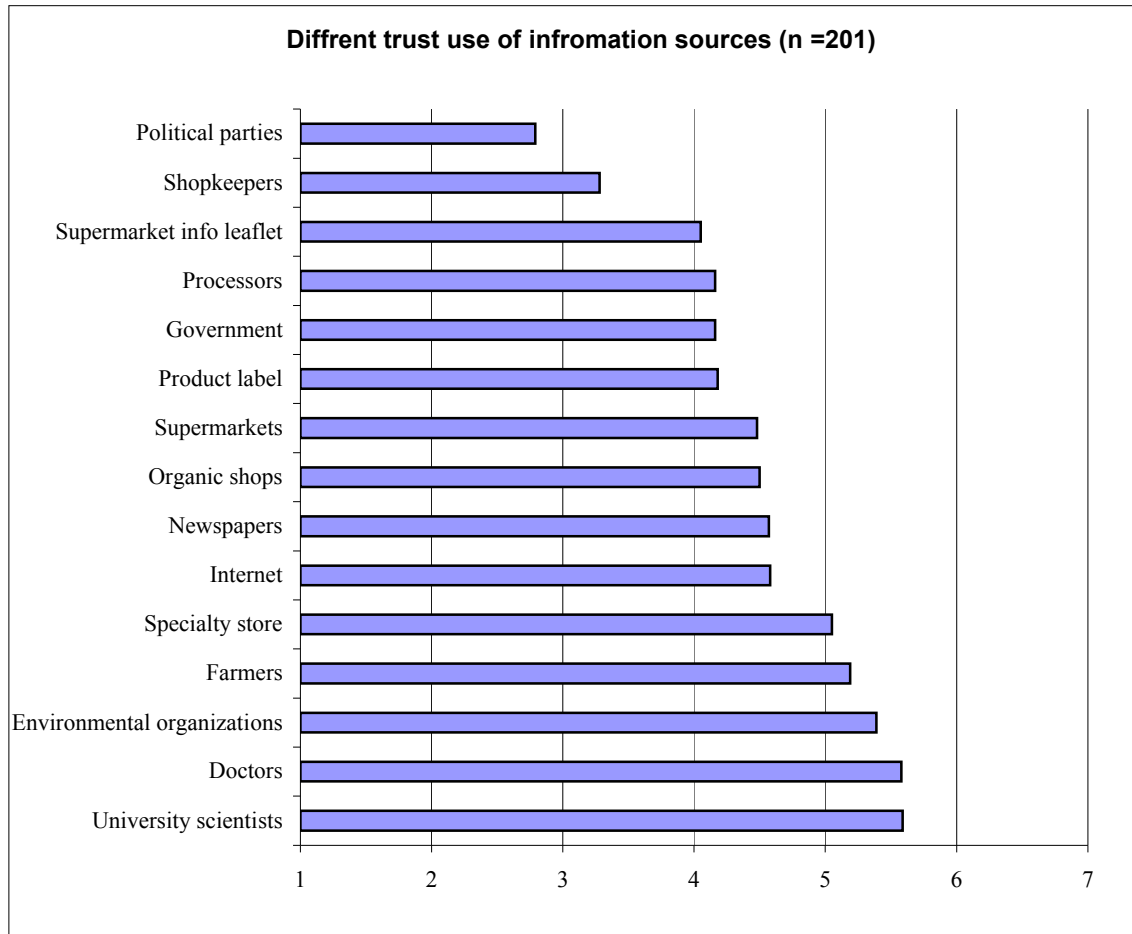


Figure 3 Different trust-use of information sources

The chi-square test revealed the result that trust on specialty store are significantly influenced by marital status, however the gender issue influenced trust on speciality store and on Internet. The gamma value shows that there is no association trust and family income and family size group. However, there is some negatively weak relationship in between age group and trust on Government and Internet.

#### 4.2.8 Knowledge for fish consumption

The knowledge construct has two categories one is product knowledge another is the procedural knowledge. People have less than moderate knowledge about the fish they purchase. In other words the product knowledge of the people shows low mean score. However, people have higher procedural knowledge, especially most of the respondents knew that “it is easy to prepare delicious and tasty meals with fish” (mean score 5.24); the rest of the items of procedural knowledge have a moderate mean score.

Table 14 Knowledge for fish consumption

	1	2	3	4	5	6	7	Mean
I know that fish sold in different markets are free from chemical preservatives	<b>23.4</b>	13.9	16.4	19.4	14.4	6	6.5	3.31
Compared to an average person, I know a lot about fresh fish	5	5	9	22.4	<b>24.9</b>	22.9	10.9	4.69
I have a lot of knowledge how to evaluate the if fish is risky to eat or not	9	8	10.9	<b>28.4</b>	18.9	18.9	6	4.20

The chi-square table shows that there is no significant association in knowledge (both product and procedural knowledge) and gender and marital status. “ The gamma value did not find any significant association in knowledge and family income and family size, however it finds weakly positive association with product knowledge items and the age group, it also find weakly positive relationship with one item in procedural knowledge (My friends consider me as an expert on fish) category with the age group. The positive relationship shows that if the age increase the higher knowledge about fish products and procedure.

