



Factors Determining Food Health Risks and Impacts on the Purchasing Intention: The Case of Farmed Fish

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Abstract

The past few years were marked by successive and highly mediated food crises. All sorts of concerns were magnified thus inevitably generating perception of a health risk linked to food. The synthesis of the literature review on the perceived risk and the confidence resulting from a qualitative study by 3 experts on 14 final consumers helped elaborate a conceptual model that goes through three phases: The first is the phase of risk perception, the second is risk reduction and the third is the behavioral phase. We conducted an empirical study on 280 consumers in an attempt at testing and validating our conceptual model. The concluded results consequent to the application of the Methods of structural equations confirmed certain hypotheses and rejected others.

Key words: Food health risk; Risk reduction strategy; Food anxiety; Trust; Methods of structural

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INTRODUCTION

The various successive food crises and scandals that have taken place since 1996 have contributed to destabilize consumers and intensify their feeling of insecurity. In fact,

consuming food products has become risky and stressful; and such growing worries may lead eventually to anxiety.

In addition, the food industry's technological progress created a gap between products and consumers. The latter no longer know what they are eating and have become unable to identify food products. Consequently, consumers feel deprived of their old landmarks.

This situation generated a context in which anxiety dominates resulting in consumers' loss of confidence in products and signals that are transmitted by the food chain (Nadège, 2004). As highlighted by Poulain (2002), food anxiety is permanent and has to be always regulated.

Today's consumers pay more attention to their health (Steptoe, Pollard, & Wardle, 1995) and try to eat in a safe way (Oakes & Slotterback, 2002). For this reason, consumers strive to know what they eat and want to be reassured as to any health risk (Fischler, 2001). In front of such trust issues that stake food consumption (Gurviez, 2001; Décaudin & Pichon, 2003), companies have to restore their marketing strategies and practices by showing more interest in the way consumers perceive the risk in order to face it (Marouseau, 2007). Actually, the perception of food risks constitutes a potential menace for the company following a sudden change in consumer behavior (Louart, 1997).

Studies on food risks represent a major concern for several marketing researchers and practitioners alike (Kapferer, 1998; Mitchell, 1999; Sirieix, 1999; Kreziak, 2000; Cazes-Valette, 2001; Dandouau, 2001; Filser, 2001; Gallen, 2001; Gurviez, 2001; Loisel & Oblet, 2001; Brunel, 2002; Brunel & Pichon, 2002; Muraro-Cochart, 2003; Marouseau, 2005; Albertini & Bereni, 2008; Pichon, 2006a). In fact, understanding the notion of perceived food risks has become fundamental in a risk society (Bergadaà & Urien, 2006).

The main objective of this research is therefore to determine the antecedents as well as the consequences of the perception of food health risks.

1. THE PERCEPTION OF FOOD HEALTH RISKS

1.1 Nutrition—An Anxiogenic Consumption

Food consumption is neither rational nor banal (Sirieix, 1999). Consumers are driven to ingest the product. According to Poulain (2002), food is not a banal consumption product, it is incorporated. It enters the body of the eater and physically and symbolically helps maintain his/her safety and the construction of his/her identity. Thus, the specificity of food consumption lays in the fact that it meets the principle of incorporation (Fischler, 1990). Consequently, eating constitutes a strong identity-related act (I am what I eat) (Suremain & Katz, 2008).

The consumers' ingestion of a foreign body carries a potential risk related to both product choice and the

obligation to diversify one's nutrition (Pichon, 2006a). It is possible then to conclude that these characteristics linked to food consumption highlight its anxiogenic aspect and refer to the concept of perceived risk (Laporte, 2013).

1.2 Food Health Risks

In order to designate health risks, marketing literature uses the terms "physical" or "safety risk" (Muraro-Cochart, 2003). Food health risks have not been the focus of numerous studies so far (Muraro-Cochart, 2003).

Food health risks are generally divided in nutritional risks and health hazards (Table 1). Nutritional risks concern food excess or deficiency (obesity, diabetes...). Health hazards can be linked to contamination (infection for example, listeriosis) or intoxication (for example: addition of chemical agents) (Nugon-Baudon & Corring, 1998).

