UNIVERSITÉ DU QUÉBEC À MONTRÉAL

LA DISTRIBUTION DES ALIMENTS SANTÉ ET LES INTENTIONS DE COMPORTEMENT DES CONSOMMATEURS

THÈSE
PRÉSENTÉE
COMME EXIGENCE PARTIELLE
DU DOCTORAT EN ADMINISTRATION

PAR
HÉDIA EL OURABI

JUIN 2015

UNIVERSITÉ DU QUÉBEC À MONTRÉAL
Service des bibliothèques

Avertissement

La diffusion de cette thèse se fait dans le respect des droits de son auteur, qui a signé le formulaire *Autorisation de reproduire et de diffuser un travail de recherche de cycles supérieurs* (SDU-522 – Rév.01-2006). Cette autorisation stipule que «conformément à l'article 11 du Règlement no 8 des études de cycles supérieurs, [l'auteur] concède à l'Université du Québec à Montréal une licence non exclusive d'utilisation et de publication de la totalité ou d'une partie importante de [son] travail de recherche pour des fins pédagogiques et non commerciales. Plus précisément, [l'auteur] autorise l'Université du Québec à Montréal à reproduire, diffuser, prêter, distribuer ou vendre des copies de [son] travail de recherche à des fins non commerciales sur quelque support que ce soit, y compris l'Internet. Cette licence et cette autorisation n'entraînent pas une renonciation de [la] part [de l'auteur] à [ses] droits moraux ni à [ses] droits de propriété intellectuelle. Sauf entente contraire, [l'auteur] conserve la liberté de diffuser et de commercialiser ou non ce travail dont [il] possède un exemplaire.»

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

HEALTH ENHANCING FOOD DISTRIBUTION AND CONSUMERS' BEHAVIORAL INTENTIONS

THESIS
PRESENTED
AS A PARTIAL REQUIREMENT
OF THE PHILOSOPHIÆ DOCTOR

BY
HÉDIA EL OURABI

JUNE 2015

REMERCIEMENTS

Je suis très reconnaissante à Dieu 'Allah', le tout puissant, qui m'a donné le courage et m'a mis les vents dans les voiles pour finaliser cette thèse.

Je souhaite adresser mes plus profonds remerciements à mes chers parents : mon père Moncef et ma mère Mongia qui m'ont beaucoup encouragé tout au long de mes études. C'est grâce à leur éducation et leur amour inconditionnel que je suis devenue ce que je suis aujourd'hui. Papa, maman, vous êtes une vraie source d'inspiration pour moi. Grâce à votre support et à votre confiance, j'ai pu poursuivre mes études de $2^{ème}$ et $3^{ème}$ cycle au Canada. Je vous aime infiniment. Merci d'avoir cru en moi. Que Dieu vous bénisse et vous protège!

Je voudrais également exprimer ma gratitude à mon cher époux Walid qui a beaucoup sacrifié de son temps pour me permettre d'avancer dans ma recherche. Merci pour ton encouragement, ton aide, et surtout ta grande patience! Sans toi cette thèse, que je qualifie de projet de couple, n'aurait pas pu voir le jour. Je t'aime et je te suis d'une infinie reconnaissance. Merci de t'avoir occupé des enfants, de la maison et de la bouffe pendant la finalisation de ma thèse. Te remercier ce n'est jamais assez. Cette thèse est définitivement la tienne!

Je suis également très reconnaissante à mes chers enfants Myriam et Adam. Ils ont fait beaucoup de sacrifices pour que je puisse étudier les fins de semaines et pendant leurs vacances scolaires. Je n'oublierai jamais ce que mon cher fils Adam me disait toujours avant de partir pour étudier: «*Travaille bien maman!*» et ce que ma chère fille Myriam me disait pendant les moments difficiles de ma thèse : «*Ne t'en fais pas maman, tu finiras très bientôt ton doctorat*».

Je suis profondément reconnaissante aux membres de mon exceptionnel comité de thèse. Mes remerciements les plus sincères s'adressent à mon directeur de recherche, Monsieur Pierre Filiatrault, Ph.D, professeur titulaire au département de marketing à l'ESG-UQAM, mon co-directeur de recherche Monsieur L. Martin Cloutier, Ph.D, professeur titulaire au département de management et technologie à l'ESG-UQAM et au membre de mon comité de thèse, Monsieur Marc-Alexandre Tomiuk, Ph.D, professeur agrégé de marketing à HEC Montréal. Vos expertises et compétences complémentaires m'ont permis de progresser sûrement dans la réalisation de ce travail de recherche. Je vous remercie pour votre encadrement, votre soutien indéfectible et vos conseils judicieux. Merci pour tout le temps que vous avez consacré pour l'avancement de ma thèse. Vous êtes des modèles pour moi!

Mes remerciements s'adressent aux membres du jury qui ont accepté d'évaluer ma thèse: Monsieur Harold Boeck, professeur de marketing à l'ESG-UQAM, Monsieur François Bellavance, professeur titulaire au département de science de la décision à HEC Montréal, Monsieur Pierre Filiatrault, professeur de marketing à l'ESG-UQAM, Monsieur Martin Cloutier professeur en management et technologie à l'ESG-UQAM et Madame Stefanie Bröring, professeure à l'Université de Bonn en Allemagne.

Je tiens également à remercier ma sœur Lilia, mon beau frère Mongi, mon frère Sami, mes cousines Samia, Mouna et Lamia, mes deux belles sœurs Rim et Esma et mon beau frère Sahbi qui m'ont toujours encouragé. Merci Mongi pour ton support moral et spirituel. Merci Esma pour tes supplications et ta grande générosité. Je salue particulièrement l'encouragement de ma belle mère Najet. Merci Tata de m'avoir assuré les conditions favorables à l'avancement de ma thèse pendant les vacances d'été. Merci pour tes bons plats tunisiens si succulents! Une pensée particulière pour mon beau père Chaker qui nous a quitté il y a trois ans mais qui restera toujours dans mon cœur. Reposes en paix cher oncle Chaker.

Je remercie mes amis Ghada, Wafa, Moujib, Jihen et Leila qui ont partagé avec moi les hauts et les bas de mon parcours doctoral. Merci pour votre écoute et votre empathie. Un grand merci à Fatma, l'éducatrice de mon fils Adam à la garderie qui a beaucoup pardonné mes retards après 17h.

Je voudrais aussi remercier l'appui financier des organismes subventionnaires pour les bourses d'études qu'ils m'ont accordées comme le Fonds de recherche du Québec - Société et culture (FRQSC), Québécor, la Banque Nationale, Hydro Québec, la Fondation de l'Université du Québec à Montréal et la Fondation de l'Université du Québec.

Finalement cette thèse n'aurait pu être réalisée sans la participation active des gens d'affaires, des professeurs et chercheurs membres de l'Institut sur la Nutrition et les Aliments Fonctionnels (INAF) de l'université Laval et du créneau Accord aliments santé de Québec International. Je salue l'aide logistique de Madame Sandra Hardy directrice du créneau Accord aliments santé de Québec International, Monsieur Paul Paquin, Ph.D, professeur titulaire, responsable de l'équipe de soutien à l'innovation à l'INAF et Monsieur François Couture, conseiller en marketing et innovation à l'INAF. Je ne peux m'en passer sans remercier l'aide précieuse de Madame Sophie Banville, Coordonnatrice des communications à l'INAF.

TABLE DES MATIÈRES

LISTE DES FIGURES

LISTE DES TABLEAUX

LISTE DES ANNEXES

RÉSUMÉ

Cette thèse par articles s'intéresse à la problématique de la distribution des aliments santé et aux intentions de comportement des consommateurs à leur égard.

Depuis au moins deux décennies, l'industrie des aliments santé au Canada est dynamique et en pleine évolution (Hobbs, 2002; Malla et al., 2013). Elle connaît une croissance continue en terme des produits offerts sur le marché, du nombre des entreprises actives, des revenus générés et des dépenses engagées en R-D (Cinnamon, 2007; Khamphoune, 2013; Malla et al., 2013; Palinic, 2005; Tebbens, 2002). Toutefois, à l'instar d'autres secteurs, cette croissance s'accompagne par des défis relatifs aux consommateurs, à l'entreprise, au marché et à la réglementation (Malla et al., 2013). En effet, l'environnement est très volatile et incertain (Boehlje, Roucan-Kane et Bröring, 2011; Hobbs, 2002; Siedlok, Smart et Gupta, 2010) et les chaînes de valeur sont complexes et dynamiques (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran et Mouly, 2007) et ce, en raison de la nature des fonctions à réaliser, de l'implication de diverses parties prenantes et de leurs interrelations (Hobbs, 2002; Sankaran 2005; Sakaran et Mouly, 2007).

Par ailleurs, la littérature existante en management du marketing met beaucoup l'accent sur la compréhension du passé plutôt que de prendre en compte la complexité, l'incertitude et la dynamique du présent et du futur (Gummesson, Kuusela et Närvänen, 2014). Le marketing stratégique se limite à l'analyse des données relatives au couple produit/marché et inclut peu d'informations contextuelles qui dépassent cette frontière (Logman, 2011). Par conséquent, la prise de décision stratégique en marketing est dépourvue d'une vision systémique et holistique soit d'une compréhension de la dynamique du marché (Gummesson, Kuusela et Närvänen, 2014).

Pour combler cet écart dans la littérature, cette thèse propose dans un premier temps de mener une étude prospective et exploratoire (article 1) en appliquant une méthode de recherche mixte intégrée: la cartographie des concepts en groupe (Kane et Trochim, 2007). Ainsi, l'article 1 s'intéresse à l'amélioration de la distribution des aliments santé. L'étude a été menée auprès de diverses parties prenantes de l'industrie des aliments santé au Québec (fabricants d'ingrédients, fabricants et transformateurs, experts et chercheurs en développement de la technologie, en sciences de la consommation, en distribution et en marketing alimentaire, et représentants du gouvernement). La cartographie des concepts en groupe a permis d'identifier un cadre conceptuel émergent que les participants partagent sur les interventions spécifiques à entreprendre visant l'amélioration de la distribution des aliments santé. Ces interventions ont été regroupées en six (6) groupements, à savoir : (1)

Information et communication avec les consommateurs, (2) Communication avec les professionnels de la santé et possibilités règlementaires, (3) Gestion de l'innovation contextualisée avec le marché, (4) Réseautage et support institutionnel, (5) Gestion de la relation avec les détaillants, et (6) Stratégies marketing.

En se basant sur ce cadre conceptuel émergent, l'objectif de l'article 2 est de comprendre les interactions entre les interventions spécifiques à entreprendre par les parties prenantes de l'industrie des aliments santé pour améliorer la distribution de ces produits. L'article 2 utilise une approche qualitative associée à la dynamique des systèmes (DS) en élaborant un diagramme d'influence (DI) qui met l'accent sur les forces dynamiques entre les six (6) groupements obtenus dans l'article 1 de cette thèse. Les données ont été recueillies à partir d'entrevues individuelles non structurées avec des experts en aliments santé et également à partir d'un groupe de discussion de 18 participants (fabricants d'ingrédients, fabricants/transformateurs, experts et chercheurs en développement de la technologie, en sciences de la consommation, en distribution et en marketing alimentaire, et représentants du gouvernement).

Finalement, l'article 3 examine les effets de la traçabilité, des allégations santé et de la vérification des allégations santé sur les intentions de comportement des consommateurs (intention d'acheter, intention de recommander et intention de servir aux autres) à l'égard des aliments enrichis d'acides gras oméga-3. Le design expérimental consiste en une analyse de variance mixte de type inter et intra-sujets dans lequel la traçabilité et les allégations santé sont deux facteurs inter sujets, d'une part, et la vérification des allégations santé et les catégories de produits enrichis d'acides gras oméga-3 sont deux facteurs intra-sujets, d'autre part. Un questionnaire a été administré à un échantillon de 463 répondants à Montréal et à Ottawa. Les résultats montrent que la traçabilité et la vérification des allégations santé ont des effets significatifs sur les intentions des consommateurs d'acheter, de recommander et de servir aux autres des aliments d'acides gras-oméga-3. De plus, des effets d'interaction significatifs double et triple ont été trouvés pour l'intention de recommander et ce, entre les allégations santé et la vérification des allégations santé, d'une part, et entre la traçabilité, les allégations santé et la vérification des allégations santé, d'autre part.

MOTS-CLÉS : Cartographie des concepts en groupe, aliments santé, distribution, planification stratégique, dynamique des systèmes (DS), diagramme de système inductif (inductive system diagram), analyse qualitative, diagramme d'influence (DI), traçabilité, allégations santé, vérification des allégations santé, intention d'acheter, intention de recommander, intention de servir, acides gras oméga-3, analyse de variance mixte de type inter et intra-sujets.

ABSTRACT

This thesis is structured around three essays on health enhancing food distribution and consumers' behavioral intentions toward these food products.

For two decades, the Canadian health enhancing food industry has been dynamic and evolving (Hobbs, 2002; Malla et al., 2013). It has been growing steadily in terms of products offered in the market, number of active firms, revenues generated and incurred R&D expenses (Cinnamon, 2007; Khamphoune, 2013; Malla et al., 2013; Palinic, 2005; Tebbens, 2002). However, like other sectors, this growth is accompanied by challenges related to consumers, firm, market and regulation (Malla et al., 2013). Indeed, the environment is very volatile and uncertain (Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002; Siedlok, Smart and Gupta, 2010) and value chains are complex and dynamic (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran and Mouly, 2007) because of the nature of functions to be performed, the involvement of various stakeholders and their interrelationships (Hobbs, 2002; Sankaran 2005; Sakaran and Mouly, 2007).

Furthermore, the existing literature in marketing management has heavily focused on understanding the past rather than taking into account complexity, uncertainty and dynamics of the present and the future (Gummesson, Kuusela and Närvänen, 2014). Strategic marketing is often limited to analyze information related to product/market couple and includes little contextual information that go beyond this boundary (Logman, 2011). Consequently, strategic decision making in marketing is without a systemic and holistic view and therefore without a dynamic understanding of the market (Gummesson, Kuusela and Närvänen, 2014).

To address this gap, this thesis proposes, firstly, to conduct a prospective and exploratory study (Article 1) by using an integrated mixed-method namely: Concept mapping (Kane and Trochim, 2007). Article 1 focuses on improving health enhancing food distribution. The study was carried with the participation of health enhancing food industry stakeholders (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and in marketing, and government representatives). Group concept mapping allowed identifying a conceptual framework that participants' share about initiatives to be undertaken for improving health enhancing food distribution. These initiatives were grouped by participants into six clusters, namely: Information and communication with consumers, (2) Communication with health professionals and regulatory options, (3) Market-oriented innovation management, (4) Networking and institutional support, (5) Retailers' relationship management, and (6) Marketing strategies.

Based on the emergent conceptual framework of Article 1, Article 2 aims to understand the interactions between initiatives to be undertaken by individual stakeholders of health enhancing foods industry to improve their products' distribution. To do so, article 2 uses a qualitative approach of system dynamics (SD). The influence diagram (ID) emphasizes on the dynamic forces between the six clusters obtained in Article 1. Data were collected from both unstructured individual interviews with experts in health enhancing foods and from a group discussion with 18 participants (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives).

Finally, Article 3 investigates the effects of traceability, health claims and verification of health claims on consumers' behavioral intentions (intention to purchase, intention, to recommend and intention to serve) toward omega-3 fatty acids enriched foods. A mixed between-within-subjects analysis of variance was used with traceability and health claims as between-subjects factors and verification of health claims and food product categories enriched with omega-3 fatty acids as within-subjects factors. A questionnaire was administered to 463 subjects in Montreal and Ottawa. The results show that traceability and verification of health claims have significant effects on consumers' intention to purchase, to recommend and to serve to others foods enriched with omega-3 fatty acids. Moreover, significant two-way and three-way interactions were obtained for intention to recommend and that, between health claims, verification of health claims, at one hand, and between traceability, health claims and verification of health claims, on the other hand.

KEY WORDS : Concept mapping, health enhancing foods, distribution, strategic planning, System dynamics (SD), inductive system diagram, qualitative analysis, influence diagram (ID), traceability, health claims, verification of health claims, intention to purchase, intention to recommend, intention to serve, omega-3 fatty acids, a mixed between-within subjects analysis of variance.

INTRODUCTION

a) Problématique générale de la thèse

L'industrie des aliments santé[1] au Canada a beaucoup évolué durant la dernière décennie (AAC[2], 2014; Malla et al., 2013). Le nombre des entreprises qui fabriquent des aliments fonctionnels[3] et des produits de santé naturels (PSN)[4] a plus que doublé entre les années 2002 et 2011. Ce nombre est passé de 294 à 750 entreprises dans cette même période (Khamphoune, 2013; Tebbens, 2002). La croissance du secteur des aliments santé au Canada est attribuable à un ensemble de facteurs tels que: l'augmentation des coûts des soins de santé, le vieillissement de la population, la conscience des consommateurs du lien entre l'alimentation, la santé et la maladie, les progrès scientifiques et technologiques et les changements dans la réglementation des aliments santé (Cinnamon, 2007; Hobbs, 2002).

Selon Malla et al. (2013), cette croissance s'accompagne pour les entreprises de ce secteur par des enjeux qui se rapportent aux consommateurs, à l'entreprise, au marché

---

[1]Un aliment santé est un «*Produit alimentaire possédant une composition particulière (native ou induite) ou élaboré à partir d'une technologie particulière ayant pour but d'améliorer la teneur en nutriments et/ou composés bioactifs de cet aliment comparativement à un produit conventionnel et procurant ainsi des bénéfices pour la santé démontrés scientifiquement.*» (Cortuff et al., 2011, p.1). On retrouve dans cette catégorie les aliments fonctionnels et les produits de santé naturels (PSN) (Cortuff et al., 2011; Malla et al., 2013).

[2]Agriculture et Agroalimentaire Canada

[3]Un aliment fonctionnel est un aliment qui ressemble en apparence aux aliments conventionnels et il fait partie d'une alimentation dite « normale ». En plus des fonctions nutritionnelles de base, un aliment fonctionnel, procure des bienfaits physiologiques démontrés et (ou) réduit le risque de maladie chronique (AAC, 2014).

[4]Un produit de santé naturel (PSN) est un produit de source naturelle, vendu sous forme posologique, et conçu pour préserver ou promouvoir la santé, restaurer ou corriger la fonction de santé humaine; ou diagnostiquer, traiter et prévenir la maladie (AAC, 2014).

et à la réglementation. En effet, l'industrie des aliments santé au Canada présente quelques caractéristiques qui engendrent de nombreux défis pour les entreprises qui la composent (Hobbs, 2002; Hodgins, 2011). Premièrement, cette industrie se caractérise par des chaînes de valeurs complexes (Hobbs, 2002) dans lesquelles un réseau complexe d'acteurs s'impliquent (Basu, Thomas et Acharya, 2007) et collaborent ensemble (Bröring et Cloutier, 2008; Hobbs, 2002) pour mener diverses fonctions liées à la recherche et développement, au transfert de la technologie, à la production et à la transformation, à l'approbation du produit et à l'élaboration des stratégies marketing (Herath et al., 2008; Hobbs, 2002). Deuxièmement, les chaînes de valeurs dans l'industrie canadienne des aliments santé sont dynamiques et en perpétuelle évolution (Hobbs, 2002; Malla et al., 2013). En fait, ces chaînes de valeur sont de plus en plus orientées vers la demande et contrôlées par des détaillants consolidés ayant un pouvoir de plus en plus important (Hodgins, 2011; OSEC, 2011).

Finalement, l'industrie des aliments santé au Canada opère dans un marché de consommateurs incertain et un environnement (scientifique-technologique, réglementaire, social et concurrentiel) très changeant (Hobbs, 2002; Malla et al., 2013; MAPAQ, 2007, 2009; Moorsel, Cranfield et Sparling, 2007).

Ces caractéristiques génèrent de la confusion chez les consommateurs, les décideurs politiques, les professionnels de la santé et les gestionnaires de marketing (Malla et al., 2013). Les entreprises de cette industrie font face à plusieurs problématiques qui concernent, par exemple, les ressources financières pour le développement et la commercialisation des nouveaux produits, les problèmes liés aux droits de propriété intellectuelle, l'incertitude et la lenteur du processus d'approbation réglementaire, le maintien de la confiance du consommateur face à la prolifération des produits et des allégations santé, etc.(Malla et al., 2013). De plus, dans le cadre de la présente thèse des entretiens individuels non structurés, menés auprès d'experts qui viennent en aide

aux entreprises des aliments santé au Québec (Canada), révèlent que les gestionnaires de marketing dans ces entreprises doivent non seulement prendre des décisions dans des environnements (technologique et scientifique, réglementaire, économique, et social) incertains, tenir compte des besoins et des intérêts des consommateurs et des distributeurs, de même que des pratiques des concurrents, tout en œuvrant dans une industrie dynamique et complexe, mais doivent aussi veiller à ce que les décisions prises au niveau de l'aspect consommateur soient cohérentes à la fois avec la réglementation et les avancements scientifiques dans le domaine des aliments santé.

Par ailleurs, au niveau de la littérature disponible en management du marketing, Ardley (2011) et McCole (2004) affirment que cette dernière n'a pas réellement apporté aux gestionnaires un éclairage dans leurs prises de décisions. En effet, le courant de pensée dominant en marketing met peu l'accent sur la gestion des relations complexes dans des réseaux où plusieurs parties prenantes interagissent et créent de la valeur (Gummesson, Kuusela et Närvänen, 2014). De plus, Logman (2007, 2008, 2011) considère que le marketing stratégique est limité à l'analyse de données liées au couple produit/marché et n'inclut pas d'informations contextuelles comme les processus marketing et les circuits de distribution qui dépassent cette frontière. Par conséquent, la prise de décision en marketing se fait sans une vision systémique et holistique qui tient compte de la complexité, de l'incertitude et de la dynamique du marché (Gummesson, Kuusela et Närvänen, 2014). Selon ces auteurs, un nouveau paradigme en théorie du marketing a récemment émergé. Il met l'accent sur les parties prenantes, la complexité et la génération de la théorie et ainsi fournit une vision systémique et holistique sans pour autant négliger les détails (Gummesson, Kuusela et Närvänen, 2014).

Au niveau méthodologique, Gummesson, Kuusela et Närvänen (2014) ajoutent que les méthodes utilisées en recherche marketing se basent sur des relations causales

unidirectionnelles entre quelques variables statiques, simples, déconnectées et historiques comme par exemple, la satisfaction du consommateur, la valeur de la marque, la publicité et son impact et l'efficience du canal de distribution (Hanssens Rust et Srivastava, 2009; Sheth et Sisodia, 2005; Srinivasan et Hanssens, 2009; Verhoef et Leeflang, 2009; Workman, Homburg et Gruner, 1998). En définitive, Trochim et Cabrera (2005) affirment que tandis que les fondements scientifique et philosophique de la complexité sont bien établis, il y a étonnamment très peu de méthodes qui peuvent être utilisées par les gestionnaires pour appréhender la complexité de leurs systèmes organisationnels.