### 4.3 Test of the conceptual models

To test the conceptual models as per the expectations of the research statistical analysis was undertaken using SPSS, version 16.0 (SPSS Inc.) and MINITAB version 13. First of all principle component analysis was conducted by using Minitab software. The reason was to combine variables into a composite variable and to make the data ready for regression analysis. After that hierarchical multiple-regression was used. Five models were tested as described below:

#### 4.3.1 Theory of Planned Behavior

In order to draw the results two multiple linear regression analyses were performed: firstly, intention to eat fish was regressed onto attitude, subjective norm and perceived behavioral control; secondly, consumption of fish was regressed onto intention, attitude, subjective norm and perceived behavioral control. Model summary and determinants of both regressions are presented in Table 15.

Table 15 Model summary (TPB) and determinants of intention and behavior (Correlation coefficient, t-value, and significance)

	Beta	t-value	Sig.	Model Summaries
<b><i>Intention regressed</i></b>				
Attitude	.66	12.76	.000	R <sup>2</sup> = .47, adjusted R <sup>2</sup> = .47, F = 89.28, Sig. of F = .000, Durbin-Watson = 1.50 Predictors: (Constant), Attitude, Norms
Norms	.17	3.38	.001	
PBC	.06	1.06	.290	
<b><i>Behavior regressed</i></b>				
Intention	.29	3.44	.001	R <sup>2</sup> = .25, adjusted R <sup>2</sup> = .24, F = 32.50, Sig. of F = .000, Durbin-Watson = 1.74 Predictors: (Constant), Intention, Attitude
Attitude	.26	3.14	.002	
Norms	.01	.227	.821	
PBC	.10	1.50	.135	

This output shows intention, attitude, norms, and PBC all together explain 24% of the variance in fish consumption behavior for this sample. The  $R^2$  (24.7%) is higher than the Adjusted  $R^2$  (24%). The probability of the F statistic (32.50) for the overall regression relationship for all independent variable is  $<0.001$ , less than or equal to the level of significance of 0.05. This finding supports the research estimation that there is a statistically significant relationship between the set of all independent variables and the dependent variable.

The Standardized Beta Coefficients give a measure of the contribution of each variable to the model. A large value indicates that a unit change in this predictor variable has a large effect on the criterion variable. In this model intention and attitude is seen to have a large effect on behavior. For the independent variable norms and control the probability of the t statistic is -.02 and 1.48 respective, which are greater than the level of significance of 0.05. Thus, it could be argued that the slope associated with norms and control are equal to zero ( $b = 0$ ) and conclude that there is not a statistically significant relationship between norm and control with fish consumption frequency. However, the t statistic shows that intention and attitude is the better predictor of fish consumption behavior Dhaka city.



### 4.3.2 The extended model

This research have two sub-constructs of the perceived risk construct as risk, and worry, the construct trust also has divided in two categories as trust on various information sources and trust on the sales-outlets. In order to conduct the stepwise multiple regression analysis composite constructs were made through principle component analysis for risk, worry, trust on information sources, and trust on sales-outlets. The regression used intention as the dependent variable, and risk, worry, trust on information sources, and trust on sales-outlets as predictor of intention. Model summary is presented in Table 16.

Table 16 Model summary (risk and trust), Correlation co efficient, t-value, and significance

	Beta	t-value	Sig.	Model Summaries
<b><i>Intention regressed</i></b>				
Risk	-.23	-3.31	.001	R <sup>2</sup> =. 18, adjusted R <sup>2</sup> =. 16, F = 10.68, Sig. of F = .000, Durbin-Watson = 1.74 Predictors: (Constant), Risk, Worry, Trust on information sources, Trust on sales outlets
Worry	-.21	-3.22	.001	
Trust on information sources	.21	3.13	.002	
Trust on sales outlets	.16	2.23	.027	

As seen from the above table all sub-constructs of risk and trust together explain 16% of the variance in fish consumption intention for this sample. The R<sup>2</sup> (18%) is higher than the Adjusted R<sup>2</sup> (16%). The F value supports that the research estimation that there is a statistically significant relationship between the set of all independent variables (risk, worry, trust on information sources, and trust on sales-outlets) and the dependent variable (intention).

The beta value shows risk and worry have negative beta co efficient, which implies that 1 unit positive standard deviation change in risk and worry is expected to result in a negative beta coefficient change in intention; also the t-value significant at the 95% level of significance for all the independent variables.

A four-step multiple regression analysis was undertaken to examine the extended model, which is in fact a combination of the TPB, and the risk, worry, trust on information sources, trust on sales outlets, product knowledge and procedural knowledge. The first two steps involved using measures from the TPB with the third step adding in perceived risk, and trust; and the fourth step included knowledge. All steps used intention as the dependent variable, with step one using attitude and subjective norm as a predictor of intention. Step two added in the measure of perceived behavioral control, which allowed for the separation of the constructs for the theory of reasoned action and the theory of planned behavior. The third step added in risk, worry, trust on information sources, trust on sales outlets, while the fourth step added product knowledge and procedural knowledge. Model summary is presented in Table 17.