Table 1
The Hazards and Nutritional Components of Food Health Risk (Laporte, 2013)

Food health risks	
Health hazards	Nutritional risks
<ul style="list-style-type: none"> • Short term (Aurier & Sirieix, 2004) • Contamination (Ferreira, 2006) • Immediate physical health (Aurier & Sirieix, 2004) • The neophobia protects (Fischler, 1990) 	<ul style="list-style-type: none"> • Long term (Aurier & Sirieix, 2004) • Secondary effects (Ferreira, 2006) • Physical, mental and social health long term (Aurier & Sirieix, 2004) • The neophilia protects (Fischler, 1990)

Food health risks are considered as a combination of the perceived importance and probability of potential negative consequences of food consumption on health (Muraro-Cochart, 2003).

2. A QUALITATIVE EXPLORATORY STUDY

In order to examine our already-defined issue and to answer the previously stated research questions, we implemented an empirical application in the food sector. As reminded by Picon (2006a), nutrition is at the source of exciting marketing studies and research particularly in the field of consumer behavior. In addition to that, the notion of risk has recently been integrated the food sector (Brunel, 2002).

We have thus chosen the aquaculture sector and principally farmed fish as a field of application for several reasons. First, there are few studies that deal with this sector. Second, it is a growing and dynamic sector as it helps deal with the decreasing fishing volumes and satisfies the increasing demand for fish. Third, it is a promising sector with growth potential that is more significant than any other agri-food sector.

The use of the qualitative exploratory study is useful in our research as this method helps define the important variables linked to our research context.

Our qualitative exploratory study has two parts: one on

expert views in the field of aquaculture and the other is on the motivations, attitudes and consumer reluctance to buy and consume farmed fish.

In fact, the first study will help us better know the aquaculture sector, understand consumer behavior in terms of purchasing farmed fish. It will also help prepare the second phase of the qualitative study conducted on final consumers.

For the purpose, we conducted semi-directive interviews with three experts who are well acquainted with the topic as they work in the field. These experts provided interesting indications and precise information on the field of aquaculture.

The second study directly deals with the core of our work and will allow for a primary confrontation with our literature review. It aims at selecting the most pertinent variables in accordance with our research context.

We followed the information saturation replication principle in order to determine the size of our sample. The sample comprises a variety of gendered profiles (6 men and 8 women), age groups (from 22 to 65 years old), levels of education and professions. We also interviewed both fish buyers and non-buyers in order to obtain more diverse information.

The interviews took place by the fish shelves in a MONOPRIX store in El Manar. The interviews, that lasted about 45 minutes each, were recorded and entirely retranscribed. To analyze the collected data, we opted for a content thematic analysis. For the purpose, we followed

Chirouze recommendations (2003). Hence, regrouping units of same results allowed us to distinguish six thematic units as follows: self-confidence, anxiety, sustainable commitment to the product category, food health risk, the search for information and brand trust.

The six thematic units will then be a priori the variables of the theoretical model that we envisage to conceptualize.

3. THE CONCEPTUAL MODEL AND RESEARCH HYPOTHESES

We will present the hypotheses in three steps: hypotheses related to antecedents of food health risks, hypotheses related to the reduction of food health risks and finally hypotheses linked to the purchasing decision.

Antecedents of perceived food risk: Explicative individual variables of risk perception will now be unveiled.

Self-confidence:

Several studies have tried to examine the link between risk perception and self-confidence. There were divergent results according to the type of the studied self-confidence. In fact, generalized self-confidence, a general stable disposition, is not correlated with the perceived risk (Cunningham, 1967) while specific self-confidence, that is the confidence to accomplish a particular task, is positively correlated with the perceived risk (Schaninger, 1976) and with the search for information (Locander & Hermann, 1979). The study of the literature review led us to formulate the following hypotheses:

H1: Self-confidence has a negative impact on the perceived short term health risk.

H2: Self-confidence has a negative impact on the perceived long term health risk.

Anxiety:

Anxiety is divided into anxiety-trait and anxiety-status (Locander & Hermann, 1979). The anxiety-trait is linked to the personality of the individual and the anxiety-status is linked to the lived situation (Locander & Hermann 1979). In fact, the relationship between perceived risk and anxiety (trait and status) was at the center of some marketing studies (Schaninger, 1976; Locander & Hermann, 1979; Chaudhuri, 1998). The anxiety-trait is considered as an antecedent to perceived risk and the anxiety-status is considered as a consequence of perceived risk (Chaudhuri, 1998). However, the anxiety-trait is positively correlated with the level of perceived risk (Schaninger, 1976) and not with the search for information (Locander & Hermann, 1979). Yet Taylor (1974) defines anxiety as a consequence of a perceived risk that is to be reduced to an acceptable level. As a conclusion to this debate, we can advance the two following hypotheses:

H3: Anxiety has a positive impact on the perceived short term health risk.