En se basant sur ces limites théoriques et méthodologiques d'une part, et sur les besoins managériaux exprimés par les experts en aliments santé, interviewés dans le cadre de la présente recherche, d'autre part, cette thèse par articles s'intéresse à la problématique de la distribution et aux intentions de comportement des consommateurs à l'égard des aliments santé.

Ainsi, dans le premier article intitulé «*Development of a Conceptual Framework for Improving Health Enhancing Food Distribution*» ayant pour objet de recherche la distribution des aliments santé, l'objectif consiste à développer un cadre conceptuel partagé par diverses parties prenantes[5] de l'industrie des aliments santé permettant d'identifier et de prioriser des interventions visant l'amélioration de la distribution de ces produits. Pour cela, cet article présente une étude qui utilise la méthode de la cartographie des concepts en groupe (Concept mapping) (Kane et Trochim, 2007) qui permet de prendre en considération la complexité des marchés et de faire participer plusieurs parties prenantes (Trochim et Cabrera, 2005). Ainsi, cet article s'inspire du

[5] Fabricants d'ingrédients, fabricants et transformateurs, experts et chercheurs en développement de la technologie, en sciences de la consommation, en distribution et en marketing alimentaire, et représentants du gouvernement.

nouveau paradigme en marketing qui met l'accent sur la complexité, l'incertitude et les parties prenantes (Gummesson, Kuusela et Närvänen, 2014).

Dans le deuxième article intitulé «*Improving the Distribution of Health Enhancing Foods: A Qualitative System Dynamics Approach*», l'objet de recherche porte aussi, comme l'article 1, sur la distribution des aliments santé. De même, comme le premier article, cet article se base sur le nouveau paradigme en marketing tel qu'énoncé par Gummesson, Kuusela et Närvänen (2014). En effet, l'objectif de l'article 2 consiste à fournir une meilleure compréhension de la dynamique entre les interventions visant l'amélioration de la distribution des aliments santé identifiées dans le premier article. Pour cela, l'article 2 utilise l'approche qualitative de la dynamique des systèmes (DS) qui permet de comprendre la structure sous jacente aux systèmes complexes (Gharajedaghi, 2006; Homer, 1996; Luna-Reyes and Anderson 2003; Senge, 1990; Sterman, 2000, 2001). Ainsi, comme l'illustre la figure 0, les résultats de l'article 1 ont guidé la conduite de l'étude dans l'article 2.

Finalement, le troisième article, intitulé «*Effects of Traceability, Health Claims and Verification of Health Claims on Consumers' Behavioral Intentions Toward Foods Enriched with Omega-3 Fatty Acids*» a pour objet de recherche les intentions de comportement des consommateurs face aux aliments santé. Selon Malla et al. (2013), la demande est un aspect très important à étudier étant donné que le succès de l'industrie des aliments santé en dépend largement. Contrairement aux deux premiers articles, l'article 3 porte seulement sur un ensemble d'interventions qui visent l'amélioration de la distribution des aliments santé, déjà identifiées dans l'article1. Cet ensemble d'interventions porte, par exemple, sur l'allégation santé, l'étiquette du produit, les logos de certification ou d'homologation, etc. Ainsi, une partie des résultats de l'article 1 ont servi pour mener l'étude dans l'article 3 (Figure 0). Plus précisément, l'article 3 s'intéresse à étudier les effets de certains indices

d'information (information cues) comme la traçabilité, les allégations santé et la vérification des allégations santé sur les intentions de comportement des consommateurs. Comparativement aux deux premiers articles, cet article utilise plutôt une démarche déductive qui consiste à élaborer un design expérimental de type 'between-within' pour tester les effets principaux et les effets d'interaction sur les variables dépendantes de cette étude (intentions de comportement : intentions d'acheter, intentions de recommander et intentions de servir aux autres). De plus, par rapport aux articles 1 et 2, l'article 3 ne porte pas sur les aliments santé en général mais sur une catégorie spécifique d'aliments santé à savoir ceux enrichis d'acides gras oméga-3. Le choix des aides gras oméga-3, comme ingrédient fonctionnel, ajoutés aux produits alimentaires se justifie par plusieurs raisons. Premièrement, les acides gras oméga-3 jouissent d'une grande popularité commerciale (McManus, Merga et Newton, 2011). Ils sont ajoutés comme ingrédient fonctionnel dans plusieurs produits tels que le lait, les œufs, le pain, etc. (Garg et al., 2006). Deuxièmement, plusieurs études ont démontré les bénéfices santé des acides gras oméga-3 et ce, pour le développement de l'enfant, l'hypertension, les maladies cardiovasculaires, le cancer, la démence, l'Alzheimer et la dépression (Riediger et al., 2009; Ruxton et Derbyshire, 2009). Troisièmement, les allégations santé fonctionnelle (relatives à la santé du cœur), de réduction de risque et celles de prévention de maladies (relatives aux maladies coronariennes et le cancer) ne sont pas encore acceptées au Canada sur les étiquettes des aliments enrichis d'acides gras oméga-3 (ACIA, 2014; Zou, 2011). Étant donné que la réglementation canadienne est en pleine évolution (Malla et al., 2013), il est possible qu'il pourra y avoir prochainement une nouvelle réglementation dans ce sens (Zou, 2011). Les résultats de cet article peuvent donc être utiles pour informer les responsables de la réglementation des allégations santé des aliments santé de la réaction des consommateurs à différents types d'allégation santé (fonctionnelle, réduction de risque de maladie et prévention de maladie) et les effets de leur vérification par différentes parties (agence gouvernementale et tierce organisation à but non lucratif).

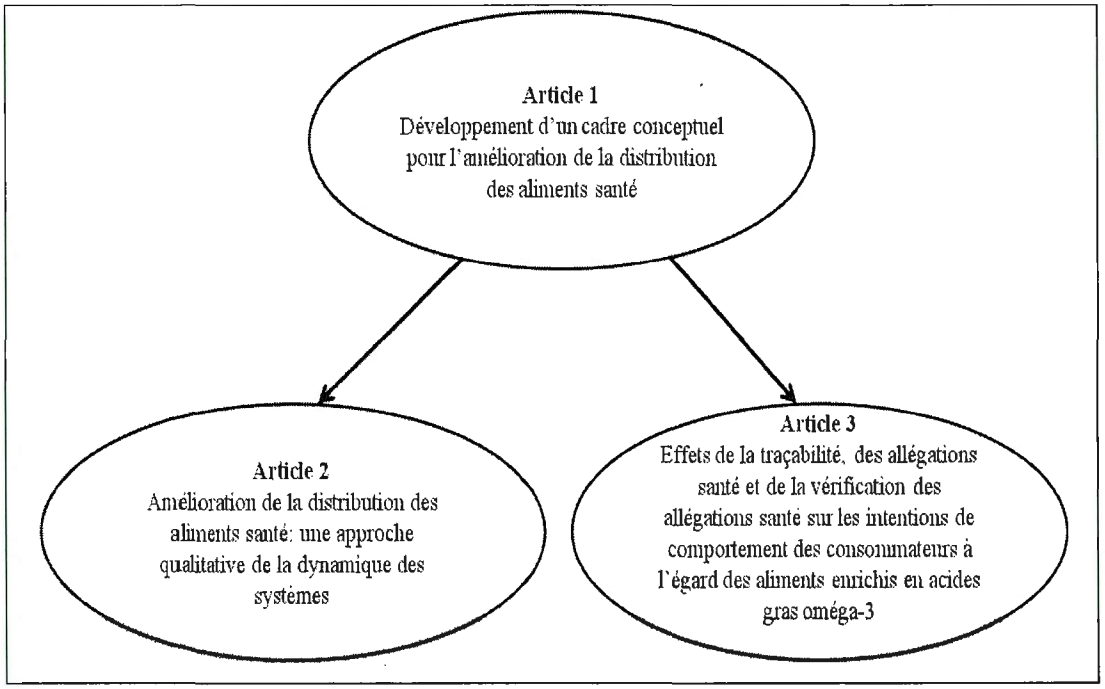


Figure 0 Liens entre les articles de la thèse

b) Sommaire des articles de la thèse

Le tableau 0 présente brièvement l'objectif, le type et l'approche de recherche, l'outil de collecte de données, les participants ainsi que la méthode d'analyse de données de chacun des trois articles de la thèse. Ces articles sont détaillés respectivement dans les chapitres II, III et IV de la présente thèse.

Tableau 0 Sommaire des articles de la thèse

	Article 1	**Article 2**	**Article 3**
Objectif de la recherche	Développer un cadre conceptuel partagé qui permet d'identifier et de prioriser des interventions spécifiques à entreprendre visant l'amélioration de la distribution des aliments santé	Identifier et fournir une compréhension de la dynamique entre un ensemble d'interventions à entreprendre visant l'amélioration de la distribution des aliments santé	Analyser les effets principaux et d'interaction de la traçabilité, de l'allégation santé et la vérification de l'allégation santé sur les intentions de comportement des consommateurs (intention d'acheter, de recommander et de servir)
Type de recherche	Exploratoire, prospective	Exploratoire	Confirmatoire
Approche de recherche	Mixte (qualitative et quantitative)	Qualitative	Quantitative
Outil de collecte de données	- Groupe de discussion - Enquête par sondage (questionnaire)	- Entrevues individuelles informelles - Groupe de discussion	Enquête par sondage(questionnaire)
Sujets/Participants	Diverses parties prenantes de l'industrie des aliments santé (experts, dirigeants d'entreprises et représentants gouvernementaux) Critères de sélection: - Connaissance et expérience - Échantillon de jugement (Cooper and Schindler, 2008)	Diverses parties prenantes de l'industrie des aliments santé (experts, dirigeants d'entreprises et représentants gouvernementaux) Critères de sélection: - Connaissance et expérience - Échantillon de jugement (Cooper and Schindler, 2008)	Étudiants à Ottawa et à Montréal Critère de sélection: de convenance
Méthode d'analyse	Cartographie des concepts en groupe	Méthode inductive du diagramme d'influence de la dynamique des systèmes (Inductive system diagram method, Burchill et Fine, 1993, 1997) (combinant des aspects de la théorie enracinée et de la dynamique des systèmes)	Analyse de variance mixte de type inter et intra sujets

c) Plan de la thèse

Comme mentionné précédemment, cette thèse est présentée en trois essais se rapportant à l'étude de la distribution des aliments santé et aux intentions de comportement des consommateurs à l'égard d'une catégorie spécifique d'aliments santé à savoir les aliments enrichis d'acides gras oméga-3. Bien que l'introduction, le chapitre I (contexte de la recherche: le secteur des aliments santé) et la conclusion de la thèse soient écrites en français, les trois articles et leurs préfaces (chapitres II, III et IV) ont été rédigés en anglais.

Suite à l'introduction, le premier chapitre présente le contexte de la recherche à savoir le secteur des aliments santé au Canada en abordant la réglementation des aliments santé, la définition des aliments santé, les caractéristiques de la demande et de l'offre des aliments santé. Le but de ce chapitre consiste à mieux situer la problématique générale de la thèse dans son contexte de recherche. Le premier article de la thèse fait l'objet du chapitre II. Le deuxième article de la thèse est présenté dans le chapitre III. Quant au troisième article, il fait partie du chapitre IV. Finalement, la conclusion de la thèse discute les conclusions spécifiques des articles, leurs limites, les voies de recherches futures et les contributions de la recherche.

d) Contributions de la thèse

Les contributions de cette thèse se situent aux niveaux théorique, méthodologique managérial et également au niveau des politiques publiques dans le domaine des aliments santé.

Au niveau théorique cette thèse permet d'enrichir la littérature en marketing qui selon Gummesson, Kuusela et Närvänen (2014) tient peu compte de la complexité, de l'incertitude et de la dynamique du marché et par conséquent, est dépourvue de vision systémique et holistique. En effet, l'apport théorique de cette thèse se résume en trois contributions majeures:

- Développer un cadre conceptuel partagé sur les interventions à entreprendre pour améliorer la distribution des aliments santé en faisant participer diverses parties prenantes de l'industrie de ces produits.
- Élaborer un diagramme d'influence permettant de comprendre l'interaction des interventions à entreprendre pour améliorer la distribution des aliments santé en mettant en évidence l'interdépendance et la complexité dynamique.
- Investiguer les effets principaux et les effets d'interaction de certaines interventions visant l'amélioration de la distribution des aliments santé comme l'allégation santé, la traçabilité et la vérification des allégations santé sur les intentions de comportement des consommateurs à l'égard des aliments santé.

Au niveau méthodologique, l'apport de cette thèse réside dans l'utilisation dans les articles 1 et 2 de méthodes de recherche qui permettent de saisir la complexité comme la cartographie des concepts en groupe (Trochim and Cabrera, 2005) et la dynamique des systèmes (Behara, 1995; Gharajedaghi, 2006; Homer, 1996; Luna-Reyes et Anderson 2003; Senge, 1990; Sterman, 2000, 2001).

Au niveau managérial, les résultats de cette thèse fournissent un nombre important d'implications susceptibles d'aider les gestionnaires à:

- Comprendre la complexité des enjeux liés à la distribution de leurs produits,
- Identifier des interventions susceptibles d'améliorer la distribution de leurs produits tout en impliquant diverses parties prenantes,

- Comprendre les effets de certaines interventions visant l'amélioration de la distribution des aliments santé sur les intentions de comportement des consommateurs.

Finalement, pour les implications au niveau des politiques publiques, les résultats de cette thèse pourraient être utiles pour les responsables de la réglementation des aliments santé au Canada en les aidant à mieux comprendre les réactions des consommateurs face à des indices d'information qu'on pourrait retrouver sur les étiquettes des produits santé tels que la traçabilité, les allégations santé et la vérification des allégations santé et à entreprendre des changements adéquats dans le système de réglementation des aliments santé au Canada.

CHAPITRE I

CONTEXTE DE LA RECHERCHE:

LE SECTEUR DES ALIMENTS SANTÉ

1.1 Introduction

Le but de ce chapitre est de présenter un survol du secteur des aliments santé au Canada. Tout d'abord, la réglementation du secteur des aliments santé au Canada est présentée à la section 1.2. Ensuite, la section 1.3 présente les définitions des termes aliments santé, aliment fonctionnels et produits de santé naturels (PSN). Puis, la section 1.4 dresse un portrait de l'industrie des aliments santé au Canada. La section 1.5, quant à elle, décrit les caractéristiques de la demande pour ces produits. Finalement, ce chapitre conclut avec les principaux enjeux dans l'industrie des aliments santé au Canada.

1.2 La réglementation des aliments santé au Canada

Au Canada, les aliments fonctionnels et les produits de santé naturels sont rigoureusement réglementés par Santé Canada et l'Agence Canadienne d'Inspection des Aliments (ACIA) (Khamphoune, 2013). Les aliments fonctionnels, définis comme des aliments ressemblant aux aliments conventionnels et procurant des bienfaits physiologiques démontrés et (ou) réduisant le risque de maladie chronique (AAC, 2014), sont régis par le Règlement sur les Aliments et Drogues (RAD). Les produits de santé naturels (PSN), étant des produits de source naturelle, vendus sous forme posologique et conçus pour préserver ou promouvoir la santé, restaurer ou corriger la fonction de santé humaine; ou diagnostiquer, traiter et prévenir la maladie

(AAC, 2014), sont assujettis au Règlement sur les Produits de Santé Naturels (RPSN). Par conséquent, les PSN sont plus strictement réglementés que les aliments fonctionnels (Malla, Hobbs et Sogah, 2013).

Le rôle de Santé Canada consiste à élaborer des politiques, des règlements et des normes liés aux aspects de la santé, de la salubrité et de la nutrition des aliments régis par la loi et ses règlements. De plus, Santé Canada élabore également des documents de référence pour aider l'industrie à se conformer aux exigences réglementaires en matière d'allégation santé sur les étiquettes des produits alimentaires (AAC[6], 2012). Quant à l'ACIA, son rôle est de veiller à l'application de la loi et des exigences connexes établies par Santé Canada en ce qui concerne la salubrité et la qualité nutritionnelle des aliments. L'ACIA tient à jour le *Guide d'étiquetage et de publicité sur les aliments*, un outil destiné à aider l'industrie, les consommateurs et les inspecteurs de l'ACIA à interpréter les politiques et les règlements sur les aliments (AAC, 2012).

En matière d'étiquetage des aliments fonctionnels et des PSN, Santé Canada et l'ACIA répertorient les allégations santé[7] en quatre grandes catégories: (a) les allégations santé générales, (b) les allégations fonctionnelles, (c) les allégations de réduction du risque de maladies, et finalement (d) les allégations de prévention de maladie ou thérapeutiques (ACIA, 2014)[8].

---

[6] Agriculture et agroalimentaire Canada.

[7] Une allégation santé *« est un énoncé ou toute autre représentation figurant sur l'étiquette ou dans la publicité d'un produit, qui indique de façon explicite ou implicite le lien qui existe entre la consommation d'un aliment ou d'un ingrédient dans un aliment et la santé d'une personne »* Disponible à: http://www.inspection.gc.ca/francais/fssa/labeti/guide/ch8f.shtml#a8_4

[8] Les définitions de ces quatre types d'allégation santé sont disponibles en ligne à : http://www.inspection.gc.ca/aliments/etiquetage/l-etiquetage-des-aliments-pour-l-industrie/allegations-sante/fra/1392834838383/1392834887794?chap=14

Les allégations santé générales « *sont des énoncés généraux qui font la promotion de la santé par une saine alimentation ou qui présentent des lignes directrices alimentaires* » (ACIA, 2014). Ces allégations ne doivent pas faire référence à un effet sur la santé, à une maladie ou à un problème de santé particulier. À titre d'exemple d'allégation santé générales acceptables au Canada, on peut citer : « *Dans le cadre d'un régime alimentaire sain, cet aliment peut aider à atteindre et à maintenir un poids santé parce qu'il fournit des portions contrôlées.* » ou bien « *Le guide alimentaire canadien recommande de consommer au moins un légume vert foncé et un légume orangé chaque jour*».

Les allégations fonctionnelles sont généralement « *des énoncés portant sur certains effets bénéfiques de la consommation d'un aliment ou d'un constituant alimentaire (c.-à-d., un nutriment ou une composante nutritionnelle) sur les fonctions normales ou les activités biologiques de l'organisme* » (ACIA, 2014). Ainsi, les allégations fonctionnelles sont relatives au rôle que joue l'aliment ou le constituant alimentaire lorsqu'il est consommé en quantités correspondant à des habitudes alimentaires normales. Comme exemple d'une allégation fonctionnelle relative à un aliment, on peut citer « *La consommation de thé vert aide à prévenir l'oxydation des lipides sanguins* ». Pour l'allégation fonctionnelle relative à un nutriment ou une composante nutritionnelle, on cite par exemple : « *La Vitamine D joue un rôle dans la formation et le maintien de bons os et de saines dents*» (ACIA, 2014).

Les allégations fonctionnelles relatives à la consommation d'un aliment qui sont permises au Canada sont les suivantes (ACIA, 2014) :

- Son de blé grossier et la régularité/les fonctions intestinales
- Thé vert et la capacité antioxydante dans le sang
- Psyllium et la régularité/les fonctions intestinales:

Quant aux allégations fonctionnelles, relatives à un nutriment, acceptables légalement au Canada, elles sont au nombre de vingt-trois (23)[9](ACIA, 2014). À titre d'exemple, citons, la protéine et la formation de muscles forts, l'acide gras oméga-3 et le développement normal du cerveau, des nerfs et des yeux chez les enfants, la vitamine D et le maintien de bons os et de dents saines, etc. (ACIA, 2014).

Par ailleurs, il est important de mentionner que les allégations fonctionnelles (quelles soient relatives à un aliment ou à un nutriment) ne doivent pas faire référence directement ou indirectement au traitement, l'atténuation ou à la prévention d'une maladie ou de ses symptômes, ni à la restauration des fonctions anormales de l'organisme (ACIA, 2014).

Les allégations de réduction de risque de maladie, quant à elles, « *sont généralement des énoncés qui établissent un lien entre un aliment ou un constituant d'un aliment et la réduction du risque d'être atteint d'une maladie (comme l'ostéoporose, le cancer, l'hypertension) liée au régime alimentaire, dans le contexte d'un régime alimentaire global* » (ACIA, 2014). Neuf allégations de réduction du risque de maladies à l'égard des aliments sont autorisées au Canada pour les aliments fonctionnels et les PSN (Malla, Hobbs and Sogah, 2013). Ces allégations de réduction du risque de maladies sont les suivantes:

1. Sodium, potassium et l'hypertension;
2. Vitamine D, calcium et ostéoporose;
3. Gras saturés, gras trans et les maladies du cœur;
4. Fruits, légumes et cancer;
5. Glucides fermentables et les caries dentaires;

[9] Ces allégations sont disponibles en ligne à : http://www.inspection.gc.ca/aliments/etiquetage/l-etiquetage-des-aliments-pour-l-industrie/allegations-sante/fra/1392834838383/1392834887794?chap=8#s16c8

6. Stérols végétaux et diminution du taux de cholestérol sanguin;
7. Produits d'avoine et diminution du taux de cholestérol sanguin;
8. Orge et diminution du taux de cholestérol sanguin;
9. Gras non saturés et diminution du taux de cholestérol sanguin.

Les allégations de prévention de maladie, quant à elles, « *sont des énoncées relatifs au traitement, à l'atténuation d'une maladie ou d'une condition liée à la santé, ou ayant trait au rétablissement, à la correction ou à la modification de fonctions corporelles chez l'humain* ». Présentement, aucune allégation thérapeutique n'a été autorisée sur les aliments au Canada (ACIA, 2014).

Il est à noter que les exigences réglementaires varient entre ces différents types d'allégation santé (Malla, Hobbs et Sogah, 2013). Ainsi les allégations santé générales et les allégations fonctionnelles sont moins exigeantes en matière de réglementation et d'évidence scientifiques que les allégations de réduction de risque de maladie et les allégations de prévention de maladie. En effet, pour les fabricants d'aliments fonctionnels et de PSN, étant donné que les deux derniers types d'allégations santé établissent des liens entre un aliment ou un constituant alimentaire (allégation de réduction de maladie) et un aliment ou un constituant alimentaire et le traitement ou l'atténuation d'une maladie (allégation de prévention de maladie), elles requièrent une forte évidence scientifique incluant des essais cliniques et donc exigent un processus d'approbation réglementaire plus long (Malla, Hobbs et Sogah, 2013).