Table 17 Model summary (extended model), Correlation coefficient, t-value, and significance

	Beta	t-value	Sig.	Model Summaries
<b><i>Intention regressed</i></b>				
Attitude	.55	9.47	.000	R <sup>2</sup> =. 51, adjusted R <sup>2</sup> =. 50, F = 51.89, Sig. of F = .000, Durbin-Watson = 1.56 Predictors: (Constant), Attitude, Norms, Procedural knowledge
Norms	.15	3.07	.002	
PBC	.05	.95	.345	
Risk	.01	.10	.92	
Worry	-.07	-1.27	.21	
Trust on info sources	.02	.35	.727	
Trust on sales outlets	.10	1.94	.054	
Product knowledge	-.08	-1.23	.219	
Procedural knowledge	.18	3.14	.002	

As seen from the Table 17; attitude, norms, and procedural knowledge are the best predictor of intention for this sample. This output shows that the independent variables all together explain 50% of the variance in fish consumption intention for this sample. The R<sup>2</sup> (51%) is higher than the Adjusted R<sup>2</sup> (50%).

The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule of thumb, the residuals are not correlated if the Durbin-Watson statistic is approximately 2, and an acceptable range is 1.50 - 2.50. The Durbin-Watson statistic for this research is 1.56, which falls within the acceptable range.

The probability of the F statistic (51.89) for the overall regression relationship for all independent variable is  $<0.001$ , less than or equal to the level of significance of 0.05. The high t-value of attitude, norms, and procedural knowledge suggested that they have greater effect on intention in comparison to PBC, risk, worry and trust on information sources and trust on sales outlets. In this case worry and procedural knowledge have negative relationship with intention. The t-value and significance implies that PBC, risk, worry and trust on information sources and trust on sales outlets fails to establish statistically significant relationship with intention.

In order to find out the role of behavior the extended model is again a five-step regression analysis was performed. Now self reported fish consumption frequency is considered as the dependent variable and attitude, norms, PBC, risk, worry, trust on information sources and trust on sales outlets are considered as the predictor of behavior. The first three steps of the regression involved using measures from the TPB with the fourth step adding in perceived risk, trust and the fifth steps included knowledge. Results of the extended model are annexed in the appendix 1, 2 and 3. The summaries result of the model is depicted in Table 18.

Table 18 Model summary (extended model), Correlation coefficient, t-value, and significance

	Beta	t-value	Sig.	Model Summaries
<b><i>Behavior regressed</i></b>				
Intention	.32	3.82	.000	R <sup>2</sup> = .28, adjusted R <sup>2</sup> = .27, F = 19.14, Sig. of F = .000, Durbin-Watson = 1.69 Predictors: (Constant), Intention, Attitude, Product knowledge, trust on information sources
Attitude	.23	2.77	.006	
Norms	.09	1.39	.165	
PBC	.09	1.42	.157	
Risk	-.04	-.52	.608	
Worry	.06	.96	.339	
Trust on info sources	-.14	-2.12	.035	
Trust on sales outlets	-.05	-.60	.551	
Product knowledge	.16	2.52	.013	
Procedural knowledge	-.11	-1.39	.166	

The result from the Table18 shows that regressed with behavior reduces the R Square at 28%. It also shows that in the model intention, attitude, product knowledge and trust on information sources are the best predictor of the fish consumption behavior. The following path diagram will showcase the role of behavior in the extended model