H4: Anxiety has a positive impact on the perceived long term health risk.

Socio-demographic characteristics:

Most researchers failed to establish a significant link between socio-demographic variables and perceived risk. (Muller, 1985; Volle, 1995; Mallet, 2001). According to Prasad (1975 cited by Mallet, 2004), only social class entails the perception of risk.

The results of Mitchell and Boustani (1993) show that senior individuals with high revenues pay more attention to their health than young individuals with low revenues. Generally, women pay more attention to their health than men do (Fishler, 1990). Kenkel (1991) stipulates that highly educated individuals have healthier life style. These persons are able to treat the information and consequently have better understanding of the impact of adopted behaviors on health (Kenkel, 1991).

Gender, age, revenue and education level are the sociodemographic characteristics we retain in our conceptual model. Taking into account these results, we can set the following hypotheses: **H5:** Socio-demographic characteristics have an influence on the perceived short term health risk.

H5-1: Age has a positive impact on the perceived short term health risk.

H5-2: Revenue has a positive impact on the perceived short term health risk.

H5-3: Gender have an influence on the perceived short term health risk.

H5-4: Education level have an influence on the perceived short term health risk.

H6: Socio-demographic characteristics have an influence on the perceived long term health risk.

H6-1: Age has a positive impact on the perceived long term health risk.

H6-2: Revenue has a positive impact on the perceived long term health risk.

H6-3: Gender have an influence on the perceived long term health risk.

H6-4: Education level have an influence on the perceived long term health risk.

Sustainable involvement:

The link between sustainable involvement and risk perception has for years been the object of a significant debate in academia (Mitchell, 1999; Pichon, 2006b). Sustainable involvement in the product category is an important variable for the study of dietary behavior (Pichon, 2006b). The higher the consumer's involvement in a food product is, the more he/she will perceive a significant risk during the purchasing process resulting in an increased search for information (Kapferer, 1998). We thus propose the following hypotheses:

H7: Sustainable involvement in the food category has a positive impact on the perceived short term health risk.

H8: Sustainable involvement in the food category has a positive impact on the perceived long term health risk.

The link between the two dimensions of perceived health risk:

As we previously mentioned, food health risk is divided into two dimensions: a short term dimension and a long term one. Pichon (2006b) asserts that, considering current trends and recent food crises, it is pertinent to test the link existing between both dimensions. It is possible to verify this hypothesis:

H9: Short term food health risks have a positive impact on long-term food health risks.

Consequences of risk perception: Strategies of reducing risk (in our case, the search for information and brand trust) aim to facilitate the purchasing act and play the role of mediating variables between the perceived risk and the purchasing intentions (Delfose, 2009).

The search for information:

The search for information is one of the consequences of risk perception (Mallet, 2004). In fact, it is considered as one of the most important strategies of risk reduction as well as an essential tool in helping the decision making process in an uncertain situation (Bauer 1960; Cox, 1967; Sheth & Venkatesan, 1968; Lutz & Reilly, 1974; Locander & Hermann, 1979; Urbany et al., 1989; Sirieix et al., 2004; Dowling & Staelin, 1994). It is clear then that the search for information act varies according to the degree and dimensions of perceived risk (Bettman, 1975; Cox, 1967).

The direct link between the perceived risk and the search for information remains ambiguous (Guerin, 2010).

The perceived risk is generally cited in literature as an antecedent to the search for information (Abdelmajed, 1993; Brunel, 2002). It is therefore possible to formulate the following hypotheses:

H10: The perceived short term health risk has a positive impact on the search for information.

H11: The perceived long term health risk has a positive impact on the search for information.

Brand trust:

No one can deny the important role a brand plays in the consumer's decision making and purchasing process. Kaabâchi (2007) highlights that the brand represents an important source of information and a strong quality indicator. According to this author, brand trust plays a significant role in risk reduction and mostly serves as a guarantee.

Several studies have dealt with the relation between the trust concept and that of perceived risk in several research

areas. Siegrist (2000) demonstrated that risk perception is positively correlated with brand trust. To Regaya et al. (2006), trust in the health allegation negatively and insignificantly influences perceived risk. The notion of trust is associated to the presence of health risk (El Dahr, 2007).