L'environnement réglementaire des aliments santé au Canada a connu plusieurs changements au cours des dernières années (Blandon, Cranfield et Henson, 2007; Malla, Hobbs and Sogah, 2013). Le plus récent régime réglementaire a été mis en place en janvier 2004 pour les PSN portant le nom du RSPN (Santé Canada, 2012).

De plus, de nouvelles allégations fonctionnelles et de réduction de risque des maladies ont été permises par Santé Canada en 2010 relativement aux produits d'avoine et aux stérols végétaux et la diminution du cholestérol sanguin (Malla, Hobbs and Sogah, 2013).

Par ailleurs, en comparaison à d'autres pays comme le Japon, les États-Unis et l'Union Européenne, le système de réglementation canadien pour les aliments santé est considéré restrictif (Malla, Hobbs and Sogah, 2013). À titre d'exemple, seulement neuf (9) allégations santé de type réduction du risque de maladie sont permises au Canada alors qu'aux États-Unis on en compte dix-sept (17). De plus, la majorité des allégations fonctionnelles au Canada sont permises aux États-Unis comme des allégations de réduction de risque de maladie. Ces dernières requièrent un processus d'approbation plus long et une évidence scientifique plus forte basée sur des essais cliniques (Malla, Hobbs et Sogah, 2013). De surcroît, alors que les États-Unis permettent les allégations qui se basent sur des évidences crédibles mais non conclusives, comme par exemple les acides gras oméga-3 (*les acides oméga-3 pourraient réduire le risque des maladies du cœur. L'évidence scientifique est prometteuse mais non concluante*) (FDA[10], 2009), au Canada, ces allégations ne sont pas encore permises légalement.

1.3 Définitions

1.3.1 Définition d'un aliment santé

Un aliment santé est un «*Produit alimentaire possédant une composition particulière (native ou induite) ou élaboré à partir d'une technologie particulière ayant pour but*

[10] Federal Drug Administration.

d'améliorer la teneur en nutriments et/ou composés bioactifs de cet aliment comparativement à un produit conventionnel et procurant ainsi des bénéfices pour la santé démontrés scientifiquement.» (Cortuff et al., 2011, p.1). De plus, au delà de sa valeur nutritive de base, un aliment santé apporte des bienfaits sur la santé pouvant ainsi justifier l'utilisation d'une allégation nutritionnelle, fonctionnelle ou de réduction de risque (Cortuff et al., 2011). Dans la catégorie des aliments santé on retrouve les aliments fonctionnels (AF), les nutraceutiques[11] et les produits de santé naturels (PSN) (Cortuff et al., 2011; Malla et al., 2013).

1.3.2 Définition d'un aliment fonctionnel

Un aliment fonctionnel (AF) est un aliment qui ressemble en apparence aux aliments conventionnels et il fait partie d'une alimentation dite « normale ». Toutefois, en plus des fonctions nutritionnelles de base, un aliment fonctionnel, procure des bienfaits physiologiques démontrés et(ou) réduit le risque de maladie chronique (AAC, 2014).

L'étendue de la catégorie des aliments fonctionnels est vaste. Comme le montre le tableau 1.1, les aliments fonctionnels incluent : (1) les aliments de base qui contiennent un niveau naturellement élevé d'un composant bioactif[12], (2) les aliments transformés avec un composant ajouté, (3) les aliments transformés avec un composant éliminé et (4) les aliments améliorés par augmentation de la concentration d'un composant naturellement présent. Ceci se fait par une sélection traditionnelle,

[11] Il est à noter que depuis l'entrée en vigueur de la réglementation sur les produits de santé naturels en 2004, le terme nutraceutique a été remplacé par PSN (Cinnamon, 2007).

[12] Un composant bioactif, est un composé chimique naturel contenu dans un végétal, un animal ou une source marine ou qui est dérivé de ceux-ci et qui produit des avantages en matière de santé/bien-être (ex., acides gras oméga-3 dans le lin ou des huiles de poisson et bêta-glucanes dérivés de l'avoine et de l'orge).

une alimentation spéciale des animaux ou par le biais du génie génétique (AAC, 2012) (Tableau 1.1).

Tableau 1.1 Les catégories d'aliments fonctionnels

Catégories	**Exemples**
Aliments de base	- Carottes (contient un niveau naturellement élevé de bêta-carotène, un antioxydant) - Aliments transformés : céréales de son d'avoine (contient un niveau naturellement élevé de bêta-glucane, une fibre soluble)
Aliments transformés avec un composant ajouté	- Jus de fruits enrichi de calcium - Lait enrichi en oméga-3 - Yaourt contenant des probiotiques
Aliments transformés avec un composant éliminé (aliments allégés)	- Les craquelins et biscuits sans gras trans
Aliments améliorés	- Œufs contenant des acides gras oméga-3 du lin - Fraises plus riches en antioxydants - Tomates à teneur élevée en lycopène (un caroténoïde antioxydant) - Son d'avoine à teneur élevée en bêta-glucane

Source : Adapté de AAC (2012) et Cortuff et al. (2011)

1.3.3 Définition d'un produit de santé naturel (PSN)

Un produit de santé naturel (PSN) est un produit de source naturelle, vendu sous forme posologique, et conçu pour préserver ou promouvoir la santé, restaurer ou corriger la fonction de santé humaine; ou diagnostiquer, traiter et prévenir la maladie (AAC, 2014). En vertu du règlement sur les produits de santé naturels, qui est entré en vigueur le 1er janvier 2004, Santé Canada classe dans les produits de santé naturels

(PSN)[13] : les vitamines et minéraux, les plantes médicinales, les remèdes homéopathiques, les remèdes traditionnels (ex.: médecine traditionnelle chinoise), les probiotiques et d'autres produits tels que les acides aminés et les acides gras essentiels.

1.4 Industrie des aliments santé au Canada

Le but de cette sous-section est de dresser un portrait de l'industrie des aliments santé au Canada. Premièrement, la structure de l'industrie des aliments santé au Canada est décrite. Ensuite, une vue d'ensemble des entreprises appartenant à cette industrie est présentée en y analysant les revenus, les exportations, l'effectif des employés, les dépenses consenties en R-D, les gammes des produits offerts ainsi que les canaux de distribution utilisés. Pour ce faire, les enquêtes sur les aliments santé menées par Statistique Canada en 2002, 2005, 2007 et 2011 ont été consultées. L'enquête de 2011, étant la plus récente étude réalisée par Statistique Canada. Elle a été publiée en septembre 2013 (Kamphoune, 2013).

En 2011, 750 entreprises se livraient à des activités liées aux aliments santé (Kkamphoune, 2013). Ce nombre a grandement évolué durant la dernière décennie. Selon Statistique Canada, il y avait 294 entreprises d'aliments santé en 2002 (Tebbbens, 2002). En 2005, il y avait 389 entreprises (Palinic, 2005). Pour ce qui est de 2007, le nombre d'entreprise d'aliments santé est passé à 689 entreprises (Cinnamon, 2007) (Tableau 1.2).

[13] Voir le site Internet de Santé Canada (2013): http://hc-sc.gc.ca/dhp-mps/prodnatur/index-fra.php

Tableau 1.2 Évolution du secteur des aliments santé au Canada entre 2002 et 2011

	2002	2005	2007	2011
Nombre d'entreprises	294	394	689	750
Revenus (en milliers de $)	-	2 886 538	3 691 831	11 264 670
Revenus à l'exportation en milliers de $)	-	545 013	731 631	1 690 206
Employés	-	12 872	13 975	16 259
Dépenses en R-D (en milliers de $)	-	74 554	147 955	238 094
Gammes de produits	-	9715	22 062	32 266

Source: Adapté de Statistique Canada (Khamphoune, 2013)

Selon l'enquête de 2011, les 750 entreprises d'aliments santé appartenaient à quatre sous-secteurs à savoir:(1) les aliments fonctionnels[14] (AF);(2) les produits de santé naturels[15] (PSN); (3) les aliments fonctionnels et les produits de santé naturels (AF et les PSN) et (4) les services seulement (Figure 1.1). Ainsi, parmi les 750 entreprises, plus de la moitié (n = 422, 56%) produisait ou développait des PSN. Près de 16% (n=117) exerçaient ces mêmes activités dans le domaine des aliments fonctionnels alors que 19% (n=144) étaient actives dans les deux sous-secteurs (AF et PSN à la fois). Par ailleurs, 66 entreprises (9%) offraient exclusivement des services dans l'un ou l'autre sous-secteur, comme le contrôle de la qualité, la recherche et le développement (R-D) ou la réglementation (Khamphoune, 2013).

[14]Un aliment fonctionnel est un aliment qui ressemble en apparence aux aliments conventionnels et il fait partie d'une alimentation dite « normale ». En plus des fonctions nutritionnelles de base, un aliment fonctionnel, procure des bienfaits physiologiques démontrés et (ou) réduit le risque de maladie chronique (AAC, 2014).

[15]Un produit de santé naturel (PSN) est un produit de source naturelle, vendu sous forme posologique, et conçu pour préserver ou promouvoir la santé, restaurer ou corriger la fonction de santé humaine; ou diagnostiquer, traiter et prévenir la maladie (AAC, 2014).

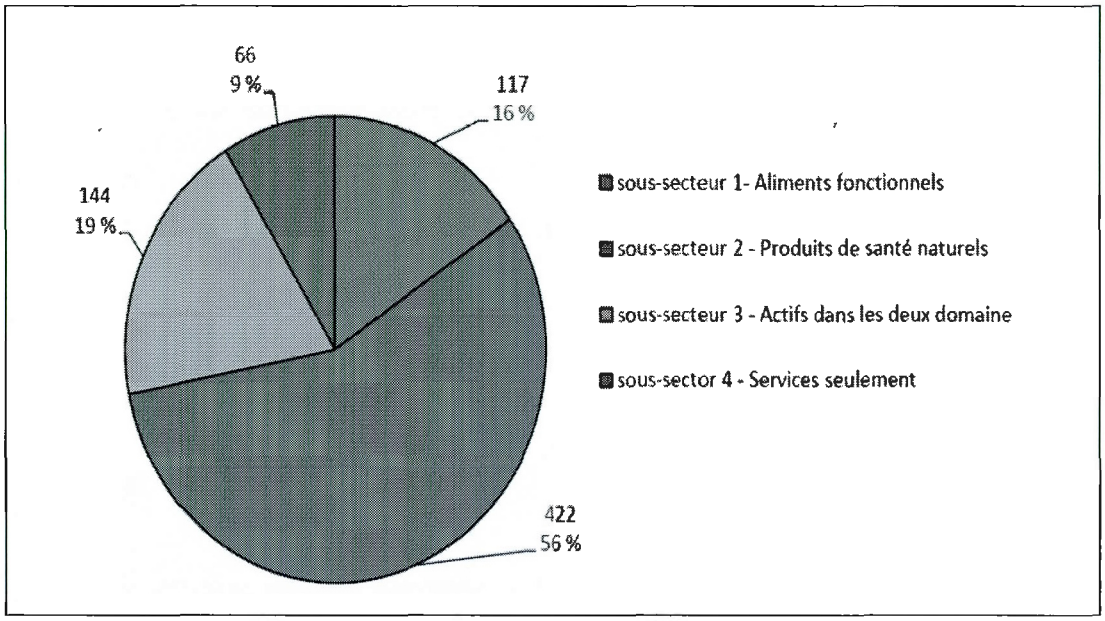


Figure 1.1 Nombre des entreprises par sous-secteurs. Source: Statistique Canada, Khamphoune (2013)

Cette répartition des entreprises d'aliments santé a changé comparativement aux années 2002, 2005 et 2007 (Tableau 1.3). Tandis que la répartition des entreprises entre les sous secteurs des aliments fonctionnels, des PSN, des aliments fonctionnels et des PSN et des services est demeurée presque la même[16] entre 2002, 2005 et 2007, en 2011 elle a significativement changé. En effet, en 2011, il y a moins d'entreprises actives dans les sous-secteurs aliments fonctionnels et aliments fonctionnels et PSN mais plus d'entreprises actives dans le sous secteur des PSN et celui des services (Tableau 1.3).

[16] Excepté qu'en 2011 il y a près de 7% de firmes actives dans le sous secteur des services (Cinnamon, 2007).

Tableau 1.3 Répartition des firmes d'aliments santé au Canada entre 2002 et 2011

	Firmes AF	Firmes PSN	Firmes actives dans les deux sous secteurs AF et PSN	Firmes de service
2002	28%	46%	26%	N.A
2005	30.3%	44.7%	25%	N.A
2007	25.3%	42.1%	25.7%	6.9%
2011	16%	56%	19%	9%

Source : Tebbens (2002), Palinic (2005); Cinnamon (2007) et Khamphoune (2013).

Les revenus des entreprises d'aliments santé au Canada totalisaient en 2011 près de 11,3 milliards de dollars (Tableau 1.2). Ces revenus ont connu un taux de croissance près de 75% depuis 2005 (Malla et al., 2013). En effet, en 2005 les revenus totalisaient seulement 2,9 milliards de dollars (Tableau 1.2) (Palinic, 2005). En 2011, les entreprises actives dans le sous-secteur des aliments fonctionnels ont généré le plus de revenus (40%) soit près de 4,4 milliards de dollars. Celles œuvrant à la fois dans le domaine des aliments fonctionnels et des PSN ont généré près et de 3,3 milliards de dollars (29% des revenus totaux). Les entreprises spécialisées dans les PSN, ont également réalisé les mêmes revenus la même année. Les entreprises de services, quant à elles, ont réalisé près de 216 millions de dollars (2% des revenus totaux) (Tableau 1.4).

Les revenus provenant des exportations des aliments santé ont plus que triplé entre 2005 et 2011. Ils sont passés de 545 millions de dollars en 2005 à près de 732 millions en 2007 et près de 1,7 milliards de dollars en 2011(Cinnamon, 2007; Khamphoune, 2013; Palinic, 2005) (Tableau 1.2). En 2011, ce sont les entreprises de PSN qui ont exporté le plus de produits (735 421 millions de dollars), soit près du

double des exportations des entreprises d'aliments fonctionnels (Khamphoune, 2013) (Tableau 1.4). Les destinations d'exportation varient selon les sous-secteurs. Pour les entreprises d'aliments fonctionnels, les États-Unis constituaient le principal marché, alors que pour les entreprises de PSN les exportations sont plus diversifiées (l'Europe, la Chine, le Japon et autres pays) (Khamphoune, 2013).

Tableau 1.4 Aperçu du secteur des aliments santé au Canada en 2011

	Firmes AF	**Firmes PSN**	**Firmes actives dans les deux sous secteurs**	**Firmes de services seulement**	**Total**
Nombre d'employés[17]	4713	6185	4718	643	16 259
milliers de $					
Revenus[18]	4 453 928	3 281 776	3 313 073	215 893	11 264 670
Exportations[19]	269 062	735 421	685 723	-	1 690 206
Dépenses en R-D[20]	18 345	98 130	107 563	14 056	238 094
Gammes de produits vendus	3444	19 818	9004	-	32 266

Source : Adapté de Statistique Canada (Kamphoune, 2013)

Concernant le nombre d'employés, les entreprises du secteur des aliments santé au Canada avaient en 2011 un effectif de 16 259 personnes ayant des fonctions liées aux aliments santé. Ce nombre représente 44% du nombre total des employés de ces

[17] Ayant des fonctions liées aux AF et aux PSN.

[18] Tirés d'activités liées aux aliments santé.

[19] Provenant d'aliments santé seulement.

[20] Consacrées à des activités liées aux aliments santé.

entreprises (37 253 employés) (Kamphoune, 2013). Par ailleurs, comme l'illustrait le Tableau 1.2, l'effectif des employés a nettement augmenté entre 2005, 2007 et 2011. En 2011, les entreprises de PSN ont le plus d'employés (6185). Les entreprises actives dans les deux domaines aliments fonctionnels seulement et aliments fonctionnels et PSN viennent en deuxième rang avec 4718 employés suivies des entreprises spécialisées en aliments fonctionnels (4713 employés) et des entreprises de services seulement (643 employés) (Tableau 1.4).

Les dépenses en R-D sont importantes et servent à assurer le succès des entreprises du secteur des aliments santé (Malla et al., 2013). Au Canada, ces dépenses ont plus que triplé entre 2005 et 2011. Alors qu'elles totalisaient 74 millions en 2005, elles se chiffraient à près de 148 millions et à près de 238 millions respectivement en 2007 et 2011(Tableau 1.2). En 2011, les entreprises actives dans les deux domaines ont dépensé le plus en R-D (environ 108millions de dollars) suivies des entreprises spécialisées en PSN (98 millions de dollars). Les entreprises d'aliments fonctionnels et celles de services ont dépensé en R-D près de 18 et 14 millions de dollars, respectivement (Khamphoune, 2013) (Tableau 1.4).

Par ailleurs, les entreprises des aliments santé forment des alliances avec d'autres firmes principalement pour mener des fonctions liées à la R-D, la production, le marketing et l'accès aux canaux de distribution (Malla et al., 2013). En effet étant donné la complexité et le caractère évolutif des chaînes de valeur des entreprises canadiennes de ce secteur (Hobbs, 2002), ces dernières se voient dans l'obligation de se former en réseau complexe avec divers acteurs de l'industrie alimentaire et pharmaceutique, les centres et laboratoires de recherche, les universités (aussi bien au Canada qu'à l'extérieur), les détaillants, les professionnels de la santé, les compagnies d'assurances, etc. (Basu, Thomas et Acharya, 2007; Khamphoune, 2013).

Pour ce qui est des gammes de produits, les résultats des enquêtes de Statistique Canada menées en 2005, 2007 et 2011 ont révélé que les gammes de produits offertes sur le marché par les entreprises du secteur des aliments santé a connu une croissance importante (Cinnamon, 2007; Khamphoune, 2013; Palinic, 2005) (Tableau 1.2). En 2005, les entreprises d'aliments santé offraient 9715 gammes de produits. En 2007, ce nombre a continué d'augmenter en passant à 22 062 gammes de produits. En 2011, le total des gammes de produits offertes s'élevait à 32 266. Dans cette même année, les entreprises de PSN ont offert le plus de produits avec 19 818 gammes, ce qui représente 61% du nombre de gammes de toutes les entreprises du secteur. Les entreprises actives dans les deux domaines (aliments fonctionnels et PSN) ont offert 9004 gammes de produits (soit 28% du total des gammes de produits de toutes les entreprises) alors que les entreprises d'aliments fonctionnels seulement ont offerts 3444 gammes de produits sur le marché, soit 11% du total de gammes de produits offertes par l'ensemble des entreprises dans le secteur (Khamphoune, 2013) (Tableau 1.4). Ces gammes de produits touchent principalement la santé et le bien être en général et la réduction du risque de maladies cardiovasculaires, de cancer, de diabète et d'arthrite (Khamphoune 2013).

Finalement, les canaux de distribution utilisés par les entreprises du secteur des aliments santé ont changé entre 2002 et 2011. En 2002 et 2005, les grossistes constituaient le canal de distribution le plus souvent utilisé par les entreprises du secteur (Tebbens, 2002; Palinic, 2005). En 2007 et 2011, la vente directe aux détaillants (magasin d'aliments naturels, épicerie, pharmacie) constitue le canal de distribution le plus utilisé par les entreprises des aliments santé (Cinnamon, 2007; Khamphoune 2013). Pour l'enquête de 2011, les résultats montraient que 46,8% des ventes des entreprises du secteur des aliments santé provenaient des détaillants, suivies de la marque maison (24,5%) et des autres fabricants (10,5%) (Tableau 1.5). Ainsi, pour les entreprises d'aliments fonctionnels (AF) et celles fabriquant à la fois

des aliments fonctionnels et des PSN, les ventes ont été le plus réalisées par l'intermédiaire des grandes chaînes. Ceux-ci représentaient respectivement 55,3% et 34% de leurs ventes (Tableau 1.5). Pour les entreprises de PSN, les ventes ont été réalisées en ayant recours à divers détaillants comme les magasins d'aliments naturels, les épiceries et les pharmacies avec une proportion des ventes plus élevée pour les magasins d'aliments naturels (14,6%) (Tableau 1.5). Étant donné qu'au Canada le marché d'épicerie de détail est concentré et verticalement intégré en amont (fonction de gros) (Malla et al., 2013; OSEC[21], 2011), il est peu surprenant que les détaillants constituent pour les aliments santé le canal de distribution le plus important (Malla et al., 2013).

[21]OSEC (2011). The Canadian Food Retail Sector. Opportunities for Swiss companies. Available online at: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272

Tableau 1.5 Proportion des ventes d'aliments santé selon les modes de distribution et le sous-secteur

	Entreprises AF	**Entreprises PSN**	**Entreprises actives dans les deux sous secteurs**	**Entreprises de services seulement**	**Total**
			en pourcentage %		
Tous revenus	100	100	100	100	100
Vente directe	0,1	13	1,1	0	3,3
Détaillants	55,8	31,3	46,7	0	46,8
- Magasin d'aliments naturels	0,4	14,6	6,1	0	5,5
-Autre magasin au détail[22]	55,3	6,7	34	0	36,8
-Pharmacie	0,1	10	6,6	0	4,5
Grossiste	2,6	11	15,1	34,2[E]	9
Marque maison	-	18	6,5	29,1	24,5
Autres fabricants	28,9	7,6	29,5	36,7[E]	10,5
Autre	12,6	19	1,1	0	10

Source : Adapté de Statistique Canada, Khamphoune (2013)

1.5 La demande pour les aliments santé au Canada

Plusieurs études canadiennes ont conclu que les consommateurs ont une attitude positive à l'égard des aliments santé et qu'ils sont prêts à payer une prime sur le prix de base pour se procurer ces produits (Ipsos Reid, 2012; Peng, West et Wang, 2006; West et al., 2002; West et Larue, 2004). Cette attitude est déterminée, par exemple, par les croyances des consommateurs du lien qui existe entre la diète et la santé, les bénéfices santé liés à la consommation de ces produits (Ipsos Reid, 2005; Henson, Cranfield et Herath, 2010; Labrecque et al, 2006; West et Larue, 2004; West et al.,

[22] Exemple: épiceries, gros détaillants, etc. (Khamphoune, 2013).

[E] À utiliser avec prudence (Khamphoune, 2013).

2002), les propriétés fonctionnelles de ces produits (Henson, Cranfield et Herath, 2010) et les allégations santé inscrites sur les aliments santé et leur crédibilité (Hailu et al, 2009; Henson, Cranfield et Herath, 2010; Labrecque et al, 2006; West et Larue, 2004).