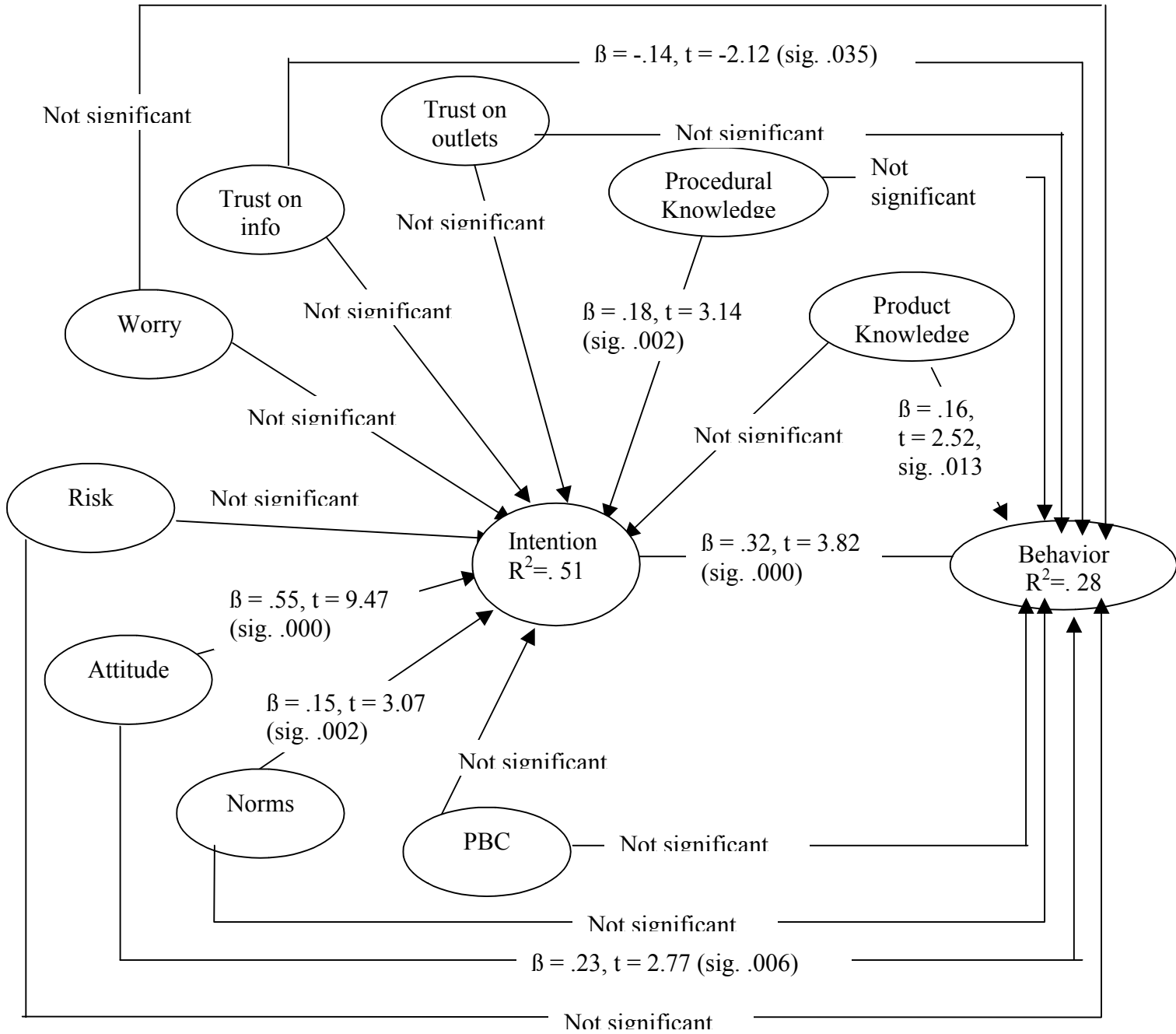


Figure 4 Regressions and inter correlations of the extended model

#### 4.3.4 The attribute model

In this study five items were used to assess the attitude construct. And 7 items were used to measure the salient beliefs reasonable in forming attitude (of which 5 items for perceived quality and 2 Items for perceived value were used), 3 Items were also used (unpleasant smell and bones), which contributes only negatively in forming food attitude. In order to conduct the multiple regression analysis in this study a composite value for attitude, perceived quality, perceived value and negative attributes were made through principle component analysis. Then the attitude taken as the dependent variable and the perceived quality, perceived value and negative attributes are taken as the independent variable and the multiple regression models was run. The model summary is as below:

Table 19 Model summary (attitude), Correlation coefficient, t-value, and significance

	Beta	t-value	Sig.	Model Summaries
<b><i>Attitude regressed</i></b>				
Quality	.81	18.22	.000	R <sup>2</sup> = .68, adjusted R <sup>2</sup> = .67, F = 138.34, Sig. of F = .000, Durbin-Watson = 1.90 Predictors: (Constant), negative attributes, value, quality
Value	-.003	-.06	.949	
Negative	-.05	-1.05	.297	

As seen from the above table perceived quality, perceived value and negative attributes all together explain 67% of the variance in fish consumption attitude for this sample. The R<sup>2</sup> (68%) is higher than the Adjusted R<sup>2</sup> (67%).

The probability of the F statistic (138.34) for the overall regression relationship for all independent variable is <0.001, less than or equal to the level of significance of 0.05. Thus, it could be said that there is statistically significant relationship of the independent and the dependent variables.

For the independent variable value and negative attributes the probability of the t statistic is -.06, and -1.05 respectively for the b coefficient is <0.001, which is greater than the

level of significance of 0.05. Thus, the slope associated with value and negative attributes is equal to zero ( $b = 0$ ) and conclude that there is not a statistically significant relationship between value and negative attributes with fish consumption attitude. However, it is being observed from the t statistic that the attribute qualities have statistically significant relationship with fish consumption attitude.

A four-step multiple regression analysis was undertaken to examine the control beliefs. All steps used perceived behavioral control (PBC) as the dependent variable, with steps using availability, suitability, time and value as predictors of PBC. Model summary is presented in Table 20.

Table 20 Model summary (control beliefs), Correlation coefficient, t-value, and significance

	Beta	t-value	Sig.	Model Summaries
<b><i>PBC regressed</i></b>				
Availability	-.18	-2.51	.013	R <sup>2</sup> = .03, adjusted R <sup>2</sup> = .03, F = 6.28.34, Sig. of F = .013, Durbin-Watson = 1.83
Suitability	.13	1.74	.084	
Time	.04	.48	.630	
Value	-.006	-.07	.942	

The model summary table shows that the R square (3.1%) and the adjusted R square (2.6%) is very small. It also shows only one predictor (availability) have the statistically significant relationship with the dependent (PBC) and independent variable. Beta coefficient and the t statistics of the model say that none but the availability attributes have the statistically significant relationship with the PBC.