Within the scope of our study, we will base our research hypotheses on the works of Mitchell (1999). The author stipulates that perceived risk is a necessary antecedent in operationalizing trust. Pichon (2006b) adds that the more consumers perceive food risk, the more their brand trust increases, hence the following hypotheses:

H12: Perceived short term health risk has a positive impact on the consumer's trust in the brand.

H13: Perceived long term health risk has a positive impact on the consumer's trust in a brand.

Impact of the search for information, perceived risk and brand trust on the purchasing intention:

Generally, information influences consumers' behavior and their decision making process. To Gallen (2001), perceived risk blocks the purchasing intentions when the consumer needs a reassurance. As for the relation between brand trust and the purchasing intention, Morgan and Hunt (1994) stipulate that behavioral intention represents manifestations of trust attributed to the partner; hence our hypotheses:

H14: Perceived short term risk has a negative impact on the purchasing intention.

H15: Perceived long term risk has a negative impact on the purchasing intention.

H16: The search for information has a positive impact on the purchasing intention.

H17: Consumers' trust in the brand has a positive impact on the purchasing intention.

It is very important to underline that there are four variables that could have a mediating effect: short term risk perception, long term risk perception, the search for information and brand trust.

However, the existing links in the model (see Figure 1) are confirmed in the literature two by two. During the qualitative study and through the content analysis, we have conceptualized our model to make it more adapted to our research context. From this fact, the mediating effects have not been validated in previous studies and more particularly in our research field. Consequently, there are no mediating effects in our model.

After having presented and justified the set of links existing between the retained variables in our research, it is time to propose the conceptual model of our research (see Figure 1). This model is composed of three stages: the stage of risk perception, the stage of risk reduction and the stage of behavior.