Pour ce qui est des croyances des consommateurs de la corrélation entre leurs régimes alimentaires et la maladie, une étude pan canadienne réalisée par Ipsos Reid, en 2012, montre que les Canadiens ont un niveau élevé de conscience et de connaissance des aliments fonctionnels et des maladies (CQVB, 2013)[23]. En effet, 68% des Canadiens sont en mesure de faire le lien entre un aliment et la prévention de risque de maladie qui lui est associée. Ceci a entraîné une grande consommation d'aliments fonctionnels et de PSN. Ainsi, une très large proportion des Canadiens (96%) achètent des aliments fonctionnels et 81% ont déclaré avoir consommé un PSN. Pour les aliments fonctionnels, les céréales à haute teneur en fibres ou à base de grains entiers, les collations santé et les yaourts avec probiotiques sont les aliments les plus consommés. Pour les PSN, les vitamines et les minéraux, les acides gras oméga-3 et les probiotiques représentent les PSN les plus recherchés. De plus, selon la même enquête, 94 % des Canadiens qui ont acheté des aliments fonctionnels l'ont fait dans une épicerie et 61% l'ont fait chez les détaillants de masse comme Walmart et Costco. Les pharmacies (35%), les magasins d'aliments naturels (33%) et les épiceries biologiques (23%) sont aussi pour les consommateurs d'autres lieux d'achats d'aliments fonctionnels. Pour ce qui est des PSN, 60% des répondants les achètent en pharmacie et 50% en épicerie.

Concernant les allégations santé et leur crédibilité, les consommateurs sont septiques et manquent de confiance (Hobbs, 2002; Zou and Hobbs, 2006). Selon l'étude d'Ipsos Reid (2012), les consommateurs sollicitent le plus souvent des sources

[23] Centre Québécois de Valorisation des Biotechnologies.

d'information comme les professionnels de la santé, les sites Internet, les magazines et les journaux, les amis et membres de la famille et les émissions télévisées (CQVB, 2013).

Par ailleurs, plusieurs études considèrent que les allégations santé et leur crédibilité constituent un déterminant très important dans l'acceptation des aliments santé par les consommateurs canadiens (Hailu et al, 2009; Henson, Cranfield et Herath, 2010; Ipsos Reid, 2012; Labrecque et al., 2006; West et Larue, 2004) et donc au succès de l'industrie (Malla et al, 2013). Ainsi, en plus d'un processus d'approbation réglementaire stricte, une communication basée sur des sources d'information fiables et crédibles comme le gouvernement et les experts en soin de la santé s'avère également primordiale (Hailu et al, 2009; Malla et al., 2013).

En guise de conclusion, il ressort suite à la description de la réglementation des aliments santé au Canada, des caractéristiques de la demande et de l'offre au Canada, que les entreprises d'aliments santé opèrent dans une industrie en pleine évolution, dynamique et complexe. Elles opèrent également dans un marché incertain et un environnement (réglementaire, technologique et scientifique) très changeant. Ceci pose pour les entreprises des défis au niveau de l'élaboration d'une stratégie marketing efficace permettant la mise en œuvre d'actions visant un meilleur accès au marché des consommateurs (Cloutier et El Ourabi, 2014). Ainsi, cette thèse s'intéresse à la problématique de la distribution des aliments santé et aux intentions de comportement des consommateurs à leur égard.

CHAPITRE II

ARTICLE 1

DEVELOPMENT OF A CONCEPTUAL FRAMEWORK FOR IMPROVING HEALTH ENHANCING FOOD DISTRIBUTION

FOREWORD

The purpose of the first article of this thesis is to develop a shared conceptual framework that identifies and prioritizes initiatives aimed at improving the distribution of health enhancing foods by involving various industry stakeholders such as ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives. To do so, this study uses an innovative structured conceptualization technique named Concept mapping (Kane and Trochim, 2007), developed by Trochim (1987). This approach is very useful in exploratory studies, because it can bring rigor to exploratory research's process.

Concept mapping is a generic term that describes any process for structuring and illustrating ideas into graphical representations (Kane and Trochim, 2007). Actually, other forms of concept mapping exist such as *cognitive mapping* or *mind mapping* (Kolb and Shephred, 1997). In order to avoid confusion, it is important to highlight the difference between concept mapping developed by Trochim (1987), that this study applies, and cognitive mapping or mind mapping. According to Kolb and Shephred (1997), the main difference lies on how the maps are constructed and interpreted. While, cognitive mapping or mind mapping is a technique where data is structured and analyzed without using statistical methods to construct maps, Trochim's concept mapping is an integrated method where the data are structured, analyzed and quantified using both qualitative and quantitative techniques (Kolb and Shephred, 1997). Concept mapping combines group discussion technique and multivariate statistical techniques, namely multidimensional scaling (MDS) and agglomerative Hierarchical Cluster Analysis (HCA). According to Jackson and Trochim (2002), the combination of these multivariate statistical techniques is the main strength that concept mapping offers to validity. In fact, instead of forcing respondents with prior categories or semantic scales, sorting concepts allows generating a web of concept interrelationships about a particular issue that represents sorters' social reality (Trochim, 1989; Jackson and Trochim, 2002; Kane and Trochim, 2007; Miller, Rosas and Hall, 2011). Moreover, by using diverse sorters to create their own categories, this helps to ensure that the categories are exhaustive (Jackson and Trochim, 2002).

Concept mapping has been applied to address substantive issues in the social services, mental health, health care, educational administration, and theory development (Trochim, 1993). However, it was little used in marketing (Bigné et al., 2002). In marketing, concept mapping was applied to study some issues in few areas

such as travel (Bigné et al., 2002); e-commerce (Su et al., 2008) and health care marketing (Hall, 2008; Shewchuk and O'Connor, 2002). In Bigné et al., (2002), concept mapping was used to identify the determinants of consumer loyalty in the travel agencies sector. According to these authors, concept mapping has benefits in marketing because it uses group discussion, structures results in an objective form and represents ideas in a perceptual map. For Su et al. (2008), concept mapping was applied to conceptualize consumers' perceptions of e-commerce quality. Regarding Shewchuk and O'Connor (2002), concept mapping was employed as a framework to provide suggestions for elderly health care marketing and planning (Shewchuk and O'Connor, 2002). Finally, Hall (2008)[24] used concept mapping for planning persuasive messages in non-profit health care services.

[24] In Hall's study concept mapping was used in conjunction with Direct Magnitude Estimation.

ABSTRACT

Major societal, economic and technological changes have occurred in recent years in the global food industry (Bigliardi and Galati, 2013; Boehlje, Roucan-Kane and Bröring, 2011) and have caused critical challenges for firms related to innovation, structural change and uncertainty (Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002). These challenges limit managers to establish managerial initiatives to best reach consumers' markets (Cloutier and El Ourabi, 2014).

Furthermore, some authors such as Ardley (2011) and McCole (2004) have argued that there is a gap between the marketing management literature and the practitioner community because theory fails to provide adequate insights for managers in their decision making process. In fact, conventional research methods in marketing such as surveys and focus groups are not well suited to address complexity, uncertainty and dynamics of the market (Gummesson, Kuusela and Närvänen, 2014).

This exploratory prospective study contributes to knowledge by developing a conceptual framework that identifies and prioritizes initiatives aimed at improving the distribution of health enhancing foods while involving various industry stakeholders such as ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and in marketing, and government representatives. This article uses an integrated mixed-method, namely concept-mapping (Kane and Trochim, 2007). The results of this study show that the improvement of health enhancing food distribution goes beyond product/market boundaries and include more contextual initiatives. Finally, results of this study can help marketing managers understanding issues related to the distribution of their products and assist them in identifying potential useful actions for strategic planning.

KEY WORDS: Concept mapping, health enhancing foods, distribution, issues, initiatives, strategic planning.

RÉSUMÉ

Des changements sociétaux, économiques et technologiques majeurs ont eu lieu ces dernières années à l'échelle mondiale dans l'industrie alimentaire (Bigliardi et Galati, 2013; Boehlje, Roucan-Kane et Bröring, 2011). Ces changements ont engendré pour les entreprises alimentaires des défis marketing liés à l'innovation, au changement structurel et à l'incertitude (Boehlje, Roucan-Kane and Bröring, 2011). Pour les gestionnaires, ces défis brouillent la mise en place d'initiatives marketing permettant un meilleur accès au marché des consommateurs (Cloutier et El Ourabi, 2014).

Par ailleurs, selon certains auteurs (Ardley, 2011; McCole, 2004) il existe un écart entre la littérature en management du marketing et la communauté des praticiens parce que la théorie a échoué à soutenir les gestionnaires dans leur processus de prise de décision. En effet, les méthodes conventionnelles utilisées en recherche marketing telles que les questionnaires et les groupes de discussion en eux-mêmes ne sont pas appropriés pour aborder la complexité, l'incertitude et la dynamique du marché (Gummesson, Kuusela et Närvänen, 2014).

Cette étude exploratoire prospective contribue à l'avancement des connaissances en développant un cadre conceptuel qui identifie et priorise des interventions spécifiques à entreprendre visant l'amélioration de la distribution des aliments santé tout en impliquant diverses parties prenantes de l'industrie des aliments santé telles que les fabricants d'ingrédients, les fabricants et les transformateurs, les experts et les chercheurs en développement de la technologie, en sciences de la consommation, en distribution et en marketing alimentaire, et les représentants du gouvernement. Cet article utilise une méthode mixte intégrée appelée cartographie des concepts en groupe (Kane et Trochim, 2007). Au plan théorique, les résultats de cette étude montrent que l'amélioration de la distribution des aliments santé dépasse les frontières produit/marché et inclut plus de variables contextuelles. Au plan pratique, les résultats de cette recherche pourraient aider les gestionnaires de marketing à comprendre les défis reliés à la distribution de leurs produits et les soutenir dans l'identification d'actions utiles à la planification stratégique.

MOTS-CLÉS : Cartographie des concepts en groupe, aliments santé, distribution, défis, interventions, planification stratégique

2.1 Introduction

Several factors have fuelled the increasing popularity of health enhancing foods[25] such as the increase in public health consciousness, the aging population, the escalation of health care costs, recent advances in research, technology and science-based evidence, the changes in regulations and the growing interest among consumers for the link between health and wellness (Belem, 1999; Roberfroid, 2000a, 2000b).

Over the past two decades, diverse food, pharmaceutical and retail companies alike have entered this lucrative market with the aim to gain higher returns and generate a competitive advantage (Herath et al., 2008; Kleef et al., 2002; Lagorce, 2009). However, major societal, economic and technological changes have occurred in the global food industry (Bigliardi and Galati, 2013; Boehlje, Roucan-Kane and Bröring, 2011) and have caused critical challenges for firms (Boehlje, Roucan-Kane and Bröring, 2011) throughout the entire value chain (Bigliardi and Galati, 2013). These challenges revolve around uncertainty, innovation and structural change (Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002). First, managers make decisions in an environment with increasing uncertainty. Second, it is crucial to develop and adopt technology and innovation to ensure long-term financial success. Third, it is essential to respond to changes in industry structure, the competition landscape and industry boundaries to maintain a market position (Boehlje, Roucan-Kane and Bröring, 2011). These challenges blur the establishment of managerial initiatives about how to best reach consumers' markets for firms seeking to commercialize health enhancing foods (Cloutier and El Ourabi, 2014).

[25] Health enhancing food is defined as being a food that-beyond its basic nutritional value- provides demonstrated health benefits that can justify the use of nutritional, functional or risk reduction allegation (Corcuff et al., 2011). Comparatively to a conventional food product, health enhancing food has a native or induced composition or is developed from a particular technology aimed at improving its nutrient content and/or bioactive compounds and thus providing scientifically demonstrated health benefits (Cortuff et al., 2011). The health enhancing food category includes functional foods, natural health product (NHP), food supplement, etc.).

Furthermore, the marketing management literature fails to provide adequate insights for managers in their decision making (Ardley, 2011; McCole, 2004). The focus in mainstream marketing is on measuring what has taken place in the past rather than dealing with complexity, uncertainty and dynamics of the present and the future (Gummesson, Kuusela and Närvänen, 2014). In fact, mainstream marketing has put little focus on managing complex networks of interrelationships where many stakeholders interact and create value (Gummesson, Kuusela and Närvänen, 2014). As a consequence, managers are still looking in vain for structured methods that they can use to deal with the complexity of their organizational systems (Trochim and Cabrera, 2005). Given the complexity, the uncertainty and the dynamics of the market, Gummesson, Kuusela and Närvänen (2014) stated that strategic decision making in marketing should focus on all stakeholders and be oriented towards the future and not be based on static, simplistic and disconnected history-oriented metrics. Moreover, Logman (2011) suggested that marketing planning/strategic management should no longer be limited to analysis of data within product/market boundaries but should emphasize more on contextual information that exceeds product/market boundaries. Thereby, a new paradigm in marketing theory has started to form recently (Gummesson, Kuusela and Närvänen, 2014). It emphasizes all stakeholders, complexity and a higher level of theory generation and therefore attempts to provide a systemic, holistic view, without neglecting the detail [26] (Gummesson, Kuusela and Närvänen, 2014).

Within the context of this emerging paradigm, the aim of this exploratory prospective study is to develop a shared conceptual framework to identify and prioritize initiatives aimed at improving the distribution of health enhancing foods while

[26] According to Gummesson, Kuusela and Närvänen (2014), this is already an important tradition within the Nordic School (Grönroos and Ravald, 2011; Gummesson, 2012; Gummesson and Grönroos, 2012).

involving various industry stakeholders. The key research questions examined are the following:

1) What consensuses may, or may not, emerge amongst stakeholders regarding initiatives to be undertaken in establishing an effective consumer-oriented distribution strategy for health enhancing foods?

2) What is the conceptual framework that stakeholders in health enhancing foods industry share on initiatives to be undertaken to improve the distribution of their products?

3) What are key themes and priorities which emerge for these initiatives to be undertaken?

To answer these questions, concept mapping (Kane and Trochim, 2007; Trochim, 1993) is used as a research method in this exploratory prospective study to develop a shared bottom-up conceptual framework of the stakeholders involved that can be translated and interpreted both quantitatively and qualitatively. As a structured mixed research method, concept mapping enables diverse stakeholders or individuals to develop a shared understandable representation that address complexity and therefore enables them to align their actions with broader organizational or systems thinking (Trochim and Cabrera, 2005). In fact, concept mapping as an inductive method « *...is consistent with an evolving paradigm of complex adaptive systems thinking and helps groups address complexity*» (Trochim and Cabrera, 2005, p. 12).

In the following section, a literature review is presented. In section 2.3, the methodological framework is introduced. The data analysis and research results are presented in section 2.4. Findings are discussed in section 2.5. Finally the article concludes, in section 2.6, with managerial implications as well as limitations and opportunities for future research.

2.2 Literature review

There is an increasing recognition in the literature of the importance of distribution in marketing strategies (Rosenbloom, 2012; Rushton, Croucher and Baker, 2014). Several authors have argued that distribution should be considered at the highest management level and included in the strategic planning process (Coughlan et al., 2006; Mentzer and Williams, 2001; Rosenbloom, 2012). To better understand the strategic role of distribution, this section is organized as follows. First, the major challenges in distribution and supply chains are presented in sub-section 2.2.1. Second, the challenges associated with the distribution of health enhancing foods are described in sub-section 2.2.2. Finally, in light of these challenges, the importance of distribution in the firm's overall objectives and strategies is highlighted in sub-section 2.2.3.

2.2.1 Major challenges in distribution and supply chains

Major changes have dramatically transformed the distribution and supply chains over the past decade, and thus, have created a metamorphosis in distribution systems (Rosenbloom, 2012; Rushton, Croucher and Baker, 2014). The most important ones are related to the increasing expectations of consumers, globalization, both in terms of global brands and global markets, and the emergence of new technologies.

Globalization is affecting almost every firm whatever its size (Armstrong and Kotler, 2011). With globalization, a huge flow of products and services is possible across national boundaries (Rosenbloom, 2012). This impacts the distribution strategies of firms and their competitiveness (Rosenbloom, 2012; Rushton, Croucher and Baker, 2014), especially as consumers are increasingly seeking to access worldwide products and services at affordable prices (Rosenbloom, 2012).

Like globalization, new technologies have also transformed distribution as well as consumers' expectations (Deloitte, 2014; Rosenbloom, 2012). In fact, the explosion of information technology, e-commerce and social media offer firms the opportunity to respond more quickly to market demand, interact with their consumers at a lower cost and therefore gain substantial competitive advantage (Rosenbloom, 2012).

Furthermore, e-commerce, mobile commerce and social media have made consumers more powerful (Deloitte, 2014). With these new technologies, consumers play active roles as value co-creators (Vargo and Lush, 2008). They interact with each others as well as with firms (Gummesson, Kuusela and Närvänen, 2014) and therefore expect better channel choices for gaining access to a variety of products and services (Rosenbloom, 2007; Venkatesan, Kumar and Ravishanker, 2007).

2.2.2 Challenges in health enhancing food distribution

During the last decade, the global food and agribusiness industries have experienced several societal, economic and technological changes (Bigliardi and Galati, 2013; Boehlje, Roucan-Kane and Bröring, 2011) which have significantly impact the entire food value chain, starting from agricultural production, through food processing and distribution of food, to end consumers (Bigliardi and Galati, 2013). These changes suggest three fundamental critical future issues for the sector, namely innovation, structural change, and uncertainty (Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002). Each of these challenges is examined hereafter.

a) Challenges in the food industry: Innovation

Several previous studies have stressed the importance of innovation for food firms as well as for the overall profitability of the industry (Costa and Jongen, 2006; Kelly,

2009; Sarkar and Costa, 2008; Traill and Mueulenberg, 2002). However, the innovation in the food industry is mainly incremental (Costa and Jongen, 2006). In fact, the majority of new products are 'me too products' and only 1 to 2% new products are considered truly differentiated products or radical innovation (Costa and Jongen, 2006). According to Khan et al. (2013), the food industry has been characterized as a market searcher rather than a market developer. This is due to several factors such as the consumer's risk aversion, the shortening of the product life-cycle by the introduction of private labels, the lack of an innovation climate and restrictive health and safety regulations (Bröring, 2008; Ronteltalp et al., 2007).

Important changes both in the nature of food demand and food supply chain organization, in conjunction with a more competitive environment, have provided an opportunity for addressing this balance (Costa and Jongen, 2006; Matthyssens, Vandenbempt and Berghman, 2006; Ziggers, 2005). Consumer requirements in food production and processing have changed considerably (Bigliardi and Galati, 2013). Consumers are increasingly seeking products tailored to their needs, aimed at preventing chronic illnesses and optimizing their health potential (Costa et al., 2001, 2007; Menrad, 2003; Roberfroid, 2000b). Moreover, consumers' demand for food is rapidly evolving into a mass customization market (Boland, 2008). Consumers are now telling companies what they want to eat (Aguilera, 2006).

As the tempo of these changes accelerates, food companies are facing additional challenges (Khan et al., 2013). Indeed, food companies are moving from incremental innovations toward radical innovations (Matthyssens, Vandenbempt and Berghman, 2006; Ziggers, 2005). Nevertheless, moving toward radical innovation requires higher technologies, analytical novel knowledge and specialist skills for evidence based claims (Khan et al., 2013). These requirements command the need for a diverse network of collaborations with external partners (Khan et al., 2013) and also a better

institutional coherence within the network (Siedlok, Smart and Gupta, 2010) to enhance the innovation capability of the firm. In short, there is a need for food companies to manage the whole chain in an integrated and interactive manner (Bigliardi, Bottani and Galati, 2010; Khan et al., 2013).

b) Challenges in the food industry: Structural change

The impacts of structural change (consolidation/concentration, vertical and horizontal integration, and changes in the boundaries of the firms) underway now in the food sector are profound and dramatic (Rogers, 2001; Stiegert, Wang and Rogers, 2009). The pervasive structural change affect almost all participants in the food and distribution industries such as food manufacturers, input supply manufacturers, retailers, consumers, public regulators, educators and researchers (Boehlje, Roucan-Kane and Bröring, 2011).

Health enhancing foods are at the food and medicine boundaries (Bröring and Cloutier, 2008; Siedlok, Smart and Gupta, 2010; Vergari, Tibuzzi and Basile, 2010), and therefore companies in this industry compete in vitamin and pharmaceutical markets for natural health products (NHP) and in conventional food market for functional foods. Furthermore, in Canada, the pharmaceutical and food processing industries alike are highly concentrated (Hobbs, 2002). In fact, the health enhancing food industry is dominated by large and established firms (AAFC, 2009). This limits the ability of small companies to gain market share (AAFC, 2009) because in such situations, companies maintain their market power through barriers to entry (economy of scales, multiple brands, etc). Consequently, strategic alliances or partnerships can be formed upstream or downstream the supply chain to access financial and human capital resources (Hobbs, 2002; Malla et al., 2013). To sum up, market concentration intensifies competition (Bigliardi and Galati, 2013). It is a challenging issue for

health enhancing food companies. It affects market access and the formation of new relationships between firms along the supply chain (Hobbs, 2002; Malla et al., 2013).

Besides the intensive upstream competition, health enhancing foods manufacturers are also facing downstream competition from food retailers (Hobbs, 2002), especially, because direct selling to retailers is the main[27] distribution channel for these firms (Kamphoune, 2013). The Canadian grocery retail market is highly concentrated and vertically integrated into food distribution, with the top six[28]retailers accounting for 80% of total food sales (OSEC[29], 2011).

Coupled with retail market concentration, the enlargement of food supermarkets' sizes and the advent of nontraditional actors whose main activity is not food distribution such as Dollarama, drugstores, etc., have generated for food manufacturers an aggressive competition for shelf space (MAPAQ, 2007, 2009). According to Betancourt and Goutschi (1998); Matlack (2009); Messinger and Narasimhan (1995) and Rosenbloom (2012), the increasing size of retailers, their consolidation (through mergers and acquisitions), their use and application of advanced technology and sophisticated marketing strategies, make them more powerful. The power is defined in distribution and marketing channel literature, as the ability to control the decision variables of another member (El-Ansary and Stern, 1972) or the ability to influence decision-making and actions of the other party (Wilkinson, 1973; 1996). As an example of exerting power, food retailers levy their suppliers slotting fees (payments) in order to occupy shelf space or when low demand

[27]Retailers accounted for approximately 37% of sales (Kamphoune, 2013).

[28]Loblaws, Sobeys, Metro, Costco Canada Safeway and Walmart Canada.

[29]OSEC (2011).The Canadian Food Retail Sector.Opportunities for Swiss companies. Available online at: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272

is realized (Hobbs, 2002; Marasteanu, Jaenicke and Dimitri, 2011; Nocke and Thanassoulis, 2014; Tamilia, 1999).