## 5 Discussion and conclusion

The objectives of this thesis were to explore the consumers' attitude and consumption of fish in Dhaka city and to understand if and how perceived risks, trust and knowledge influence attitude and fish consumption in this area. To accomplish these two objectives this study applies TPB (Ajzen, 1991) as a conceptual framework. Thus, the main extended model involves constructs from the TPB model and an inclusion of perceived risk (risk and worry), trust (on information sources and on sales outlets) and knowledge (product and procedural knowledge) in it. The items designed to measure the constructs were either adopted or taken from previous researches in Western countries. A convenience sample (n = 201) was collected through direct interviews of households in Dhaka city, the capital of Bangladesh. The analysis methods employed were exploratory factor analysis, descriptive analysis, principle component analysis and the multiple regression analysis. The following sections of this thesis discuss the findings regarding the research issue and questions. Conclusion and some suggestions for future researches will end the thesis.

### 5.1 Factor analysis, reliability and validity of the constructs

Factor loadings of all the items used to measure the constructs within the TPB model are greater than the standard level of 0.7 (Hair et al. 1998). Cronbach's alpha of attitude towards eating fish, intention, norms and PBC is 0.94, 0.93, 0.84 and 0.67 respectively. The cumulative explained variance of the TPB model is 73%. The higher factor loadings and Cronbach's alphas ensure convergent reliability and validity of the constructs within the TPB model.

In the attribute belief model six factors were identified as, perceived quality, perceived value, negative effect, availability, consuming time, and suitability; Cronbach's Alpha for all these six factor are 0.80, 0.80, 0.82, 0.78, 0.71, and 0.65; which are clearly above the satisfactory level (Hair et al. 1998). Thus, convergent validity of the constructs are ensured.



Two factors were extracted for the risk construct named as risk and worry. Two items of the perceived risk have factor loading lower than the critical level and thus excluded, however the rest of the items have higher factor loading. The Cronbach's Alpha for risk and worry is 0.76 and 0.82 respectively, which ensure the reliability and validity of the constructs. There were 22 items used to measure 'trust' constructs (19 of the information sources, 3 of the sales outlets). Exploratory factor analysis suggests that there are factors of trust components, of which five components are related to trust on the information source and one is related to trust on the sales outlets itself. In case of measuring knowledge construct, 11 items were used (4 items for product knowledge and 7 items for procedural knowledge). All the items associated with product knowledge have factor loading well above the recommended level of 0.7; The Cronbach's Alpha is 0.90 and 0.92 respectively for the procedural knowledge and product knowledge, the higher factor loading and Cronbach's Alpha ensure the reliability and validity of the items used to measure the knowledge construct (Hair et al. 1998, Malhotra, 2006).

## **5.2 Behavior and intention towards eating fish**

From the time immemorial fish is the main source of animal protein in Bangladeshi diet. The result of the study also supports that people consume fish at a high level of frequency (at least one time on an average per day). The study does not find any significant difference among demographic and among economic groups of consumers in consuming fish. In Bangladeshi culture it is common to keep at least one item of fish in the dining table per day of the middle and upper middle class people, although as per the FAO, statistics per capita fish consumption is 14 kg for the whole country (FAO, 2008). The consumption seems to be very high because of the nature of the sample, the sample is not a country representative and most of the respondents are belong to the middle or upper middle class people; it is well argued that per capita fish consumption increases with increase in income (Dey et. al., 2005). It also found people have high intention to consume fish in coming three days, mean score is 4.95 and 4.98 respectively for "I plan

to eat” and I expect to eat”. Results of this study confirmed that intention is a significant predictor of behavior as proposed by TPB, and correlation between intention and behavior is significantly high ( $\beta = .32$ ,  $t = 3.82$  sig. .000), which is similar to other studies in the field of social science and seafood (Ajzen & Fishbein, 2005; Olsen, 2001; Verbeke & Vackier, 2005).

### 5.3 The role of attitudes towards fish consumption

People in Dhaka city normally evaluate fish as a meal as good or extremely good. The average mean of the attitude score is high (5.56 on a scale from 1 to 7) indicating very positive attitudes towards fish in this sample. Parallel to other studies in the domain of social science and food consumption this study also confirmed that attitude is the strongest predictor of intention (Ajzen, 1991; Conner and Armitage, 1998; Olsen, 2001, 2004; Saba and Vassallo, 2002; Verbeke and Vackier, 2005, Honkanen et. al, 2006). This study also support that the impact of attitude on behavior was highly significant both directly ( $\beta = .23$ ,  $t = 2.77$ , sig. .006) and indirectly ( $\beta = .55$ ,  $t = 9.47$ , sig. .000).