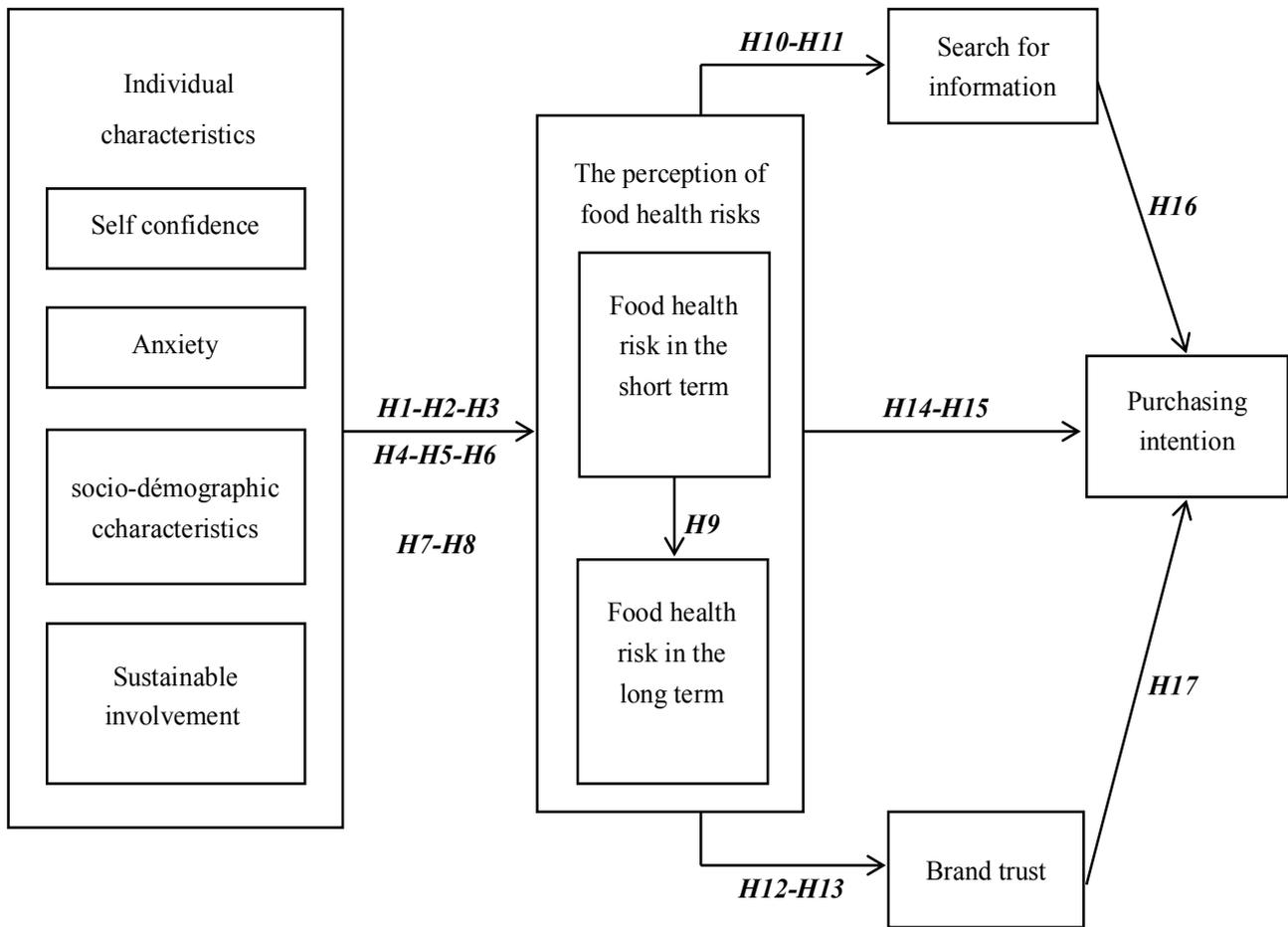


Figure 1
Conceptual Model of Potential Food Health and Reducing Risk

Thus, causality links between the model's variables are theoretically established but the choice of the introduced variables was made following the results of the qualitative study for a better adaptation of the model to the study's context.

4. RESEARCH METHODOLOGY

In order to test the above exposed hypotheses, we have conducted a quantitative study. The questionnaire was elaborated following the instructions of Evraud et al. (2003). Our sample is composed of 280 chosen individuals according to the convenience sampling method. This sample size allowed us to later apply the method of structural equations.

At this level, we had to choose the measuring scales that better fit our research field. In fact, the measuring scales used in this work were all borrowed from the literature. Risk perceived during the purchasing of farmed fish is measured by a scale developed by Brunel in 2002. Individual variables—such as self-confidence, anxiety and involvement—have been respectively studied using the measuring scales developed by Roehrich (1993),

Spielberger (1993) and Strazzieri (1994). The strategies of risk reduction—i.e. the search for information and brand trust—were respectively studied using the measuring scales of Abdelmajid (1993) and Kaabâchi (2007). Finally, the purchasing intention is measured using the scale proposed by Sweeney and Geoffrey (2001).

5. RESULTS OF THE STUDY

We will present the results of a Principal Components Analysis conducted on SPSS.20. Then, we will conduct a Confirmatory Factorial Analysis which is an application of methods of structural equations done on Amos 18. It allows to certify the psychometric quality of the obtained results after an exploratory phase (Roussel et al., 2002).

5.1 Results of the Exploratory Analysis

It is important to note that all the measuring scales used in the scope of this research have been previously purified and validated in past studies but it is necessary to re-do the work in order to adapt all these measuring scales to our field of application and to the Tunisian context.

The exploratory factorial analysis is conducted via the implementation of a Principal Components Analysis (PCA).

This analysis helps study the reliability and dimensionality of the measuring scales using Cronbach alpha.

At the level of this first stage of the analysis, we could eliminate several measuring indicators. This phase is necessary to sum up the most plausible information and to establish the structure of the various constructed scales of the model.

5.2 Results of the Confirmatory Analysis

The measuring model: we were able to confirm the structure of the various measuring scales for our model's six constructs. In fact, the reliability analysis as well as the convergent and discriminant validity have demonstrated satisfactory results as is summed up in appendix 1.

The global model: we now propose to test the global

measuring model. It is necessary to test the model's quality of adjustment as a whole (taking into consideration all the variables at once).

The quality adjustment indices obtained in the initial model were low. In order to ameliorate the model's quality, we have then followed a procedure of element addition and elimination. In fact, the study of the modification indices of the latent variables' error terms resulted in the elimination of elements ANXI3, CF3, CF5, and CF7. The elimination of some elements from the measuring model caused a theoretical problem. It is difficult to theoretically explain these elements' elimination. Nevertheless, this was necessary to favor the best possible adjustment of the model's data. Future research could possibly be interested in the improvement of our constructs measures.