In addition, retailers are solidifying their power in the market place by means of private labels (Hodgins, 2011; Lawrence and Burch, 2008). In Canada, private label packaged food attained in 2012 a market value of 6.6 billion dollars and a market share of 12.7% (Euromonitor, 2013 in AAFC, 2013). From 2007 to 2012, the market grew at a compound average annual growth rate (CAGR) of 4.8% (Euromonitor, 2013 in AAFC, 2013). This situation is challenging food manufacturers by shortening the product-life cycle (Bröring, 2008; Ronteltalp et al., 2007), especially as consumers no longer buy private labels only for value pricing or budget shopping purposes (Martínez-Ruiz et al., 2014) and therefore no longer consider them as a weak alternative to branded food products (Hale, 2010; Hardy, 2010 in Khan et al., 2013).

c) Challenges in the food industry: Uncertainty

The environment in which Canadian health enhancing food companies operate is uncertain (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). This is mainly because products are based on new and evolving technology and sold into new and evolving markets in a restrictive and uncertain regulatory environment (Hobbs, 2002).

Health enhancing foods are heavily based on higher advances in technologies, novel knowledge and specialist skills (Khan et al., 2013). Although evolving technologies offer opportunities to target new markets, they come with additional challenges

(Hobbs, 2002; Siedlok, Smart and Gupta, 2010). In fact, the time span[30] from discovery to market and R&D activities are additional sources of uncertainty. In addition, consumers' market for health enhancing foods is characterized by a rapid change in consumer opinions (Childs and Poryzees, 1997), consumer skepticism and information asymmetry (Grunert, Bech-Larsen and Bredahl, 2000; Zou and Hobbs, 2006). Given consumers are seeking products aimed at preventing chronic diseases and optimizing their health potential (Costa et al., 2001, 2007; Menrad, 2003; Roberfroid, 2000b), health enhancing foods suffer from a lack of trust from consumers (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). In fact, health enhancing foods have credence attributes and consumers cannot adequately assess their properties, quality or safety before or even after purchase (Verbeke, 2005; Zou and Hobbs, 2006). In such situation, market failures arise due to information asymmetry between buyers and sellers (Verbeke, 2005). Sellers have more knowledge concerning the production process, product origin, nutritional content, or about safety issues than buyers do (Verbeke, 2005).

Because of information asymmetry and credence attributes of health enhancing foods, labelling plays a determinant role in helping consumers make informed choices (Garretson and Burton, 2000; Hailu et al., 2009; Kozup, Creyer and Burton, 2003; Malla, Hobbs and Perger, 2005; Roe, Levy and Derby, 1999;Wansink, 2003). However, two challenges have limited health enhancing food companies in using labels to signal the health benefits of products, namely regulatory uncertainty and the credibility of health claims (Hobbs, 2002).

The regulatory environment for health enhancing foods in Canada has evolved considerably in recent years (Blandon, Cranfield and Henson, 2007; Malla, Hobbs

[30] According to Dr Howard Tennant- Council Member of the National Research Council of Canada and President Emeritus of the University of Lethbridge, the length of time from idea to market for highly innovative products such nutraceuticals is averaging 13 years.

and Sogah, 2013). In January 2004, a new regulatory regime for natural health products (NHP) was implemented in Canada under the Natural Health Product Regulations (Health Canada, 2007). Currently, 26 structure/function claims[31] are approved in Canada for foods and nine disease risk reduction claims[32] are permitted both on foods and on NHP (Malla, Hobbs and Sogah, 2013).

Despite this evolution, the Canadian regulatory environment still lags behind the rest of the world regarding the regulation for these products (Malla, Hobbs and Sogah, 2013). In fact, compared to Japan, the United States and the European Union, Canada has a relatively strict regulatory system in the area of functional foods and NHP (Crowley, 2008; L'Abbe et al., 2008; Malla, Hobbs and Sogah, 2013). Only nine disease risk reduction health claims are permitted in Canada, while seventeen disease risk reduction claims are allowed in the United States (Malla, Hobbs and Sogah, 2013). The qualified health claims[33] and the product specific claims[34] on food are prohibited in Canada but allowed in the United States and Japan (Malla, Hobbs and Sogah, 2013). Moreover, most of structure/function claims in Canada are approved as disease risk reduction claim in other countries such as the United States (Malla, Hobbs and Sogah, 2013). Finally, NHPs are regulated in Canada differently than food

[31] Structure/function claims relate to the effects that a food has on the normal functions of the body. They are based on the role that the food or the food constituent plays when consumed at levels consistent with normal dietary patterns.(Canadian Food Inspection Agency, 2014). This information is available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=7#s13c7

[32] Disease risk reduction claim are statements that link a food to a reduced risk of developing a diet-related disease or condition in the context of the total diet (Canadian Food Inspection Agency, 2014). This information is available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14

[33] Qualified health claims are claims that contain credible but inconclusive evidence (Malla, Hobbs and Sogah, 2013).

[34] Product specific claims are used only by products that undergo a registration process for a claim that specifies a relationship between the food or food constituents and a health benefit (Malla, Hobbs and Sogah, 2013).

by using a product specific system which requires a more substantial level of evidence. While for example, in Japan and in the United States, NHPs are treated similarly to foods, they are considered distinct from food without imposing significantly different regulations (Malla, Hobbs and Sogah, 2013).

These differences in regulations, policies and health claims are challenging the health enhancing foods industry in Canada (Malla, Hobbs and Sogah, 2013; Malla et al., 2013). The lack of an internationally agreement or standards on the appropriate definition of health enhancing foods and different regulatory contexts that exist amongst countries is problematic for firms (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). It raises costs, creates uncertainty for exporting firms and acts as a brake on the expansion of international trade (Hobbs, 2002; Malla et al., 2013).

Besides, the Canadian regulatory system is also considered slow moving (Crowley, 2008; Malla et al., 2013) and unpredictable (Hobbs, 2002; Malla et al., 2013). In fact, the approval process is considered to be "slow" and cumbersome (Malla et al, 2013) and regulations do not follow the rate of innovation advances of health enhancing food companies (Crowley, 2008). Further, the variety of terminologies and definitions for health enhancing foods (Siedlok, Smart and Gupta, 2010) creates confusion, a high level of uncertainty (Malla et al., 2013; Siedlok, Smart and Gupta, 2010;Vergari, Tibuzzi, and Basile, 2010) and distrust among health professionals and consumers (Malla et al., 2013).

Such concerns might restrict and discourage the development and marketing of new products with potential health benefits for consumers (Burdock, Carabin and Griffiths, 2006; Hobbs, 2002), increase the costs of product marketing, postpone new product launches, and increase innovation risks (Burdock, Carabin and Griffiths, 2006; Coppens, Fernandes and Pettman, 2006).

As stated by Herath et al. (2008), given the direct impact of regulations on health enhancing foods firms, several studies have highlighted the importance of streamlining the regulatory situation in both the international (Gray, Armstrong and Farler, 2003; Heasman, 2005; Taylor, 2004; Wrick, 2005) and in the Canadian contexts (Doering, 2005; Fitzpatrick, 2004, 2005; Gnirss, 2004; Ramsay, 2002; Kondro, 2004).

2.2.3 Importance of distribution in strategic planning and in marketing mix strategy

Given the significance of the challenges, described earlier, several authors highlight the great importance of distribution for the firm's overall objectives and strategies as well as for the firm's fundamental marketing strategies (such as segmentation, differentiation and positioning strategies), and thus, highly recommend including distribution in the strategic planning process (Coughlan et al., 2006; Mentzer and Williams, 2001; Rosenbloom, 2012). The success of many companies is tightly related to the priority given to distribution strategies. In today's highly competitive markets, companies that dismiss distribution as a key decision area when formulating their overall objectives and strategies limit their capabilities to compete effectively (Rosenbloom, 2012).

Regarding the role of distribution in the marketing mix, it has been argued that place (the fourth P of marketing mix strategy) may be equal or more important than the other Ps, namely, product, price and promotion (Rosenbloom, 2012; Tamilia, 1999). Indeed, it has become very difficult for firms, in today's aggressive competitive landscape, to gain a sustainable competitive advantage by focusing only on product, price, and promotion (Rosenbloom, 2012). Comparing to product strategy, price strategy and promotion strategy, distribution strategy is difficult to copy by competitors because it requires long term commitment and relationship-building with

retailers and significant investment in infrastructure and human skills (Fites, 1996; Rosenbloom, 2012).

Shortly, following the explosion of information technology and e-commerce, the greater difficulty in gaining a sustainable competitive advantage, the increasing power of mass retailers in marketing channels, and the need to reduce distribution costs, managers have increased their attention to distribution (Rosenbloom, 2012; Tamilia, 1999). As a consequence of these challenging changes, retailers are considered to have become "Gate-keepers" into the consumer marketplace (Rosenbloom and Mollenkopf, 1993; Rosenbloom, 2012).

Furthermore, the growing importance of distribution in marketing has coincided with the reallocation of manufacturers' marketing budgets from advertising or marketing pull to marketing push (trade marketing) (Kumar, 1997; Tamilia, 1999; Tsao et al., 2014). In fact, manufacturers are now allowing larger proportions of their marketing budgets to trade promotions, fees, discounts, and merchandising activities to retailers and wholesalers (Rosenbloom, 2012; Tsao et al., 2014).

2.3 Methodological framework

This exploratory and prospective study uses an integrated-mixed research method, namely, group concept mapping (Kane and Trochim, 2007; Rosas and Kane, 2012) to gather data and information from diverse groups of participants. Group concept mapping methods are appropriate to analyze complex systems (Trochim and Cabrera, 2005). In particular, the establishment of effective distribution of health enhancing foods should involve many stakeholders in the value chain.

The participants in this study are stakeholders involved in the health enhancing foods sector in Quebec, Canada, such as ingredient-makers and/or food manufacturers/processors, industry experts/researchers in food technology development, consumer sciences, food distribution and marketing, and government representatives. The data collected was about specific initiatives to be undertaken to establish effective consumer-oriented distribution strategy of health enhancing foods. Participants were selected according to their knowledge and experience -judgment sampling- (Cooper and Schindler, 2008). The aim was to achieve a wide variety of ideas and viewpoints from participants involved in the health enhancing foods industry. Thus, sampling was heterogeneous and purposeful rather than representative (Kane and Trochim, 2007).

Six basic steps were followed to generate concept maps from this group of participants. These steps are as follows: preparation of the concept mapping project, idea generation, idea structuring, concept mapping analysis, interpretation of the concepts maps from the bridging and anchoring indices obtained and finally, presentation of the concepts maps to participants of this study. Each of these steps is detailed below.

At the first step, the preparation of the concept mapping project was carried out following the guidelines suggested by Kane and Trochim (2007). The research team of this study, in collaboration with experts in leading organizations that support health enhancing foods industry in Quebec, identified a group of potential participants with different perspectives. This step was important to ensure external representational validity[35] (Rosas and Kane, 2012). The typical profile of targeted participants included senior executives (sales, marketing and R&D) in health

[35] Refers to the extent to which the conceptualized model represents the reality it is aimed to represent (Rosas and Kane, 2012).

enhancing food companies, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives, who have relevant experience and knowledge in the area of health enhancing foods.

In step 2, ideas generation, 18 participants generated, during two group discussion sessions[36], a set of 120 statements that aimed to complete the following focus prompt *« A specific initiative to undertake to improve health enhancing food distribution is...»*. To evaluate whether these statements represent the conceptual domain under inquiry, and therefore ensure external representational validity (Rosas and Kane, 2012), the research team members in collaboration with some experts[37] in the field of health enhancing foods reviewed them and agreed that they captured well the reality of the firms. The 120 statements represented the participants' ideas about a set of initiatives to be undertaken for improving the distribution of health enhancing foods.

The qualitative statements (ideas, opinions) generated between participants during the two group discussions, handled in this study, were translated into a structured questionnaire to quantitatively measure these same statements in an integrated methodological framework (Geoffrion, 2010). Thereby, six researchers[38] participated in several revision rounds to eliminate statements' redundancies, inconsistencies, simplify the terminology and pretest the measuring instrument (Kane and Trochim, 2007). After completing rounds of revisions, the research team approved a list of 80 consolidated statements.

---

[36] Nine (09) participants in each group discussion session.

[37] In food technology development and in food marketing.

[38] The researchers are in management, in marketing, in strategy and in food technology development.

In step 3 (ideas structuring), participants completed individually the rating and sorting tasks necessary for data gathering. These tasks were performed by an extended group of 21 participants, including fourteen managers (VP marketing, VP sales, VP Research and Development) in SME health enhancing food companies (ingredient-makers and/or food manufacturers/processors), five experts/researchers in food technology development, in consumer sciences, in food distribution and marketing, and two representatives from government ministries. During this step, each participant rated the relative importance and relative feasibility of each of the 80 statements on a five-point numerical Likert-type scale. For the completion of the sorting task, participants were provided with a deck of cards, business card format, of the 80 statements. Each statement was printed individually on a card and given an identifying number. Following some specific instructions[39], the participants sorted out the set of statements into piles based on the similarity of idea or theme (Kane and Trochim, 2007). At the end of the sorting task, each participant recorded the identifying number of each statement in a sorted pile and gave it a descriptive label or a descriptive sentence for each one.

In step 4, the data gathered from participants was entered into a dedicated software, namely: Concept System® program (Trochim, 1987) for aggregation and generation of a two-dimensional solution, called a concept map. The concept map was generated by using a Multidimensional Scaling (MDS) analysis (Borg and Groenen, 2005; Davidson, 1983) of the total similarity square matrix of the 80 statements followed by an agglomerative Hierarchical Cluster Analysis (HCA) (Anderberg, 1973; Rencher and Christensen, 2012).

[39] (a) A statement cannot be in two or more different piles; (b) A statement thought to be unique can be placed in its own separate pile; and (c) unrelated statements cannot be placed in a one pile such as a miscellaneous pile (Kane and Trochim, 2007).

The MDS first provides a point map that illustrates the distribution of all statements in a bi-dimensional Euclidian space (Kane and Trochim, 2006) and allows for establishing interrelationships amongst the data points (Abrahams, 2010). Statements that are close to each others are those which were most often sorted together by participants while those that are far from each others are those who were piled less frequently together by participants (Kane and Trochim, 2007). The agglomerative HCA provides a cluster map that depicts how statements are located relative to one another and grouped into clusters.

To proceed with the interpretation of the generated concept maps (step 5), a systematic procedure was followed. This procedure consisted in determining the number of clusters to be selected that best represent the shared conceptual framework of the participants. Kane and Trochim (2007) recommend handling a bridging/anchoring analysis and a cluster label analysis. Following Kane and Trochim (2007), the research team examined individually and independently, the fifteen clusters solution generated by the Concept System® software (Trochim, 1987) and proceeded to reduce successively the number of clusters until achieving both a coherent and meaningful empirical and theoretical interpretations of results (Iris, Ridings and Conrad, 2010). The research team members independently achieved a concept map of six clusters.

Finally, the results of this study were presented to participants for the purpose of discussing resulting concepts maps (Kane and Trochim, 2007) and for assessing face validity (Iris, Ridings and Conrad, 2010). First, the results were presented to two experts in leading organizations which support the health enhancing foods sector and to a manager in a public institution dedicated to the health enhancing foods industry. Second, results were presented during a face-to face meeting to a subgroup of thirteen participants (executive managers in health enhancing food firms, government

representatives, experts and researchers in food science and food marketing). Upon this meeting, participants agreed that the concepts maps well-represented issues of health enhancing food distribution.

2.4 Results

The data was analyzed and a set of concept maps was obtained. These maps helped facilitate the interpretation of the data, and enabled the identification and conceptualization of initiatives aimed at improving the distribution of health enhancing foods.

Concept mapping generates two basic types of maps, namely: the cluster map and the cluster rating map (Abrahams, 2010). Each type of map shows a different level of detail revealed in the analysis (Abrahams, 2010). The cluster map displays titled clustered polygons and the cluster rating map reports layers showing ratings based on a given scale (e.g. importance, feasibility, bridging/anchoring indices).

The cluster map (Figure 2.1) of this study was generated by using the results of the MDS to group the 80 statements into clusters by performing an agglomerative HCA. The MDS analysis of the total similarity matrix converged after 9 iterations producing a final stress value of 0.24[40]. The stress value is the normalized residual variance for a perfect relationship of a monotone regression of distance upon dissimilarity or similarity (Kruskal, 1964). It indicates the goodness of fit of the final

[40]In a study of 69 concept mapping projects, Rosas and Kane (2012) reported that the average stress value was 0.28 (SD = 0.04, range: 0.17-0.34, 95% CI [0.27-0.29]). Therefore, the stress value obtained in this study is comparable, and even better than the mean obtained in previous concept mapping studies.

representation of the distance matrix (x,y) coordinates with respect of the total similarity matrix (raw data) (Kruskal and Wish, 1978). Moreover, a squared correlation coefficient (r^2) was calculated in this study to assess the proportion of shared variance of the input and output data (Rosas and Kane, 2012). This estimate indicates that on average 55%[41] of the variation in the aggregated participant sort was accounted for by the conceptual framework. Thereby, the stress value and the squared correlation coefficient value obtained in this study reflect the judgments made by participants in organizing information to produce the model. In fact, there is evidence of internal representational validity, as this far exceeds established standards (Rosas and Kane, 2012). In addition to internal representational validity, the cluster map of this study is reliable. A set of reliability estimates was computed for assessing partcipants' rating and sorting statements. These estimates are presented in Appendix 2.1.

The cluster map (Figure 2.1) represents the shared conceptual framework by participants who completed the rating and sorting tasks. The six clusters were labeled as follows: (1) Communication with health professionals and regulatory options, (2) Information and communication with consumers, (3) Market-oriented innovation management, (4) Networking and institutional support, (5) Retailers' relationship management, and (6) Marketing strategies. The statements contained in each of these clusters are presented respectively in Appendices 2.2 to 2.7.

[41]In a pooled analysis of 69 concept mapping projects, Rosas and Kane (2012) reported that the average squared correlation coefficient value was 0.44 (SD = 0.09, range: 0.28-0.68, 95% CI [0.42-0.46]). Therefore, the squared correlation coefficient value obtained in this study is comparable, and even better than the mean obtained in previous concept mapping studies.

Furthermore, the cluster map illustrates the interrelationship among statements as clusters on the map (Abrahams, 2010). Thereby, the smaller the cluster is, the greater the interrelationship between the statements, and vice versa.

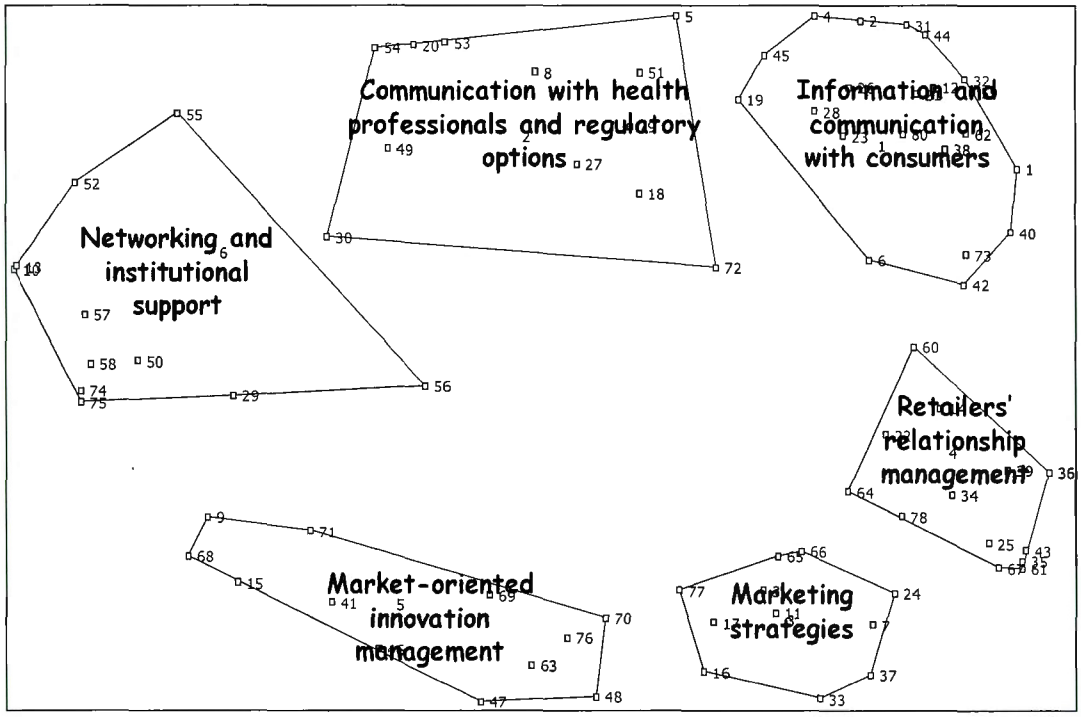


Figure 2.1 Improving health enhancing food distribution: Final six-cluster map

The cluster rating map depicts the degree of importance for clusters (Figure 2.2). The degree of importance is represented by the number of layers in each cluster (values between 1 and 5). Clusters with more layers indicate a high importance rating while those with few layers indicate a low importance rating (Kane and Trochim, 2007). Based on the participants' rating task, Figure 2.2 illustrates the mean importance ratings for each of the six clusters obtained in this study.

As noted in Figure 2.2 and Table 2.1, the '*Information and communication with consumers*' cluster had the highest mean importance rating (3.91 on a scale of 5) and the lowest bridging value (0.2). This means participants rated this cluster as an important issue and sorted the statements within this cluster together more frequently. Thereby, '*Information and communication with consumers*' was the most important and distinctive concept in the overall conceptual framework of this study. The '*Market-oriented innovation management*' cluster was rated second highest (3.85 on a scale of 5) with a midrange bridging value of 0.56. Although participants rated the statements within this cluster as important, they dispersed the statements of this cluster in other piles during the sorting process. The '*Retailers' relationship management*' cluster had an importance rating of 3.69 on a scale of 5 and a low bridging value of 0.32. The '*Communication with health professionals based on regulatory options*' cluster had an average importance rating of 3.59 on a scale of 5 and a bridging value of 0.61, suggesting this cluster is quite highly related to other clusters on the map. The '*Networking and institutional support*' cluster achieved a mean overall importance rating of 3.59 on a scale of 5 and had a midrange bridging value of 0.55, evidencing a modest degree of internal consistency. Finally the *'Marketing strategies'* cluster was rated 3.38 on a scale of 5 for importance and had a low bridging value of 0.28, suggesting that this cluster is clearly differentiated from the other clusters.