In the paradigm of TPB and TRA it is proposed that behavioral beliefs are the main determinants of attitude, and then attitude can be assessed by number of salient beliefs related to the behavior in question (Fishbein and Ajzen 1975; Ajzen, 1991). As proposed by Olsen, 2004; perceived quality, which was assessed by taste, appearance, and texture, is the most important attribute determining satisfaction and evaluation in seafood context, it is also suggested that bones and smell are unique attributes having negative effect on the attitudes (Olsen 2001; 2004; Verbeke & Vackier, 2005). This study found that perceived quality is the best predictor of attitude, while it is also observed that in general people don't think bone and smell of fish are unpleasant. The reason for not evaluating bone and smell as severely unpleasant is because of the culture and cooking style (spicy and gravy curry). Although the bones in the fish are considered unpleasant in seafood studies (Olsen, 2004), but in Bangladesh people consume some species of fish because of the bone, example puti (*Puntius chola* and / or *Puntius puntio*). Although it was not

assessed in this research but species-specific smell is favorite to maximum people; while asking about the smell attributes, most of the respondents answered that the smell of Hilsha is special and they like it.

#### **5.4 Influence of social norms**

Within the paradigm of TPB it is argued that social norms the weakest predictor of intention (Ajzen, 1991; Fishbein & Ajzen, 2005). However, in this study it is suggested that that social pressure is a significant and strong indicator of intention to consume fish (beta = .15, t-value = 3.07, significance = .002). Like other Asian countries, in Bangladesh people prefer to eat together and most of the families are large in size (in this study average household size is 4.17). So, while eating together family members are some how forced to eat fish (Olsen, 2001). Fish eating is a cultural part of Bangladeshi people; however in this study the cultural influence seems to have lower influence. Religious factors are suggested as minor motives in Norway (Honkanen et. al., 2006), however, country like Bangladesh it could have a greater influence. In future research emphasis should be taken to tap the religious effect on consumption, for instance the Hindu people don't eat beef, thus there is a common understand among general people that Hindus consume more fish. Also, in Muslim community there are some people who did not consume shrimp due to religious reason. These effects should address minutely in future research.

#### **5.5 Perceived control and barriers toward fish consumption**

In this study no significant correlation was found with perceived behavioral control and both intention ( $\beta = .05$ ,  $t = .95$ , sig. .345) and behavior ( $\beta = .09$ ,  $t = 1.42$ , sig. .157); this finding is consistent with previous research in the field of food consumption (Mahon, et. al., 2006, Armitage, and Conner, 1999). It is because, incase of having high level of self-confidence in evaluating a product purchasing decision of the consumer, perceived behavioral control will not be a major issue in influencing the intention (Mahon, et. al.,

2006). According to TPB, the perceived control is determined by control beliefs (Ajzen, 1991). Olsen (2004), found the most important control factors that influence consumers' seafood purchasing include price/cost, convenience/availability and knowledge. In this study, it is found that attributes such as perceived value, suitability, are not significant indicators of perceived control. However, only availability found having significantly positive and moderate impact on personal control ( $\beta = -0.18$ ,  $t = -2.51$ , sig. 0.013). In Bangladesh fish is perceived as cheaper and good value for money, and suitability for preparing many dishes with fish is not questioned. The time invested for cooking and preparing fish, which is refereed as an external barrier of consumption (Olsen, 2006) was not found having significant effect on perceived behavior control ( $\beta = 0.04$ ,  $t = 0.48$ , sig. 0.630).

## **5.6 Influence of perceived risk**

The study reveal that although people are concern about the risky aspects of fish consumption, and most of the people reported that they knew about the risky aspects of fish consumption (87% respondents answered that they know fish are preserved with hazardous chemicals and 75% of the responded that they know fish are cultured in toxic environment); however the risk perception level is not too much high. Although, the result shows that people did not felt higher risk but the potential long term risk perception bearing a higher mean (4.03); suggesting that people are concern (or becoming concern) about the long term effects. In food marketing literature it is argued that the higher degree of perceived risk about the food items tends the lower consumer's propensity to buy the product (Klerck and Sweeney, 2007). Although this study shows that the consumer's risk perception is lower but still it should be the concern of the fish industry to reduce the perceived risk of the consumers in Dhaka city. To assess and measure the worry perception this study used two items, which also have higher mean (4.30) then other facets of risk perceptions. It also says that people are worried.

In the extended model both the sub-constructs of perceived risk construct fail to establish a significant linear relationship with intention and behavior. The relationship of risk sub-construct with intention ( $\beta = .04$ ,  $t = .76$ , sig.  $.45$ ) and behavior ( $\beta = -0.04$ ,  $t = -.52$ , sig.  $.608$ ) is not statistically significant, the result of the sub-construct worry reveal the same insignificance with intention ( $\beta = .01$ ,  $t = .10$ , sig.  $.92$ ) and behavior ( $\beta = 0.06$ ,  $t = .96$ , sig.  $.339$ ). However, while regressed with trust (trust on information sources and trust on sales outlets), both risk and worry have statistically significant relationship with intention. This type of situation might be occurred because of the familiar “*optimistic bias*” concept. The concept says “optimistic bias is an effect where people perceive that they are at less risk than a comparable or typical member of society from a given hazard” (Frewer, 1999). Another reason for such failure might be the smaller sample size ( $n=201$ ) and the possibility of existing non-linear relationships or interactions other constructs, which is not addressed in this study. Further study with larger sample size and observation of interactions among the constructs of interest is suggested.