Table 2
Confirmatory Factorial Analysis of the Measuring Model

X ²	DL	X ² standardized	GFI	AGFI	TLI	CFI	RMSEA	RMR
1101,896	604	1,82	0,839	0,793	0,844	0,872	0,054	0,064

As is shown by the Table 2, some adjustment indices are slightly inferior to the limits recommended in the literature. We could though consider that on the whole, the results are satisfactory and affirm the good adjustment quality of the measuring model; in fact:

- The RMR respective values (indicator of the mean value of the residues) and those of the RMSEA (approximate estimation of the error's mean value) are: 0,064 and 0,054, therefore inferior to 0,08 which proves the model's good matching.

- The model also meets parsimony conditions since standardized X² (1,82<3) is low and conforms with the most rigorous norms.

- The GFI, AGFI, CFI and TLI calculated from the measuring model are respectively equal to 0,839, 0,793, 0,844 and to 0,872 so very close to 0.9 which allows us to assert the relevance of our model. The relative weakness of these indices can be probably explained by the complexity of the measuring model.

5.3. The Structure Model and Hypotheses Test

Two methods of analysis are necessary to verify the existing relations in the conceptual model of food risk perception.

The impact of only one quantitative variable on one or more qualitative variables will be studied by a variance analysis. The simultaneous influence of several quantitative variables will be verified by the method of structural equations.

Variance analysis: As recommended by Evrard et al. (2003), the variance analysis aims at determining whether one variable (or more explicative ones) has/have or not an influence on a variable to explain. The variable to explain is quantitative and the explicative variables are nominal

(gender, level of education, profession). The indicator used to validate the hypotheses is Fisher's F test.

The test of the relationship between gender and level of education and perceived food health risk is done using a variance analysis (one factor ANOVA).

The hypotheses to be tested are the following:

H5: Socio-demographic characteristics (gender, education level) have an influence on the perceived short term health risk.

H5-3: Gender have an influence on the perceived short term health risk.

H5-4: Education level have an influence on the perceived short term health risk.

H6: Socio-demographic characteristics (gender, education level) have an influence on the perceived long term health risk.

H6-3: Gender have an influence on the perceived long term health risk.

H6-4: Education level have an influence on the perceived long term health risk.

Table 3
Effect of Gender on the Health Food Perceived Risk in the Short Term

	Sum of squares	Ddl	Average square	F	Signification
Intergroup	1.556	1	1.556	1.559	0.213
Intragroup	277.444	278	0.998		
Total	279.000	279			

Table 4
Effect of Gender on the Health Food Perceived Risk in the Long Term

	Sum of squares	Ddl	Average square	F	Signification
Intergroup	0.133	1	0.133	0.133	0.716
Intragroup	278.867	278	1.003		
Total	279.000	279			

The consumer's gender has no influence on his/her short term food health risk perception ($p = 0.213 > 0,05$) nor on that in the long-term ($p = 0.716 > 0,05$) which annuls hypotheses H5-3 and H6-3.

Table 5
Effect of Education Level on the Health Food Perceived Risk in the Short Term

	Sum of squares	Ddl	Average square	F	Signification
Intergroup	3.828	3	1.276	1.280	0.282
Intragroup	275.172	276	0.997		
Total	279.000	279			

Table 6
Effect of Education Level on the Health Food Perceived Risk in the Long Term

	Sum of squares	Ddl	Average square	F	Signification
Intergroupe	1.834	3	0.611	0.609	0.610
Intragroupe	277.166	276	1.004		
Total	279.000	279			

The consumer's level of education has no influence on his/her short term food health risk perception ($p = 0.282 > 0.05$) nor on that in the long term ($p = 0.610 > 0.05$) which annuls hypotheses H5-4 and H6-4.

It is worth noting here that we have tested the existing direct links in the model.

Structural analysis: Before implementing the structural analyses, it is important to elaborate the initial statistical verifications. In fact, we have tested the stability of the structure model, studied the multi colinearity and evaluated the adjustment of the structure model. In this respect, we notice that the conditions of multi normality have been respected; therefore, we can confirm that our model is stable.

Now it is necessary to verify the research hypotheses based on the significance of Student t and the value of the regression link as well as its sign. We were therefore able to validate the hypotheses **H2, H3, H4, H6-1, H7, H8, H9, H12, H14, H15, H17**. Hypotheses **H1, H5-1, H5-2, H6-2, H13** are not validated while hypotheses **H10, H16** have only been partially validated.