In summary, *'Information and communication with consumers'*, *'Retailers' relationship management'* and *'Marketing strategies'* have low bridging values and are the most differentiated and cohesive concepts in the shared concept mapping framework of this study. However, *'Market-oriented innovation management'*, *'Communication with health professionals and regulatory options'* and *'Networking and institutional support'* have high bridging values and therefore are the less well differentiated concepts in this study's framework (Table, 2.1).

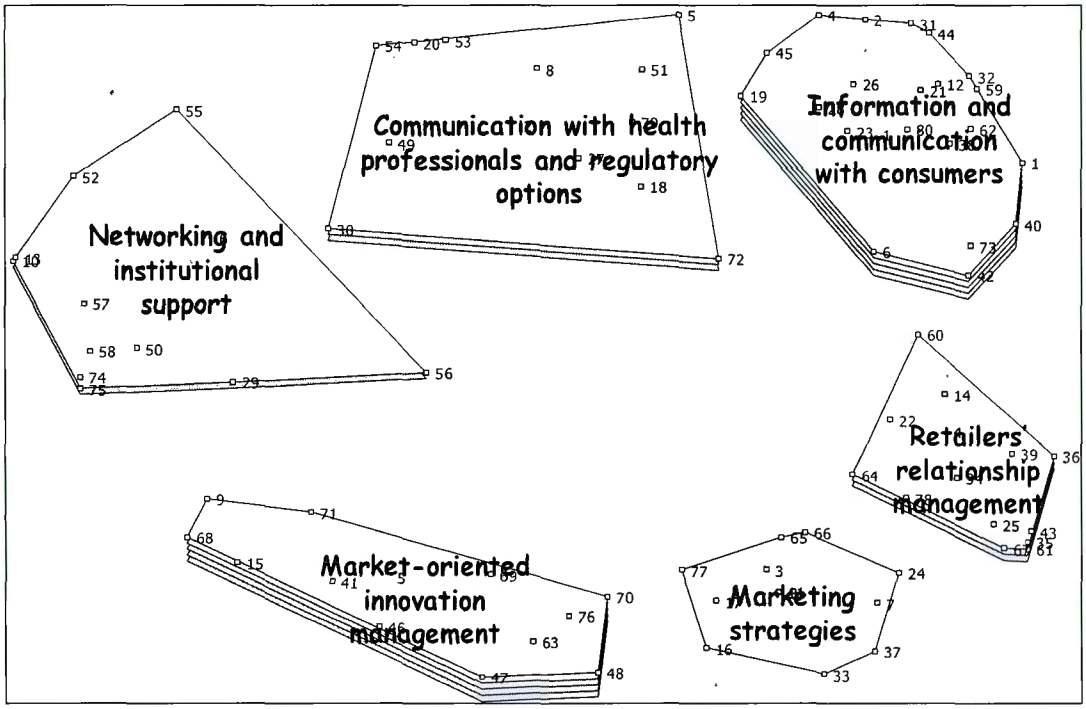


Figure 2.2 Improving health enhancing food distribution: Cluster rating map

Table 2.1 Cluster rating

Cluster #	Cluster name	Bridging/ anchoring values	Mean importance
1	Information and communication with consumers	0.20	3.91
2	Market-oriented innovation management	0.56	3.85
3	Retailers' relationship management	0.32	3.69
4	Communication with health professionals and regulatory options	0.61	3.59
5	Networking and institutional support	0.55	3.59
6	Marketing strategies	0.28	3.38

In addition to the cluster map (Figure 2.1) and the cluster rating map (Figure 2.2), the results relate to pattern matching analysis that contrasts the importance ratings and the feasibility of each cluster obtained in this study. In fact, pattern matching analysis identifies, by cluster, the most important and feasible initiatives to undertake for improving the distribution of health enhancing foods.

As illustrated in Table 2.2, generally, clusters with the highest importance rating are also perceived by participants as the most feasible. Likewise, clusters rated as less important are also considered less feasible by respondents of this study. However, the '*Marketing strategies*' cluster had the lowest importance rating but was rated as highly feasible within 6 months (2nd in ranking and less feasible within a range of 6 months-2 years.

Table 2.2 Pattern matching analysis

Cluster Name	**Mean importance**		**Feasibility (0 - 6 months)**		**Feasibility (6months - 2 years)**	
	order	**index**	**order**	**index**	**Order**	**index**
Information and communication with consumers	1	3.91	3	2.90	2	3.87
Market-oriented innovation management	2	3.85	1	3.24	1	4.04
Retailers' relationship management	3	3.69	4	2.89	3	3.75
Communication with health professionals and regulatory options	4	3.59	5	2.66	6	3.60
Networking and institutional support	5	3.59	6	2.52	5	3.47
Marketing strategies	6	3.38	2	2.94	4	3.71

The cluster rating map (Figure 2.2) and the cluster statement list (Appendices 2.2 to 2.7) were used to partition the six clusters related to initiatives aimed at improving the distribution of health enhancing foods into three meaningful conceptual domains: Communication and regulatory options initiatives, Scientific initiatives, and Commercial initiatives (Figure 2.3). This partition was handled by the research team and supported by participants during the result interpretation held during the final group meeting

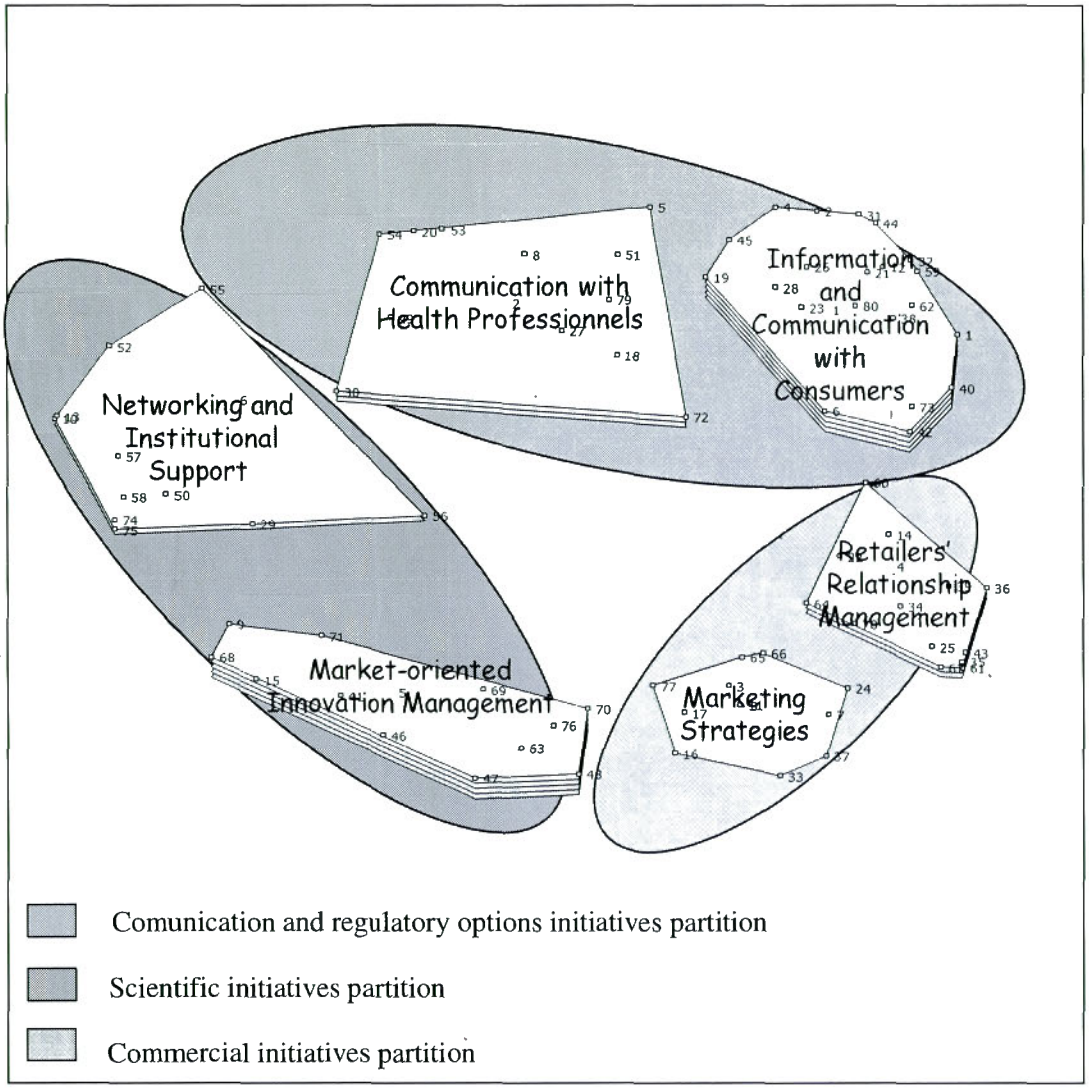


Figure 2.3 Improving health enhancing food distribution: Partitioned cluster rating map

The upper side of the cluster rating map (Figure 2.3) includes two clusters: *'Information and communication with consumers'* and *'Communication with health professionals and regulatory options'*. They represent initiatives aimed at improving the distribution of health enhancing foods pertaining to communication and regulatory options. In fact, the statements in these two clusters express the need for an

effective communication of health enhancing foods benefits to consumers and the means for performing that communication. This finding is coherent with previous studies which highlighted that support from health professionals is an important mean to communicate to consumers the benefits of health enhancing foods and therefore reduce their lack of credibility toward these products and their health benefits (e.g. Hobbs, 2002; Siedlok, Smart and Gupta, 2010).

Furthermore, participants in this study perceived the prominence of initiatives related to communication in improving the distribution of health enhancing foods. As seen in Table 2.3, the high importance rating of this first partition (3.75) was assigned by participants, to the statements contained in the two clusters forming this partition. Among '*Information and communication with consumers*' cluster were statements (2) and (12) respectively labeled 'Ensure that the health allegation of health products is well understood by the consumer'[42] and 'Sensitize the consumer to the benefits associated with the consumption of health enhancing foods'[43]. Regarding the '*Communication with health professionals and regulatory options*' cluster, amid the most important statements were statements (20) and (27) respectively entitled 'Make sure that the message delivered to the consumer on the health enhancing foods conforms with the regulations of national authorities e.g. Health Canada'[44] and 'Make the information about health enhancing foods available to health professionals e.g. doctors, prevention workers, etc.'[45] Thereby, while statements (2) and (12) focused on effective communication to consumer through sensitization about health enhancing foods benefits and better understanding of these benefits by consumers, statements (20) and (27) pinpointed the means for an effective communication of

[42]Importance rating 4.65 on 5.

[43]Importance rating 4.45 on 5.

[44]Importance rating 4.55 on 5.

[45]Importance rating 4.00 on 5.

health enhancing foods benefits to consumers, namely the conformity of the message with the regulatory authorities (Health Canada) and the reliance on health professionals to help consumers with their food choices.

Table 2.3 Rating of the conceptual partitioning of clusters

Cluster #	Partition/Cluster name	Average Cluster Rating	Average Partition Rating
Communication and regulation partition			**3.75**
1	Information and communication with consumers	3.91	
4	Communication with health professionals and regulatory options	3.59	
Scientific partition			**3.72**
2	Market-oriented innovation management	3.85	
5	Networking and institutional support	3.59	
Commercial partition			**3.53**
3	Retailers' relationship management	3.69	
6	Marketing strategies	3.38	

Based upon the analysis of the cluster rating map (Figure 2.2) and cluster statement list (Appendices 2.2 and 2.3), the clusters-'*Communication with health professionals and regulatory options'* and *'Information and communication with consumers'* could be considered together as a meaningful conceptual domain related to Communication initiatives and regulation aimed at improving the distribution of health enhancing foods.

On the left side of Figure 2.3, two clusters-'*Market-oriented innovation management'* and *'Networking and institutional support'*-invoke initiatives related to scientific aspects that bear upon the improvement in the distribution of health enhancing foods. Indeed, the statements contained in these two clusters address the need for more innovation and ways to achieve this innovation. Moreover, participants felt that scientific initiatives require substantive investments and collaboration with external partners to improve the distribution of health enhancing foods. This finding is supported in previous studies (Bigliardi, Bottani and Galati, 2010; Khan et al., 2013; Siedlok, Smart and Gupta, 2010).

The average importance rating attributed by participants about statements that make up the two clusters of the scientific initiatives partition was 3.72. For example, the most important statements, amongst others, in the '*Market-oriented innovation management'* cluster were statements (68), (69) and (70) respectively named 'Innovate on the scientific dimension of health enhancing foods'[46] ; 'Innovate on the product/market dimension of health enhancing foods'[47] and 'Innovate on the selling dimension of the health enhancing foods'[48]. Concerning the *'Networking and institutional support'* cluster, among the most important statements we find statements (13), (57) and (74) respectively labeled 'Support the R&D of health enhancing foods by financial incentives (grants, tax credits etc.,)'[49]; 'Facilitate partnerships between companies and institutions responsible for the R&D of health enhancing foods'[50] and 'Encourage open innovation to share the costs associated with

[46]Importance rating 4.00 on 5.

[47]Importance rating 3.95 on 5.

[48]Importance rating 3.90 on 5.

[49]Importance rating 4.30 on 5.

[50]Importance rating 4.10 on 5.

clinical trials of health enhancing foods'[51]. As statements (68), (69) and (70) emphasized on various aspects of innovation (scientific, marketing and selling), statements (13), (57) and (74), dwell on the ways to accomplish that innovation especially through partnerships with health enhancing food companies, ingredient suppliers, research centers and all the stakeholders in the health enhancing foods value chain.

From the analysis of the cluster rating map (Figure 2.2) and cluster statement list (Appendices 2.4 and 2.5), the two clusters-'*Market-oriented innovation management'* and *'Networking and institutional support*' form together a significant conceptual domain that affects the distribution of health products, namely the scientific partition.

At the right bottom side of figure 2.3, there are two clusters - *Retailers' relationship management'* and *'Marketing strategies'*- which correspond to commercial initiatives impacting the distribution of health enhancing foods. Indeed, statements within these two clusters express the need for a better marketing management process through more market research, well defined marketing strategies and closer relationships with retailers. This finding is consistent with previous studies which highlighted the need to align distribution and retailers' relationship management with a firm's overall objectives and strategies (Coughlan et al., 2006; Kumar, 1997; Mentzer and Williams, 2001; Rosenbloom, 2012).

Additionally, participants highlighted the importance of commercial initiatives for improving the distribution of health enhancing foods. As depicted in Table 2.3, the average rating of commercial partition (3.59) was ascribed by participants regarding statements in these two clusters during rating sessions. For instance, amongst

[51]Importance rating 3.80 on 5.

important statements about actions to be undertaken in the *'Marketing strategies'* cluster are statements (3), (66), (65) and (77) respectively, titled 'Improve the marketing management process of the company'[52]; 'Conduct market research to determine the consumer's perceived satisfaction about health enhancing foods'[53]; 'Conduct market research to determine the consumer's understanding of the health aspects of health enhancing foods'[54] and 'Continuously differentiate the company's products from its competitors'[55].

As for the *'Retailers' relationship management'* cluster, amongst the important statements are statements (61), (36) and (67) respectively labeled 'Ensure that the retailer is committed to promote and valorize health enhancing foods'[56], 'Provide training on health enhancing foods to retailers and brokers' and 'Persuade the retailer about the advantages of the health enhancing foods comparatively to conventional foods'.

In summary, all these statements are interrelated. In fact, while statement (3) emphasized on a better marketing management process, statements (66), (65), (77), (61), (36) and (67) focused both on marketing actions (e.g. market research, training programs to retailers and brokers of health enhancing foods, closer relationships with retailers) and marketing strategies (e.g. differentiation strategy) to improve the marketing management process of health enhancing food companies and thus the distribution of their products. In other words, improving the distribution of health

[52]Importance rating 3.75 on 5.

[53]Importance rating 4.35 on 5.

[54]Importance rating 4.15 on 5.

[55]Importance rating 4.05 on 5.

[56]Importance rating 4.30 on 5.

enhancing foods requires (1) evaluating consumers' knowledge, satisfaction and understanding of health enhancing foods' aspects through market research, (2) improving consumers' knowledge, satisfaction and understanding of health enhancing foods' benefits through retailers' implication (closer relationships and training) and finally (3) differentiating continuously health enhancing foods and thus creating original positioning in consumers' minds. Following the analysis of the cluster rating map (Figure 2.2) and cluster statement list (Appendices 2.6 and 2.7), the two clusters: '*Retailers' relationship management*' and '*Marketing strategies*' can form a meaningful conceptual domain, namely commercial partition to improve the distribution of health enhancing foods.

2.5 Discussion

The concept mapping process used in this study provided a framework to identify and prioritize specific initiatives aimed at improving the distribution of health enhancing foods. The discussion summarizes key findings of group concept mapping analysis. The findings are significant because they are consistent with the literature and statements within the clusters from collective representation of a diverse group of participants brought to the sample. There are several noteworthy findings:

1) The high importance of the *Information and communication with consumers* cluster and its close proximity to the *Communication with health professionals and regulatory options* cluster;

2) The high importance attributed to the *Market-oriented innovation management* cluster and its association with the *Networking and institutional support* cluster;

3) The high importance rating of *Retailers' relationship management* cluster and its closeness to *Marketing strategies* cluster.

The importance rating of the *Information and communication with consumers* cluster and its proximity to the *Communication with health professionals and regulatory options* cluster is consistent with previous studies on health enhancing foods. According to Ronteltap et al., (2007), communication plays a crucial role in determining how novel foods are received by the consumer. The commercialization of these products will not be successful without relevant communication to help consumers making informed choices and including such products to their diets (Frewer, Scholderer and Lambert, 2003). Health enhancing foods have inherent credence attributes and therefore cannot be experienced directly by consumers either before or after purchase (Verbeke, 2005; Zou and Hobbs, 2006). Given this uncertainty, consumers have to use other product cues such as information labelling, health claims, educational programs, trusted source such as nutritionist, doctors, etc. to make informed choices (Garreston and Burton, 2000; Hailu et al., 2009; Kozup, Creyer and Burton, 2003; Roe, Levy and Derby, 1999; Wansink, 2003). In fact, the lack of trust from consumers toward the benefits of health enhancing foods could potentially be overcome with sufficient education and support from the health and government organizations (Siedlok, Smart and Gupta, 2010). The communication of health benefits of health enhancing foods to consumers requires: (1) information activities that are targeted to consumers and opinion-leaders (nutritionist, medical doctors, etc.) (Hobbs, 2002), and (2) regulatory structures to validate the safety and efficacy of these products and therefore boost consumer confidence (Ray, 2004). Thereby, the communication partition (Figure 2.3) provides a response to the challenge of uncertainty that health enhancing food companies are facing, especially the uncertainty that is related to market acceptance and information asymmetry.

The importance of *Market-oriented innovation management* cluster is heavily supported by previous studies. It is recognized that innovation helps firms gain profits (Costa and Jongen, 2006; Kelly, 2009; Sarkar and Costa, 2008; Traill and

Mueulenberg, 2002) and maintain a sustainable competitive advantage (Bard, Balachandra and Kaufman, 1988; Kirwin, Sporleder and Hooker, 2008; Mikkola 2001).

Regarding the association of *Market-oriented innovation management* cluster with *Networking and institutional support* cluster, this lends evidence to the contentions of previous studies. According to Siedlok, Smart and Gupta (2010), inter-firm, inter-industrial and, to some extent, inter-institutional collaborations are driven by advances in technology and innovation and changes in the social trends. In fact, Tether (2002), argues that innovation is no longer considered as an individual's action but rather, a collective action between diverse partners. Diverse collaborative networks and arrangements are critical to develop radical innovative products, such as health enhancing foods, and therefore improve the innovation capability of the firm (Khan et al., 2013). Hence, the role of pharmaceutical and nutraceuticals firms, food ingredient firms, packaging firms, nanotech firms, research institutes are important (Bröring and Cloutier, 2008; Chiaroni, Chiesa and Frattini, 2011; Hobbs, 2002; Matthyssens, Vandenbempt and Berghman, 2008; Sarkar and Costa, 2008) for proving clinical efficacy of health enhancing foods and developing effective commercialization strategies to boost consumer awareness and acceptance of these products (Khan et al. 2013; Sarkar and Costa, 2008; Siedlok, Smart and Gupta, 2010).

Furthermore, collaborations with heterogeneous stakeholders have diverse advantages. They enable to reduce the time frame to market and thereby counteract consumer's resistance; attain a comparatively speedy return on investment (Khan et al., 2013); and broadening the nature of innovation (Hardy, 2010 in Khan et al., 2013).

In addition, government support in the form of financial resources and regulatory structure is also important for enhancing collaborative knowledge development and resource sharing activities among academics, industry and research institutes stakeholders (Khan et al., 2013).This is essential for SMEs, who are more likely to avoid the challenges of establishing strategic collaborations with external partners because of the lack of resources and skills to adapt themselves in a rapidly changing innovation environment (Khan et al., 2013).

The Scientific partition (Figure 2.3) provides a response to the challenge of innovation that health enhancing food companies are facing. As stated by Khan et al. (2013, p.35) «*The challenges of resource expansion and time reduction may be met through open source development and open innovation, collaborative R&D activities and collaborative networks (pharmaceutical/biotech companies, research institutes and ingredient suppliers)*».

The high rating of retailers' relationship management cluster and its proximity to marketing strategies cluster is evidenced by findings in previous studies. Given the intensive competition in health enhancing foods (Bigliardi and Galati, 2013; Hobbs, 2002) and the growing power of retailers (Burch and Lawrence, 2005; Lawrence and Burch, 2008;), the access to consumers' market is mainly through the giant retailers (Menrad, 2003).Thereby, it is critical for health enhancing foods firms to establish networks with diverse channels in order to enhance the scope and speed to market (Sarkar and Costa, 2008). Besides, firms are increasingly required to use sophisticated marketing techniques to better understand the differentiated consumer needs (De Jong et al., 2006).

From these findings, it appears that issues related to the distribution of health enhancing foods are interrelated and intertwined. In fact, for health enhancing food

companies, success depends heavily on management conduct, in finding high technologies (Kotilainen et al., 2006; Mark-Herbert, 2004) and in communicating effectively (Frewer, Scholderer and Lambert, 2003) the benefits of their products to consumers through trusted sources such as nutritionists and doctors.

2.6 Conclusion and future research

The aim of this prospective exploratory research was to develop a conceptual framework that identifies and priorities initiatives aimed at improving the distribution of health enhancing foods while involving various industry stakeholders such as ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives. Concept mapping was applied in this study. The results generate a number of findings about how to improve the distribution of health enhancing foods and therefore how to best reach consumers' market.