## **5.7 People’s trust on information sources and on sales outlets**

This study defines trust as the consumers trust on different fish vendors at different fish trading spots. These fish vendors included in traditional fish markets and supermarkets; it also includes the trustworthiness of various food safety information sources. Trust is measured both as cognitive (knowledge-based informational trust) and affective (emotional institutional and inter-personal trust) (Lobb, 2005). Thus, in this study the trust construct is divided into subconstructs and conducts the regression analysis; 22 items were used to measure the trust construct, 19 items to measure the trustworthiness of the information sources and 3 items to measure the trustworthiness of different sales outlets. However, interpersonal trust (trust of fish vendors) are seems to have low trust, mean score of the three items used to measure interpersonal trust is 3.00. Like other studies in western context (Lobb, 2005), this study also finds that people have lower trust on Government (mean 4.16) and political parties (mean 2.79) than other information sources; which should be a concern of the government and policy making authorities

because trusts upon information sources or suppliers is an important component for food safety (Lobb, 2004). However, information gathered from the specialist sources like doctors (mean 5.58) and university scientists (mean 5.59) are seems trustworthy. People don't believe that fish sold in the different markets are free from chemical preservatives, cultured in toxin free environment and are free from artificial colors. In other words people have lower faith on fish sold different markets. Both the sub-constructs of trust is seems as a good predictor of fish consumption intention ( $\beta = .21$ ,  $t$ -value = 3.13, sig. 0.002 and  $\beta = .16$ ,  $t$ -value = 2.23, sig. 0.027), but while including in the extended model trust on sales outlets fails to establish a significant relationship with both intention and behavior. However, trust on information sources have statistically significant relationship with behavior ( $\beta = -.14$ ,  $t = -2.12$ , sig. .035). As Lobb, 2005 reported that risk and trust are *inexplicably* linked in relation to consumer behavior, however, this non-linear relationship among risk and trust is kept for further research, in this regard we again recall as Lobb, 2005 referred " is the necessity to analyze risk and trust as interactive variables rather than as two distinct concepts".

## 5.8 Knowledge of the consumers

In this study knowledge is defined from the both view as the product and the procedural knowledge of the consumer. The product knowledge includes knowledge about the origin of the product i.e. fish (e.g. imported / local, catch /cultured, cultured is safe / hazardous place); quality of the product (e.g. fresh / not fresh); about the preservatives (chemical used or not as preservative) while the procedural knowledge include the preparing and cooking of the fish (Olsen, 2004). Average of the four items used to measure the product knowledge is 3.58, while average of the seven items used to measure the procedural knowledge is 4.40. Thus, the results shows people have higher procedural knowledge in preparing fish as a meal. The extended model shows that there is no statistically significant relationship with procedural knowledge and fish consumption behavior ( $\beta = -.11$ ,  $t = -1.39$ , sig. .166), but product knowledge have significant impact on the behavior ( $\beta = .16$ ,  $t = 2.46$ , sig. .015). However, in case of intention there is statistically significant

relationship with procedural knowledge ( $\beta = .18$ ,  $t = 3.14$ , sig.  $.002$ ), but product knowledge fails to establish significant relationship with intention ( $\beta = -.08$ ,  $t = -1.23$ , sig.  $.219$ ). In the marketing literatures, two different types of knowledge was discussed, as subjective and objective knowledge (Klerck and Sweeney 2007, Chiou 1998), which are not addressed in this study, in future research this classification should be taken into consideration. These types of classification are crucial because when the consumers have high subjective product knowledge the effect of perceived behavioral control on behavioral intention is assumed to be weaker (Chiou, 1998), while the objective knowledge is closely associated with the consumer's risk perception (Klerck and Sweeney 2007). However, larger sample size and interactive variable analysis might reveal some significant result.

## 5.9 Managerial and theoretical implications

The study found that the consumers in the Dhaka city consume fish at a satisfactory high frequency. The average score supports that people at least one time consume fish per day or seven times in a week. Their general attitude towards fish consumption and the motivation to eat fish are also significantly positive. This supports the famous proverb "fish and rice make a Bangladeshi (*mache vaate Bangali*)". However, most of the people knew that fish are cultured in toxic environment and preserved with hazardous chemicals, it also founds that people are moderately worried about the long-term effect of hazardous fish consumption. It is proved in the food research that when consumers perceive risks associated with the food item, they are ready to seek information (Klerck and Sweeney, 2007), it is common that when the consumers will search the food information they will ask for the most trustworthy information sources, fish processing companies should consider this an opportunity to fulfill the consumer's demand. These findings suggest that there is an immense potentiality of safe and hazard free fish business. The trust of the respondents on supermarkets also gives the signal that hazard free safe fishes in supermarkets will enjoy a good business.

This study found that perceived quality is the best predictor of attitude; it implies that the freshness/quality is the most important attributes to the consumers. Time used to cook and prepare was not found as having significant effect on attitude as well as perceived control. This study also found that family expectations and social pressure is a significant and strong indicator of intention to consume fish. This study found availability is the important factor in determining the perceived behavior control.

In academic aspects, the present study shown the intention of fish consumption can be explained and predicted by attitudes, norms and procedural knowledge. It is also observed that fish consumption behavior is determined by attitude, intention and product knowledge.