Thus, the concluded results highlight the relationship between the two perceived health risk dimensions in the long and short terms. In addition, we demonstrated that some individual variables influence the food health risk

perception in the short and long terms such as anxiety and sustainable involvement. Self-confidence and age influence only the long term food health risk perception. There is equally a relation between the search for information and brand trust with only short term food health risk. Finally, the purchasing intention is negatively influenced by the two food health risk dimensions and positively by the search for information and brand trust.

CONCLUSION, MANAGERIAL IMPLICATIONS, LIMITS AND FUTURE RESEARCH AREAS

In fact, thanks to a hypothetic-deductive method, we managed to elaborate and test a conceptual model explaining the process of perception and food health risk reduction. The conceptual model consists of three stages. The first is linked to risk perception. The second is related to risk reduction and the third is tied to the purchasing decision.

Based on theoretical reflections and the results of the qualitative study, we were able to select the variables to integrate in our model. The literature review helped us to deeply study the concept of perceived risk. Marketing literature regroups the explanatory factors of risk perception in three different groups: consumer characteristics, product characteristics and those of the situation (Volle, 1995; Dandouau, 2000; Mallet, 2004). In addition, the literature review helped us identify the various strategies of risk reduction used by consumers. The latter strategies aim to reassure them and consequently facilitate the purchasing act. Facing this multitude of variables influencing the consumers' risk perception and risk reduction we opted for a qualitative study comprising two complementary stages: a first stage consisting in interrogating the experts in the field of aquaculture and a second stage consisting in interviewing final consumers. The first study aims to familiarize with the aquaculture sector (mainly understand the challenges and threats of this sector) and to prepare the qualitative study conducted on final consumers. The second stage consists in selecting the most pertinent variables in conformity with our research context and preparing the quantitative study.

Thus the qualitative study conducted on 14 consumers of farmed fish in mass markets allowed us to refine our hypothesis as well as the research model. This step also helped us refine the antecedents and consequences of food health risk perception indicated in the literature. The concluded results in the scope of this research are the following: the individual variables (anxiety and sustainable involvement in the product category) influence the two dimensions of perceived health risk. Only age and self-confidence have an effect on the perception of a long term food health risk.

We were equally able to verify a positive link

between the perception of a short term health risk and the perception of a long term one.

Regarding strategies of risk reduction deployed by consumers, we can say that the latter resort to the search for information and brand trust only when they perceive a short term food health risk. We can deduce from this that in order to ease their food health risk perception, consumers resort to internal solutions linked to experience and prior or external knowledge springing from information spread by the *entourage* to information available on the product packaging and/or tips solicited from the vendors.

To conclude, the purchasing intention is affected by both dimensions related to perceived food health risk, search for information as well as brand trust. In fact, the perception of one of the dimensions of health risk suppresses the purchasing act. Furthermore, the more consumers look for information, the more they have the intention to buy the product. Finally, brand trust reassures consumers and later boosts their purchasing intentions.

For the purposes of this study, we have selected a field of application that has, to our knowledge, never been the object of serious marketing research before. In fact, we opted for this type of product (farmed fish) to measure perceived food health risk as the dynamics of this sector help face the decreasing fishing volumes and satisfy increasing demands in fish.

In addition, our research presents the answers needed for the understanding of reactions and consumers' behavior facing the perception of a food health risk. In fact, during the semi-directive interviews, we noticed that risk perception results from the consumers' partial ignorance. This conclusion drives the concerned companies to adopt strategies aiming at establishing a durable relationship between the product and the consumer. We could insist on the primordial role of extrinsic quality signals (such as labels) that could be one of the quality indicators and consequently an efficient way of reducing uncertainty.

From significant results between anxiety and food health risk perception, we insist on the role of public authorities to encourage consumers to have a healthy and balanced nutrition. This state of anxiety can be reduced by the communication of the short and long term nutritional benefits of farmed fish. Professionals of the food field have to be able to clarify the ambiguity present in the Tunisian consumer's mind at the level of the process of farmed fishing, its type, and the type of food ingested by fish (natural, artificial...).