First of all, the results highlight the multidimensionality of the initiatives to be undertaken to improve the distribution of health enhancing foods. In fact, initiatives are grouped into six clusters, namely: (1) Information and communication with consumers; (2) Market-oriented innovation management; (3) Retailers' relationship management; (4) Communication with health professionals and regulatory options; (5) Networking and institutional support; and (6) Marketing strategies. Second, the results provide the importance of each cluster of initiatives and therefore offer a useful guidance in the process of decision making by identifying the most important and feasible initiatives. Finally, the results provide a better understanding of the interrelationships between these initiatives.

Regarding the implications, the shared bottom-up conceptual framework about stakeholders involved in the improvement of health enhancing food distribution have both managerial and theoretical implications. On the practical front, results obtained can be used for planning strategic action and public policy implementations. On the theoretical front, the aim of this exploratory prospective study was to follow the new paradigm in marketing (Gummesson, Kuusela and Närvänen, 2014) which stresses the importance of focusing on all stakeholders and being oriented toward the future. The findings show that improvements in the health enhancing food distribution go beyond product/market boundaries and include more contextual initiatives and stakeholders. The results of this study can be used to conduct further empirical confirmatory research for theory development regarding these aspects.

Although the proposed framework has been empirically produced by the analyses presented, and is consistent with the current state of knowledge in the literature, it may be incomplete and therefore this exploratory study has some limitations. Participation in this project was limited to managers, government representatives and experts in health enhancing foods in a specific territory (Quebec City). Future research should extend the present research sample to other regions and countries to facilitate the generalization of these findings and to perform subgroup analyses. In addition, the use of concept mapping in this study was limited to the identification and prioritization of initiatives aimed at improving health enhancing food distribution. Nevertheless, concept mapping is also appropriate for scale development and validation (Rosas and Camphausen, 2007). Future research should use clusters and statements generated in this study to develop and validate a scale for improving health enhancing food distribution. Finally, the bottom-up conceptual framework of this study does not provide insights to better understand interrelationships between initiatives aimed at improving health enhancing food distribution. Future studies can

focus on understanding the interaction between these initiatives and how their interrelationships affect the decision making process in health enhancing foods firms

REFERENCES

Abrahams, D. A. (2010). Technology adoption in higher education: A framework for identifying and prioritising issues and barriers to adoption of instructional technology. *Journal of Applied Research in Higher Education*, 2(2), 34-49.

Agriculture and Agri-Food Canada (AAFC) (2013). *Private label trends-Packaged food in Canada.* Available online at:http://www.aquaculture.ca/files/documents/PrivateLabelPackagedFoodCanadaENG.pdf (Accessed March, 2014).

Aguilera, J. M. (2006). Seligman lecture 2005 food product engineering: Building the right structures. *Journal of the Science of Food and Agriculture*, 86(8), 1147-1155.

Anderberg, M. R. (1973). *Cluster Analysis for Applications*, New York: Academic Press.

Ardley, B. (2011). Marketing theory and critical phenomenology: Exploring the human side of management practice. *Marketing Intelligence & Planning*, 29(7), 628-642.

Armstrong, G. & Kotler, P. (2011). *Marketing: An Introduction*, New Jersey: Global Edition, 10th edition.

Bard, J. F., Balachandra, R. & Kaufman, P. E. (1988). An interactive approach to R&D project selection and termination. *IEEE Transactions on Engineering Management*, 35(3), 139-146.

Belem, M. A. (1999). Application of biotechnology in the product development of nutraceuticals in Canada. *Trends in Food Science & Technology*, 10(3), 101-106.

Betancourt, R. & Goutschi, D.A. (1998). Distribution services and economic power in a channel. *Journal of Retailing*, 74(1), 37-60.

Bigliardi, B., Bottani, E. & Galati, F. (2010). Open innovation and supply chain management in food machinery supply chain: A case study. *International Journal of Engineering, Science and Technology*, 2(6), 244-255.

Bigliardi, B. & Galati, F. (2013). Innovation trends in the food industry: The case of functional foods. *Trends in Food Science & Technology*, 31(2), 118-129.

Bigné, J. E., Aldas-Manzano, J. Küster, I. & Vila, N. (2002). The concept mapping approach in marketing: An application in the travel agencies sector. *Qualitative Market Research: An International Journal*, 5(2), 87–95.

Blandon, J., Cranfield, J. & Henson, S. (2007). *Functional Food and Natural Health Product Issues: The Canadian and International Context.* International Food Economy Research Group Department of Food, Agricultural and Resource Economics. Available online at: http://www4.agr.gc.ca/resources/prod/doc/misb/fb-ba/nutra/pdf/u_of_guelph_functional_foods_review_final_25jan2008_en.pdf (Accessed September, 2012).

Boehlje, M., Roucan-Kane, M. & Bröring, S. (2011). Future agribusiness challenges: Strategic uncertainty, innovation and structural change. *International Food and Agribusiness Management Review*, 14(5), 53-81.

Boland, M. (2008). Innovation in the food industry: Personalized nutrition and mass customization. *Innovation: Management, Policy & Practice*, 10(1), 53-60.

Borg, I. & Groenen, P. J. (2005). *Modern Multidimensional Scaling: Theory and applications.* Berlin: Springer.

Bröring, S. (2008). How systemic innovations require alterations along the entire supply chain: The case of animal-derived functional foods. *Journal on Chain and Network Science*, 8(2), 107-119.

Bröring, S. & Cloutier, L. M. (2008). Value-creation in new product development within converging value chains: An analysis in the functional foods and nutraceutical industry. *British Food Journal*, 110(1), 76-97.

Burch, D. & Lawrence, G. (2005). Supermarket own brands, supply chains and the transformation of the agri-food system. *International Journal of Sociology of Agriculture and Food*, 13(1), 1-17.

Burdock, G. A., Carabin, I. G. & Griffiths, J. C. (2006). The importance of GRAS to the functional food and nutraceutical industries. *Toxicology*, 221(1), 17-27.

Canadian Food Inspection Agency (CFIA) (2014). *Health claims: Definitions.* Available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14 (Accessed April, 2014).

Chiaroni, D., Chiesa, V. & Frattini, F. (2011). The open innovation journey: How firms dynamically implement the emerging innovation management paradigm. *Technovation*, 31(1), 34-43.

Childs, N. M. & Poryzees, G. H. (1997). Foods that help prevent disease: Consumer attitudes and public policy implications. *Journal of Consumer Marketing*, 14(6), 433-447.

Cloutier, L. M. & El Ourabi, H. (2014). *Building a sustainable distribution chain for health enhancing foods in Quebec: Managerial cognition differences amongst stakeholders. 11th Wageningen International Conference on Chain and Network Management* for the Conference theme track: *Managing Sustainability and Innovation in Chains and Networks.*

Cooper, D. & Schindler, P. (2008). *Business Research Methods.* New York: McGraw-Hill/Irwin.

Coppens, P., Fernades da Silva, M. & Pettman, S. (2006). European regulations on nutraceuticals, dietary supplements and functional foods: A framework based on safety. *Toxicology*, 221(1), 59-74.

Cortuff, R., Couture, F., Lemieux, S., Michaud, R., Paquin, P. & Pomerleau, S. (2011). *Critères d'évaluation d'un aliment à valeur nutritive améliorée ou santé et de son caractère innovant.* Document présenté à TRANSAQ, *Institut sur la Nutrition et Aliments Fonctionnels (INAF).* Université Laval, 11 juin 2011.

Costa, A. I. A., Dekker, M., Beumer, R. R., Rombouts, F. M. & Jongen, W. M. F. (2001). A consumer-oriented classification system for home meal replacements. *Food Quality and Preference*, 12(4), 229-242.

Costa, A. I. & Jongen, W. M. F. (2006). New insights into consumer-led food product development. *Trends in Food Science & Technology*, 17(8), 457-465.

Costa, A. I. D. A., Schoolmeester, D., Dekker, M. & Jongen, W. M. (2007). To cook or not to cook: A means-end study of motives for choice of meal solutions. *Food Quality and Preference*, 18(1), 77-88.

Coughlan, A., Anderson, E., Stern, L. & El-Ansary, A. (2006). *Marketing Channels.* New Jersey: Prentice-Hall, 7th edition.

Crowley, L. (2008). *Canada seeks opinion on health claims review.* News Release. Available online at: http://www.nutraingredients-usa.com/Regulation/Canada-seeks-opinion-on-health-claims-review (Accessed January, 2014).

Davison, M. L. (1983). *Multidimensional scaling*. New York: Wiley.

De Jong, J., van Kleef, E., Frewer, L. J. & Renn, O. (2006). *Perceptions of risk, benefit and trust associated with consumer food choice*. In L. J. Frewer, & H. C. M. van Trijp (Eds.), *Understanding consumers of food products* (p. 125-150). Cambridge, England: Woodhead Publishing.

Deloitte (2014). *Global Powers of Retailing*, Deloitte, London, available online at: http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Consumer-Business/dttl_CB_Global-Powers-of-Retailing-2014.pdf (Accessed April, 2014).

Doering, R. L. (2005). *A duty to do it well: Regulations and food industry competitiveness and innovations under the Food and Drug Act* [mimeo]. Ottawa, Canada: Gowling Lafleur Henderson Barristers and Solicitors.

El-Ansary, A. & Stern, L. (1972). Power measurement in the distribution channel. *Journal of Marketing Research*, 9(1), 47-52.

Fites, D. V. (1996). Make your dealers your partners. *Harvard Business Review*, 74(2), 84-95.

Frewer, L., Scholderer, J. & Lambert, N. (2003). Consumer acceptance of functional foods: Issues for the future. *British Food Journal*, 105(10), 714-731.

Fitzpatrick, K. (2004). Regulatory issues related to functional foods and natural health products in Canada: Possible implications for manufacturers of conjugated linoleic acid. *American Journal of Clinical Nutrition*, 79(Supplement 6), 1217S-1220S.

Fitzpatrick, K. (2005). *Regulatory issues related to functional foods and natural healthproducts in Canada*. In C.M. Hasler (Ed.), Regulations of functional foods and nutraceuticals: A global perspective (pp. 213–226). Oxford, England: Blackwell.

Garretson, J. A. & Burton, S. (2000). Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust. *Journal of Public Policy & Marketing*, 19(2), 213-227.

Geoffrion, P. (2010). *Le groupe de discussion*. In B. Gauthier (Ed), *Recherche Sociale : de la problématique à la collecte de données*, 5ième éd (pp.391-414). Québec : Presses de l'université du Québec.

Gnirss, G. (2004). Innovation versus regulation. *Food in Canada*, 64(8), 20.

Gray, J., Armstrong, G. & Farley, H. (2003). Opportunities and constraints in the functional food market. *Nutrition and Food Science*, 33(5), 213–218.

Grönroos, C. & Ravald, A. (2011). Service as business logic: Implications for value creation and marketing. *Journal of Service Management*,23(4), 5-22.

Grunert, K. G., Bech-Larsen, T. & Bredahl, L. (2000). Three issues in consumer quality perception and acceptance of dairy products. *International Dairy Journal*, 10(8), 575-584.

Gummesson, E. (2012). The three service marketing paradigms: Which one are you guided by? *Mercati e Competitività*, 9(1/12), 5-15.

Gummesson, E. & Groönroos, C. (2012). The emergence of the new service marketing: Nordic school perspectives. *Journal of Service Management*, 22(2), 5-22.

Gummesson, E., Kuusela, H. & Närvänen, E. (2014). Reinventing marketing strategy by recasting supplier/customer roles. *Journal of Service Management*, 25(2), 228-240.

Hale, T. (2010). *How deep is your love? Progressive Grocer Store Brands,* (September), 8-9. Available online at: http://stagnitodigitalmedia.com/storebrands/Digital_Editions/PGStoreBrands2010Sep/flipviewerxpress.html (Accessed March, 2014).

Hall, M. L. (2008). *Non-profit health care services marketing: Persuasive messages based on multidimensional concept mapping and direct magnitude estimation. Feinstein College of Arts & Sciences Faculty Papers*. Available online at: http://docs.rwu.edu/fcas_fp/7/ (Accessed September, 2012).

Hailu, G., Boecker, A., Henson, S. & Cranfield, J. (2009). Consumer valuation of functional foods and nutraceuticals in Canada. A conjoint study using probiotics. *Appetite*, 52(2), 257-265.

Health Canada (2007). *Managing health claims for foods in Canada: Towards a modernized framework.* Discussion Paper, *Food Directorate, Health Products and Food Branch, Health Canada*. Available online at: http://www.hc-sc.gc.ca/fn-an/consult/_man-gest_health_claims-allegations_sante/index-eng.php (Accessed September, 2013)

Heasman, M. (2005). *The regulatory context for the use of health claims and the marketing of functional foods: Global principles.* In C.M. Hasler (Ed.), *Regulation of functional foods and nutraceuticals: A global perspective* (pp. 37–54). Oxford, England: Blackwell, IFT Press.

Herath, D., Cranfield, J., Henson, S. & Sparling, D. (2008). Firm, market, and regulatory factors influencing innovation and commercialization in Canada's functional food and nutraceutical sector. *Agribusiness*, 24(2), 207-230.

Hobbs, J. E. (2002). Evolving supply chains in the nutraceuticals and functional foods industry. *Canadian Journal of Agricultural Economics*, 50(4), 559-568.

Hodgins, M. E. (2011). *Innovation policy in Canada's Agri-Food system: The functional food and natural health products' segment.* Unpublished Doctoral thesis, City University London. Available online at: http://openaccess.city.ac.uk/1121/1/Hodgins, Mary Ellen.pdf (Accessed July, 2013).

Iris, M., Ridings, J. W. & Conrad, K. J. (2010). The development of a conceptual model for understanding elder self-neglect. *The Gerontologist*, 50(3), 303–315.

Jackson, K. M. & Trochim, W. M. (2002). Concept mapping as an alternative approach for the analysis of open-ended survey responses. *Organizational Research Methods*, 5(4), 307-336.

Kane, M. & Trochim, W. M. K. (2007). *Concept Mapping for Planning and Evaluation.* Thousand Oaks, CA: Sage.

Kelly, D. (2009). Adaptation and organizational connectedness in corporate radical innovation programs. *Journal of Product Innovation Management*, 26(5), 487-501.

Khamphoune, B. (2013). *Results from the 2011 Functional Foods and Natural Health Products Survey.* Statistics Canada. Ottawa. Available online at: http://www.statcan.gc.ca/pub/18-001-x/18-001-x2013001-eng.pdf (Accessed November, 2013).

Khan, R. S., Grigor, J., Winger, R. & Win, A. (2013). Functional food product development-opportunities and challenges for food manufacturers. *Trends in Food Science & Technology*, 30(1), 27-37.

Kirwin, R., Sporleder, T. L. & Hooker, N. H. (2008). *Product Innovation in the U.S. Food and Beverage Industries Since 2002.* Research Report, FDRS.

Kleef, E., van Trijp, H., Luning, P. & Jongen, W. M. (2002). Consumer-oriented functional food development: how well do functional disciplines reflect the 'voice of the consumer'? *Trends in Food Science & Technology*, 13(3), 93-101.

Kolb, D., G. & Shephred, B. M. (1997). Concept mapping organizational cultures. *Journal of Management Inquiry*, 6(4), 282-295.

Kondro, W. (2004). Natural health products: New labels, new credibility? *Canadian Medical Association Journal*, 170(6), 941.

Kotilainen, L., Rajalahti, R., Ragasa, C. & Pehu, E. (2006). *Health Enhancing Foods*. World Bank. Available online at: http://siteresources.worldbank.org/INTARD/Resources/Health_Enhacing_Foods_ARD_DP_30_final.pdf (Accessed January, 2013).

Kozup, J. C., Creyer, E. H. & Burton, S. (2003). Making healthful food choices: The influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing*, 67(2), 19-34.

Kumar, N. (1997). The revolution in retailing: From market driven to market driving. *Long Range Planning*, 30(6), 830-835.

Kruskal, J. B. (1964). Multidimensional scaling by optimizing goodness of fit to a nonmetric hypothesis. *Psychometrika*, 29(1), 1-27.

Kruskal, J. B. & Wish, M. (1978). *Multidimensional Scaling*. Beverly Hills, CA: Sage Publications.

L'Abbé, M. R., Dumais, L., Chao, E. & Junkins, B. (2008). Health claims on foods in Canada. *The Journal of Nutrition*, 138(6), 1221S-1227S.

Lagorce, A. (2009). *Functional foods bring healthy returns* - MarketWatch.com. Available online at: http://www.marketwatch.com/story/functionalfoods-bring-healthy-returns-2009-12-09 (Accessed January, 2014).

Lawrence, G. & Burch, D. (2008). *The 'wellness' phenomenon: Implications for global agri-food systems*. Paper presented at *The XII World Congress of Rural Sociology 'Envisioning Prosperous Rural Futures in a Globalizing World*, Goyang, Korea 6-11 July. Available online at: http://www.irsa-world.org/XII/papers/3-2.pdf (Accessed January, 2014).

Logman, M. (2011). Realism versus simplicity in strategic marketing planning: The impact of temporality. *Marketing Intelligence & Planning*, 29(7), 662-671.

Malla, S. M., Hobbs, J. E. & Perger, O. (2005). Estimating the health care savings from trans Fat-Free canola in Canada. *Food Economics*, 2(3-4): 175-184.

Malla, S., Hobbs, J. E. & Sogah, E. K. (2013). *Functional foods and natural health products regulations in Canada and around the world: Nutrition labels and health claims. Canadian Agricultural Innovation and Regulation Network*, 132 pp. Available online at: http://www.ag-innovation.usask.ca (Accessed April, 2014).

Malla, S., Hobbs, J. E., Sogah, E. K. & Yeung, M. T. (2013). *Assessing the functional foods and natural health products industry: A comparative overview and literature review. Canadian Agricultural Innovation and Regulation Network*, 132 pp. Available online at: http://www.ag-innovation.usask.ca (Accessed April, 2014).

Marasteanu, I. J., Jaenicke, E. C. & Dimitri, C. (2014). Slotting fees for organic retail products: Evidence from a survey of US food retailers. *Journal of International Food & Agribusiness Marketing*, 26(1), 28-48.

Mark-Herbert, C. (2004). Innovation of a new product category-Functional foods. *Technovation*, 24(9), 713-719.

Martínez-Ruiz, M. P., Ruiz-Palomino, P., Martinez-Canas, R. & Blázquez-Resino, J. J. (2014). Consumer satisfaction and loyalty in private-label food stores. *British Food Journal*, 116(5), 849-871.

Matlack, C., (2009). A French Wal-Mart's Global Blitz. *Bloomberg Business Week*, December 21, G4-G6.

Matthyssens, P., Vandenbempt, K. & Berghman, L. (2006). Value innovation in business markets: Breaking the industry recipe. *Industrial Marketing Management*, 35(6), 751-761.

Matthyssens, P., Vandenbempt, K. & Berghman, L. (2008). Value innovation in the functional foods industry: Deviations from the industry recipe. *British Food Journal*, 110(1), 144-155.

McCole, P. (2004), Refocusing marketing to reflect practice: The changing role of marketing for business. *Marketing Intelligence & Planning*, 22(5), 531-539.

Menrad, K. (2003). Market and marketing of functional food in Europe. *Journal of Food Engineering*, 56(2), 181-188.

Messinger, P. R. & Narasimhan, C. (1995). Has power shifted in the grocery channel? *Marketing Science*, 14(2), 189-223

Mentzer, J. T. & Williams, L. R. (2001). The role of logistics leverage in marketing strategy, *Journal of Marketing Channels*, 8(3/4), 29-47.

Mikkola, J. H. (2001). Portfolio management of R&D projects: Implications for innovation management. *Technovation,* 21(7), 423-435.

Miller, L. C., Rosas, S. R. & Hall, K. (2012).Using concept mapping to describe sources of information for public health and school nursing practice. *Journal of Research in Nursing*, 17(5), 466-481.

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2007). La dynamique de la distribution alimentaire d'hier à aujourd'hui. *Bioclips plus*, 10(2), 1-12. Available online at: http://collections.banq.qc.ca/ark:/52327/bs15524 (Accessed April, 2014).

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2009). Étude de la dynamique et des tendances des marchés au sein du secteur agroalimentaire. *Bioclips plus*, 12(2), 1-12. Available online at: http://www.mapaq.gouv.qc.ca/SiteCollectionDocuments/Bioclips/BioClipsplus_Vol_12_no2.pdf (Accessed September, 2012).

Nocke, V. & Thanassoulis, J. (2014). Vertical relations under credit constraints. *Journal of the European Economic Association*, 12(2), 337-367.

Nunnally, J. C. (1978). *Psychomtietric Theory*, New York: McGraw-Hill, 2nd Edition.

OSEC (2011). *The Canadian Food Retail Sector.* Available online at: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272 (Accessed April, 2014).

Ramsay, C. (2002). *A cure worse than the illness: Canada's proposed regulatory framework for natural health products in light of international evidence.* Vancouver, BC, Canada: The Fraser Institute.

Ray, K. (2004). *A Strategic Analysis of New Product Entry into the Nutraceuticals, Functional Foods, and Vitamins and Supplements Market.* Unpublished masters, University of Victoria.

Rencher, A. C. & Christensen, W. F. (2012). *Methods of Multivariate Analysis*, Hoboken, NJ: John Wiley & Sons, 3rd edition.

Roberfroid, M. B. (2000a). Concepts and strategy of functional food science: The European perspective. *The American journal of clinical nutrition*, 71(6), 1660-1664.

Roberfroid, M. B. (2000b). A European consensus of scientific concepts of functional foods. *Nutrition*, 16(7), 689-691.

Roe, B., Levy, A. S. & Derby, B. M. (1999). The impact of health claims on consumer search and product evaluation outcomes: Results from FDA experimental data. *Journal of Public Policy & Marketing*, 18(1), 89-105.

Rogers, R. T. (2001). Structural change in US food manufacturing. *Agribusiness*, 17(1), 3-32.

Ronteltap, A., van Trijp, J. C. M., Renes, R. J. & Frewer, L. J. (2007). Consumer acceptance of technology-based food innovations: Lessons for the future of nutrigenomics. *Appetite*, 49(1), 1-17.

Rosas, S, A. & Kane, M. (2012). Quality and rigor of the concept mapping methodology: A pooled study analysis. *Evaluation and Program Planning*, 35(2), 236-245.

Rosenbloom, B. & Mollenkopf, D. (1993). Dominant buyers: Are they changing the wholesaler's role in marketing channels? *Journal of Marketing Channels*, 3(1), 73-90.

Rosenbloom, B. (2007). Multi-channel strategy in business-to-business markets: Prospects and problems. *Industrial Marketing Management*, 36(1), 4-9.