The study did not found any significant difference among demographic and economic groups in ranking items of consumption frequency as well as almost of all items designed to measure the constructs within TPB as well as the conceptual model. Thus, it could be argued that the data, which combing different groups, is appropriate for causal model test. However, as Fishbein & Ajzen, 1975 says that external variables such as age, sex, income, may influence the consumption and its predictors indirectly; therefore, these demographic and economic factors should be investigated further in future studies.

#### **5.10 Limitation and suggestion for future researches**

This research is based on a convenience sample from the capital (Dhaka city) of Bangladesh, thus the results are not necessarily representative of the whole population. Future study should include a more representative sample in Bangladesh to portrait the real picture of fish consumption in Bangladesh. It was difficult to collect some demographic information, like household income and designation. The respondents were not wanted to disclose these sorts of information; in the future research the researcher (s) should take this issue in mind. .



As stated in the earlier chapters in this study the research did not focus on any specific species, thus this research will explore only the general fish consumption pattern. However, detailed and extensive study will require for identifying complete consumption pattern as well as the species-specific effects on consumption.

Finally because of the small sample size the present model does not address the strong possibility of non-linear relationships or interactions among the constructs of interest. Understanding the cost and time investment for a larger sample, further studies are suggested by involving the full causal model of TPB and the risk model, which involves all salient beliefs of product attributes, and extension of TPB by adding other important constructs.

Another limitation of the study that, this study used cross-sectional design and the behavior was measured by past behavior. However, such types of data causes conceptual problems since the causal ordering in the TPB is violated and as Budd, 1987 mentioned that associations between TPB variables might become *artificially inflated* (Bruijn, et. al., 2008).

Like other studies in the domain of TRA/TPB, this study also used structured questionnaire approach, which is subject to criticism (Armitage, and Conner, 1999). In this regard, empirical research supports that structured TRA questionnaires produced considerably stronger correlations between components than randomly constructed questionnaires (Budd, 1987).

Despite of the limitations, the findings and suggestions of this study are significant to the fish (/ food) industry as well as in the academic literature. As the study is not a country representative study, the results should not be generalized for the whole country.

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## Appendix 1 Summary of the extended model

Model Summary <sup>c</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.458 <sup>a</sup>	.210	.206	1.47233	1.691
2	.497 <sup>b</sup>	.247	.240	1.44052	
3	.514 <sup>c</sup>	.264	.253	1.42755	
4	.530 <sup>d</sup>	.281	.266	1.41509	
a. Predictors: (Constant), Intention					
b. Predictors: (Constant), Intention, Attitude					
c. Predictors: (Constant), Intention, Attitude, Know_product					
d. Predictors: (Constant), Intention, Attitude, Know_product, Trust_info					
e. Dependent Variable: Behaviour					

## Appendix 2 ANOVA of the extended model

ANOVA <sup>e</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	114.376	1	114.376	52.762	.000 <sup>a</sup>
	Residual	431.383	199	2.168		
	Total	545.758	200			
2	Regression	134.891	2	67.445	32.502	.000 <sup>b</sup>
	Residual	410.867	198	2.075		
	Total	545.758	200			
3	Regression	144.293	3	48.098	23.602	.000 <sup>c</sup>
	Residual	401.465	197	2.038		
	Total	545.758	200			
4	Regression	153.275	4	38.319	19.136	.000 <sup>d</sup>
	Residual	392.484	196	2.002		
	Total	545.758	200			
a. Predictors: (Constant), Intention						
b. Predictors: (Constant), Intention, Attitude						
c. Predictors: (Constant), Intention, Attitude, Know_product						
d. Predictors: (Constant), Intention, Attitude, Know_product, Trust_info						
e. Dependent Variable: Behaviour						

## Appendix 3 Pearson Correlation of the constructs within the extended model

	Behavior	Intention	PBC	Attitude	Norms	Perceiv_risk	Worry	Trust_info	Trust_outlets	Know_product	Know_procedure
Behaviour	1.000	.458	.224	.450	.084	-.236	.015	.017	.147	.227	.200
Intention	.458	1.000	.250	.666	.205	-.243	-.139	.247	.259	.147	.500
PBC	.224	.250	1.000	.247	.205	-.234	.116	.062	.073	.092	.170
Attitude	.450	.666	.247	1.000	.046	-.354	-.091	.177	.187	.219	.504
Norms	.084	.205	.205	.046	1.000	.058	-.082	.280	.076	-.188	.097
Perceiv_risk	-.236	-.243	-.234	-.354	.058	1.000	-.154	-.002	-.302	-.321	-.178
Worry	.015	-.139	.116	-.091	-.082	-.154	1.000	.064	.153	.206	-.172
Trust_info	.017	.247	.062	.177	.280	-.002	.064	1.000	.296	.212	.338
Trust_outlets	.147	.259	.073	.187	.076	-.302	.153	.296	1.000	.571	.247
Know_product	.227	.147	.092	.219	-.188	-.321	.206	.212	.571	1.000	.251
Know_procedure	.200	.500	.170	.504	.097	-.178	-.172	.338	.247	.251	1.000