In order to fight the lack of transparency felt by consumers with regards to the process of fish farming and production, to face the external controversial information and those diffused by international media, and in order to help consumers take the right decisions, concerned companies have to present comprehensive and reliable information. The results of our quantitative study show

that the search for information significantly influences the purchasing intention. Consumers have become more and more demanding in terms of the quest for information. They want to be informed on what they eat. For this purpose, it becomes necessary to retrace the history of farmed fish; whence the implementation of a tool to follow the journey of the needed product. More detailed labeling especially on the origin of the farmed fish, their modes of production, farming areas, nutritive value and allegations linked to health becomes mandatory. During interviews with experts, one of them has recommended that public authorities intervene by conducting a series of actions aiming at reducing food health risk perception among consumers. The implementation of websites seems to be a good alternative to inform consumers that there is no health risk due to the consumption of farmed fish whether it be in the short or long run.

Besides, the development of awareness and promotion programs through opinion leaders (consumer associations or journalists) could equally be an effective means to reassure consumers and restore their confidence. Having confirmed the relationship between trust and purchasing intention, we also recommend that farming companies implement advertising strategies based on gustative, nutritional and healthy aspects promising to comfort consumers about their choices. Moreover and in coherence with our results, the use of advertising slogans (for example "let's produce naturally") was a very useful tool in restauring consumers' trust in industrialized products. Finally, the creation of special TV programs such as a documentary on farmed fish in Tunisia can provide answers to consumers' questions. These programs could reassure consumers if they know, for instance, that farmed fish in Tunisia is controlled and certified by the Ministry of Agriculture and Fishing and that companies use more natural products and less antibiotics, the issue will no longer be disturbing to them.

Distributors, and here we refer to mass distributors, play an important and reassuring role in the promotion of farmed fish through the brand and its vendors. In case of uncertainty, consumers try to look for information from reliable sources such as vendors. These have to reassure final consumers on the perfect condition of the product (fresh and high quality product). Furthermore, and to improve the food offer and reinforce the consumers trust, brands have to exercise a pressure on suppliers to guarantee a better tracking of foods and respect the production and farming rules. For instance, in 2004, Carrefour France launched an advertising campaign entitled: *Mieux consommer, c'est urgent* (French for "better consumption is urgent").

According to the last survey conducted by the Institute of Research for Development in Tunisia, supermarkets are more visited by the middle class. We can therefore suggest to concerned companies to propose prices that take the purchasing power of this class into consideration.

The major limitation of our work is related to the determinants of food health risk that were based on some individual characteristics judged as the most determining within the scope of this study. Situational variables have not been taken into consideration.

The main objective of this research is to study the process of food health risk perception and reduction leading to the purchasing act. However, the study of non-purchasing/deferral behavior could be areas for pertinent research. Darpy and Volle (2003) have highlighted the importance of deferring the purchase in the consumers' purchasing decision process. Both authors have stressed that the study of the purchasing deferral could provide elements and complementary answers on the formation of intentions. In fact, in front of the "food cacophony" (Fischler, 1990) and food hyper choice, consumers can postpone their purchase. Explaining this phenomenon starting from the relationship between deferral and sustainable involvement and self-confidence could also be an appropriate research area.

On the other hand, it is thoughtful to study other supplementary variables in our research model. In fact, the development of the research field into new variables such as sensitivity to food crises (Mallet, 2004) and risk appeal (Bergadaà & Urien, 2006) will improve the model.

In sum, proposing a typology of consumers in terms of the perceived risk might be a pertinent research axis. This typology helps us better target marketing actions.

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APPENDIX

A. Summary of Reliability and Convergent Validity

Factors	Rho of Joreskog	Rho of convergent validity
Food health risk in the short term	0.715	0.770
Food health risk in the long term	0.70	0.608
Self confidence	0.664	0.665
Anxiety	0.77	0.70
Sustainable involvement	0.83	0.59
Search for information	0.804	0.65
Brand trust	0.840	0.66

B. Summary of Discriminant Validity

	Food health risk in the short term	Food health risk in the long term	Anxiety	Sustainable involvement	Self confidence	search for information	Brand trust
Food health risk in the short term	0.77	0.44	0.007	0.003	0.004	0.009	0.0005
Food health risk in the long term		0.608	0.055	0.025	0.0004	0.0025	0.044
Anxiety			0.7	0.025	0.024	0.031	0.908
Sustainable involvement				0.58	0.035	0.24	0.02
Self confidence					0.665	0.008	0.02
search for information						0.65	0.027
Brand trust							0.66