Rosenbloom, B. (2012). *Marketing Channel: Management View*. Mason, Ohio: South-Western, 8th edition.

Rushton, A., Croucher, P. & Baker, P. (2014). *The Handbook of Logistics and Distribution Management: Understanding the Supply Chain*. Philadelphia: Kogan Page Publishers.

Sarkar, S. & Costa, A. I. (2008). Dynamics of open innovation in the food industry. *Trends in Food Science & Technology*, 19(11), 574-580.

Shewchuk, R. & O'Connor, S. J. (2002). Using cognitive concept mapping to understand health care to the elderly: An illustrative approach for planning and marketing. *Health Marketing Quarterly*, 20(2), 69-80.

Siedlok, F., Smart, P. & Gupta, A. (2010). Convergence and reorientation via open innovation: The emergence of nutraceuticals. *Technology Analysis & Strategic Management*, 22(5), 571-592.

Stiegert, K. W., Wang, S. S. & Rogers, R. T. (2009). Structural change and market power in the US food manufacturing sector. *Agribusiness*, 25(2), 164-180.

Su, Q., Zhao, L., Song, Y. T. & Chen, T. (2008). Conceptualizing consumers' perceptions of e-commerce quality. *International Journal of Retail and Distribution Management*, 36(3), 360-374.

Tamilia, R. D. (1999). *The logistics revolution: is logistics management now more important than marketing?* Working paper no 04-99, *Centre de recherche en gestion, Université du Québec à Montréal.*

Taylor, C. L. (2004). Regulatory framework for functional foods and dietary supplements. *Nutrition Reviews*, 62(2), 55–59.

Tether, B. (2002). Who co-operates, and why.An empirical analysis. *Research Policy*, 31(6), 947-967.

Traill, W. B. & Meulenberg, M. (2002). Innovation in the food industry. *Agribusiness*, 18(1), 1-21.

Trochim, W. M. (1987). *The Concept System*. Ithasca, NY: Trochim Publishing.

Trochim, W. M. (1989). An introduction to concept mapping for planning and evaluation. *Evaluation and Program Planning*, 12(1), 1-16.

Trochim, W. M. (1993). *The reliability of concept mapping*. In *Annual Conference of the American Evaluation Association*, Dallas, Texas. Available online at: http://www.socialresearchmethods.net/research/Reliable/reliable.htm (Accessed September, 2012).

Trochim, W. M., Cook, J. A. & Setze, R. J. (1994). Using concept mapping to develop a conceptual framework of staff's views of a supported employment program for individuals with severe mental illness. *Journal of Consulting and Clinical Psychology*, 62(4), 766-775.

Trochim, W. M. & Cabrera, D. (2005). The complexity of concept mapping for policy analysis. *Emergence: Complexity and Organization*, 7(1), 11-22.

Tsao, Y. C., Lu, J. C., An, N., Al-Khayyal, F., Lu, R. W. & Han, G. (2014). Retailer shelf-space management with trade allowance: A Stackelberg game between retailer and manufacturers. *International Journal of Production Economics*, 148 (February), 133-144.

Vargo, S. L. & Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of marketing Science*, 36(1), 1-10.

Venkatesan, R., Kumar, V. & Ravishanker, N. (2007). Multichannel shopping: Causes and consequences. *Journal of Marketing*, 71(2), 114-132.

Verbeke, W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics*, 32(3), 347-368.

Vergari, F., Tibuzzi, A. & Basile, G. (2010). *An overview of the functional food market: From marketing issues and commercial players to future demand from life in space.* In *Bio-Farms for Nutraceuticals* (pp. 308-321). Springer US. Available online at: https://www.makeover.landesbioscience.com/special/Giardi_9781587064678.pdf#page=337 (Accessed July, 2013).

Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? *Journal of Consumer Affairs*, 37(2), 305-316.

Wilkinson, I. F. (1973). Power and influence structures in distribution channels. *European Journal of Marketing*, 7(2), 119-129.

Wilkinson, I. F. (1996). Distribution channel management: Power considerations. *International Journal of Physical Distribution & Logistics Management*, 26(5), 31-41.

Wrick, K. L. (2005). *The impact of regulation on the business of nutraceuticals in the United States: Yesterday, today and tomorrow.* In C.M. Hasler (Ed.), *Regulation of Functional Foods and Nutraceuticals: A global perspective* (pp. 3–36). Oxford, England: Blackwell, IFT Press.

Ziggers, G. W. (2005). Radical product innovation in the dutch food industry: An empirical exploration. *Journal of Food Products Marketing*, 11(3), 43-65.

Zou, N. & Hobbs, J. E. (2006). *Modeling functional food choice and health care impacts: A literature review*. Working paper, Research Project Number CMD-06-02, *Consumer and Market Demand Agricultural Policy Research Network*. Available online at: http://consumerdemand.ualberta.ca/Portals/22/ConsumerDemanDocuments/CMD_06-02.pdf (Accessed April, 2014).

APPENDICES

Appendix 2.1 Reliability in concept mapping

The traditional theory of reliability, as applied in social science, is neither directly appropriate nor applicable to concept mapping (Trochim, 1993). While the traditional theory of reliability is based on a priori known or assumed correct answer for each test item, there is no assumed correct answer or correct sort in concept mapping (Trochim, 1993). Moreover, in traditional theory of reliability the data is typically stored in a matrix with respondents as the rows and items as the columns (Trochim, 1993). In concept mapping the structure of the data matrix is reversed, with the columns being respondents and the rows being items (or pairs of items) (Trochim, 1993). Thus, in traditional theory of reliability the emphasis is on each test item, or the total score (Trochim, 1993), whereas in concept mapping the emphasis is on the consistency across participants (Trochim, 1993). Therefore, it is relevant, in concept mapping, to speak of the reliability of the similarity matrix or the reliability of the map, but not of the reliability of individual statements (Trochim, 1993).

The assessment of the reliability in concept mapping can be conducted by using the sorting and rating data (Rosas and Kane, 2012). A set of reliability estimates can be computed for assessing participants' sorting and rating consistency.

a) Sorting reliability

For sorting reliability, Trochim (1993) proposed five estimates, namely: Split-half total matrix reliability (r_{SHT}); Split-half map reliability (r_{SHM}); Individual to individual

sort reliability (r_{II}); Individual-to-total reliability (r_{IT}) and Individual-to-map reliability (r_{IM}).

The split-half total matrix reliability (r_{SHT}) and the split-half map reliability (r_{SHM}) are calculated by dividing randomly the participants into two subgroups A and B and by computing separately the similarity matrices (T_A and T_B) and the MDS maps (X_A and X_B) (Trochim, 1993). As shown in figure 2.4, the correlation between the similarity matrices for each subgroup (T_A and T_B) is called the Split-Half Total matrix reliability (r_{SHT}) and the correlation between the two MDS maps (X_A and X_B) gives an estimate called the Split-Half Map reliability (r_{SHM}).These two reliability estimates are traditionally corrected with the Spearman–Brown correction[57](Nunnally, 1978) because the reliability is affected by the number of participants in a given group concept mapping estimates (Trochim, 1993). Regarding the estimation of the individual-to-total reliability (r_{IT}) and the Individual-to-map reliability (r_{IM}), one can compute respectively the correlation between each participant's binary sort matrix (S_{NxN}) and the total similarity matrix (T_{NxN}) (Trochim, 1993) and the correlation between each person's binary sort matrix (S_{NxN}) and the distances on the final map (D_{NxN}) (Trochim, 1993) (Figure 2.4). Finally, the individual-to-Individual sort reliability (r_{II}) is calculated by computing the correlations between all pairs of participant's binary sort matrix (S_{NxN}) (Trochim, 1993) (Figure 2.4).

In this study, all these sorting reliability tests are depicted in Table 2.4. The split-half total matrix reliability (r_{SHT}) and the split-half map reliability (r_{SHM}) were respectively

---

[57] Spearman-Brown correction formula: $r_{kk} = \frac{k\bar{r}_{ij}}{1+(k-1)\bar{r}_{ij}}$

Where:
r_{ij} = the correlation estimated from the data
k = N/n where N is the total sample size and n is the sample size on which r_{ij} is based

(0.89 and 0.82). For the individual-to-total reliability (r_{IT}) and the individual-to-map reliability (r_{IM}), they were respectively 0.97 and 0.94. Finally, the average Individual-to-Individual sort reliability (r_{II}) was 0.90. These estimates indicate that there is a considerable consistency in the concept mapping results. Moreover, all these estimates were higher than those obtained in Rosas and Kane (2012)[58] and Trochim, (1993)[59] (Table 2.4).

b) Rating reliability

Rating reliability can be assessed by computing the correlation among items using Cronbach's alpha and the inter-rater reliability coefficient (AICC) (Rosas and Kane, 2012).

In this study, the Cronbach's alpha coefficients for rating 1 (importance) and rating 2 (feasibility) were respectively 0.92 and 0.90 (Table 2.4). Although, these estimates are lower than Rosas and Kane (2012) (both 0.97) (Table, 2.4), they are still excellent because a Cronbach's alpha higher than 0.95 can reflect excessive redundancy in statements and a greater number of items (Cortina, 1993).The Cronbach's alpha coefficients for rating 1 (importance) and rating 2 (feasibility), obtained in this study, suggest that the statements on the importance and feasibility scales are highly intercorrelated and internally consistent (DeVellis, 1991).

Regarding, the average inter-rater reliability coefficient (AICC 1) for importance scale and the average inter-rater reliability coefficient (AICC 2) for feasibility scale, they were respectively 0.82 and 0.79, suggesting that across raters, the importance

[58]A pooled analysis of 69 concept mapping studies.

[59]A pooled analysis of 38 concept mapping studies.

and feasibility ratings are stable. In a pooled analysis of 69 concept mapping projects, Rosas and Kane (2012) reported that the average AICC 1 value was 0.89 (SD= 0.09, range: 0.69-0.99, 95% CI [0.88-0.91]). However, in Trochim's (1993) pooled analysis of 38 concept mapping projects, the AICC 1 average value was 0.78 (SD= 0.12, range: 0.43-0.94). Therefore, the AICC 1 value obtained in this study is lower than AICC 1 average value reported by Rosas and Kane (2012) but higher than AICC 1 average value reported by Trochim (1993) (Table 2.4). In fact, the number of participants in this study (21) is 4 times lower than participants' average presented in Rosas and Kane's (2012) pooled analysis (M=81.77, SD= 69.83, range: 18-485, 95% CI [64.99-98.54]) (Table 2.5). Nevertheless, the number of participants in this study is higher than the average of participants presented in Trochim's (1993) pooled analysis (M= 13.94, SD= 5.69, range: 6-33) (Table 2.5). Regarding AICC 2, Rosas and Kane (2012) reported that the average AICC 2 value was 0.87 (SD= 0.10, range: 0.42-0.97, 95% CI [0.84-0.90]). Thus, the AICC 2 value obtained in this study is lower than AICC 2 average value reported by Rosas and Kane (2012) (Table 2.4). As explained for AICC1, this is mainly due to the number of participants in this study comparing to Rosas and Kane (2012). In fact, there is three times less the number of participants in this study than the one reported by Rosas and Kane (2012) (Table 2.5).

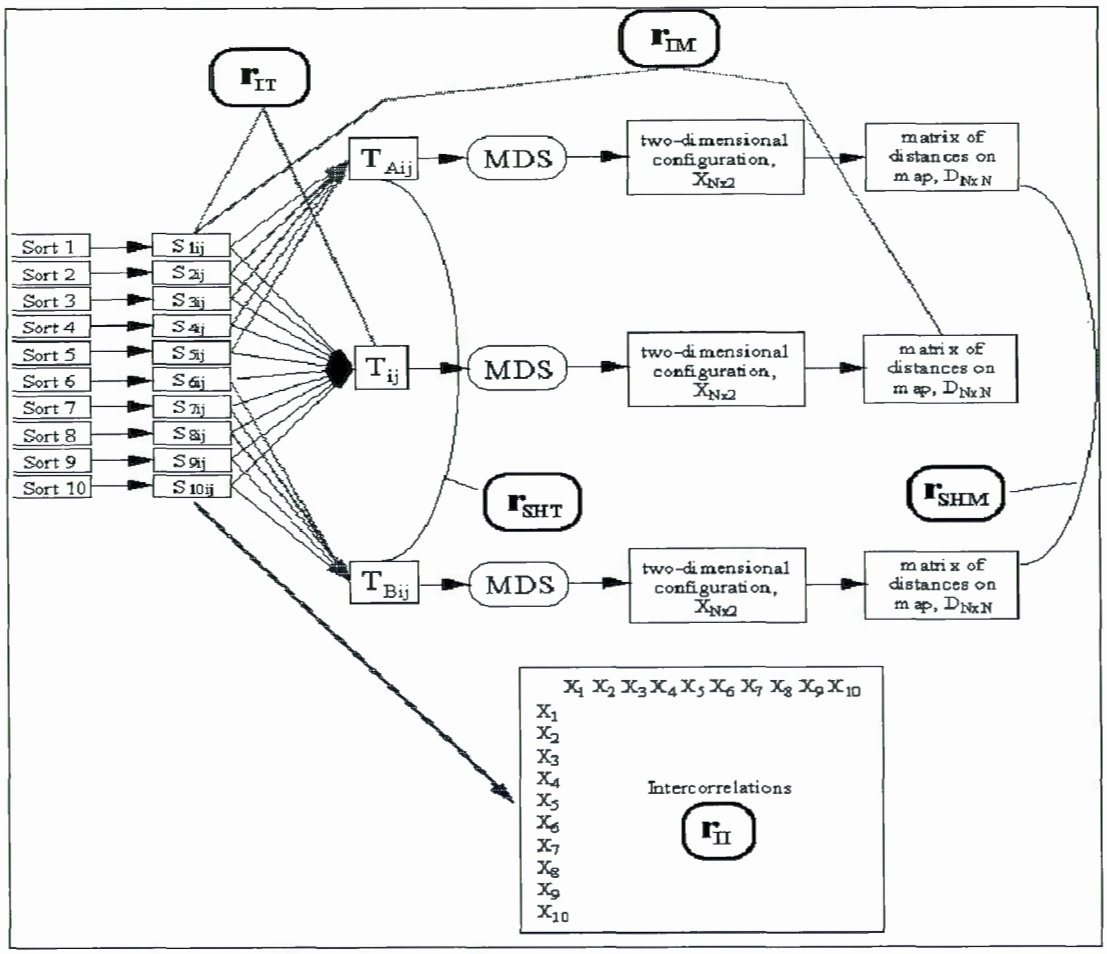


Figure 2.4 The key components in the concept mapping data and the related reliability estimates. Source: Trochim (1993, p. 6)

Table 2.4 Reliability tests of concept mapping

	Article 1 of this thesis	**Rosas and Kane (2012)**						**Trochim (1993)**			
	Value	M	SD	Min	Max	95% CI for mean		M	SD	Min	Max
						lower	upper				
Tests for data sorting reliability											
r_{SHT}	0.89	0.86	0.07	0.65	0.97	0.85	0.88	0.83	0.05	0.72	0.93
r_{SHM}	0.82	0.63	0.17	0.26	0.95	0.59	0.67	0.55	0.16	0.26	0.91
r_{IT}	0.97	0.96	0.02	0.90	0.99	0.95	0.96	0.93	0.02	0.88	0.97
r_{IM}	0.94	0.91	0.04	0.80	0.98	0.90	0.92	0.86	0.05	0.74	0.95
r_{II}	0.90	0.87	0.06	0.69	0.96	0.85	0.88	0.82	0.07	0.67	0.93
Tests for data rating reliability											
Cronbach's alpha for rating 1 (importance)	0.92	0.97	0.02	0.91	0.99	0.96	0.97	n.a	n.a	n.a	n.a
Cronbach's alpha for rating 2 (feasibility)	0.90	0.97	0.02	0.91	0.99	0.96	0.97	n.a	n.a	n.a	n.a
Average inter-rater reliability coefficient (AICC 1)	0.82	0.89	0.07	0.69	0.99	0.88	0.91	0.78	0.12	0.43	0.94
Average inter-rater reliability coefficient (AICC 2)	0.79	0.87	0.10	0.42	0.97	0.84	0.90	n.a	n.a	n.a	n.a

Abbreviations: M = Mean; SD = Standard Deviation; Min = Minimum; Max = Maximum; CI = Confidence Interval

Table 2.5 Descriptive statistics of concept mapping

	Article 1 of this thesis	Rosas and Kane (2012)								Trochim (1993)				
	M	M	SE	SD	Mdn	Min	Max	95% CI for mean		M	SD	Mdn	Min	Max
Descriptive statistics								Lower	Upper					
Number of statements	80	96.32	2.07	17.23	98.00	45.00	132.00	92.18	100.46	83.84	17.99	93	39	99
Number of sorters	21	24.62	1.84	15.30	20.00	6.00	90.00	20.95	28.30	14.62	5.77	14	7	32
Number of raters 1(importance)	21	81.77	8.04	69.83	62.00	18,00	485.00	64.99	98.54	13.94	5.69	14	6	33
Number of raters 2 (feasibility)	21	65.82	5.84	43.32	57.00	5.00	247.00	54.11	77.53	n.a.	n.a.	n.a.	n.a.	n.a.
Total number of participants	21	155.78	15.21	126.34	118.00	20.00	649.00	125.43	186.13	n.a.	n.a.	n.a.	n.a.	n.a.
Percent completing sorting	100	50.07	2.84	23.59	56.86	10.58	100	48.39	51.75	n.a.	n.a.	n.a.	n.a.	n.a.
Percent completing rating 1 (importance)	100	65.87	2.43	20.24	70.27	12.79	100	64.87	66.87	n.a.	n.a.	n.a.	n.a.	n.a.
Percent completing rating 2 (feasibility)	100	51.64	2.83	20.84	56.00	10.50	100	50.47	52.81	n.a.	n.a.	n.a.	n.a.	n.a.

Appendix 2.2 Cluster statement list -Communication with health professionals and regulatory options-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	20	De s'assurer que le contenu du message livré au consommateur sur ces aliments est conforme à la réglementation des autorités nationales responsables (ex. Santé Canada)	4,55	x	x
2	27	De rendre l'information au sujet des ces aliments disponible auprès des professionnels de la santé (ex. médecins, intervenants en prévention, etc.)	4,00	x	x
3	72	D'interpréter la valeur scientifique des ingrédients de ces aliments pour aider les consommateurs à faire de bons choix	3,85	x	x
4	53	De simplifier et d'uniformiser les logos de certifications ou d'homologation de ces aliments	3,75		
5	79	De faire des relations publiques avec le réseau des professionnels de la santé	3,70	x	x

Appendix 2.3 Cluster statement list -Information and communication with consumers-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	2	De s'assurer que le contenu d'une allégation santé de ces aliments soit compris par le consommateur	4,65		
2	44	De s'assurer que le consommateur soit en mesure de lire est de comprendre l'étiquette de ces aliments	4,45	x	
3	12	De sensibiliser le consommateur aux bienfaits associés à la consommation de ces aliments	4,45	x	x
4	21	D'informer les consommateurs sur les bienfaits de ces aliments par le meilleur canal de communication disponible	4,45	x	x
5	1	De s'assurer que le message au sujet des bienfaits de ces aliments soit transmis clairement tout au long de la chaîne jusqu'au détaillant	4,40		
6	42	D'attirer l'attention des médias(reportages télé, radio, journaux, magazines) pour faciliter la distribution de ces aliments	4,15	x	x
7	38	De sensibiliser le consommateur sur les bienfaits de ces aliments par des articles de vulgarisation dans les magazines et journaux de masse	4,15	x	x
8	4	De vulgariser les termes trop «scientifiques» ou «techniques» typiquement utilisés pour que les consommateurs comprennent les bienfaits de ces aliments	4,10	x	x
9	6	De bien positionner ces aliments par rapport à leurs principaux bienfaits sur la santé	4,10	x	x
10	31	De sensibiliser le consommateur aux bienfaits de ces aliments par des informations spécifiques à leur sujet sur les étiquettes	4,05		x
11	45	De faciliter la reconnaissance par les consommateurs de ces aliments par des programmes de promotion ou labels (ex. semblable à celui de «Aliments du Québec»)	3,95		
12	80	De mettre en ligne des portails d'informations que le consommateur peut consulter pour s'informer au sujet des ingrédients de ces aliments	3,95	x	x
13	73	De communiquer de manière distincte, mais cohérente, les bienfaits de ces aliments selon les différents types de détaillants (ex. : un pharmacien, un gérant de supermarché ou de boutique spécialisée, un chef cuisinier dans un restaurant, etc.)	3,90	x	x

Appendix 2.4 Cluster statement list -Market-oriented innovation management-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	46	De s'assurer de comprendre son propre modèle d'affaires lors de la recherche et du développement de ces aliments	4,20	x	x
2	47	De s'assurer de comprendre son propre modèle d'affaires lors de la mise en marché de ces aliments	4,15	x	x
3	71	De prendre en compte parallèlement les dimensions scientifiques, réglementaires et marché/produit de ces aliments	4,00		
4	15	D'intégrer la culture d'innovation dans la mission de l'entreprise	4,00	x	x
5	68	D'innover sur la dimension scientifique de ces aliments	4,00		x
6	69	D'innover sur la dimension marché/produit de ces aliments	3,95		
7	70	D'innover sur la dimension vente de ces aliments	3,90		

Appendix 2.5 Cluster statement list -Networking and institutional support-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	13	D'appuyer la recherche et le développement de ces aliments par des incitatifs financiers (ex. subventions, crédits d'impôt aux entreprises)	4,30	x	x
2	57	De favoriser les partenariats entre les entreprises et les institutions (ex. centres de recherche) responsables de la recherche et développement de ces aliments	4,10	x	x
3	56	D'améliorer le lien de confiance et de compréhension entre l'ensemble des intervenants pour les aliments santé	3,85	x	x
4	74	D'encourager l'innovation ouverte pour partager les coûts des essais cliniques des ingrédients de ces aliments	3,80	x	x
5	10	De mettre à la disposition des fabricants un programme de financement d'études cliniques de ces aliments	3,70		x
6	52	De mettre en place des procédures de réduction du délai d'obtention d'un NPN (Numéro de Produit Naturel)-homologué par Santé Canada) pour les PSN (Produits de Santé Naturels)	3,65		
7	58	De favoriser les partenariats entre les entreprises liées à la fabrication de ces aliments	3,60	x	x

Appendix 2.6 Cluster statement list -Retailers' relationship management-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	22	De connaître la perception du consommateur face aux bienfaits de ces aliments	4,35	x	x
2	61	De s'assurer que le détaillant est déterminé à promouvoir et à mettre en valeur ces aliments	4,30	x	x
3	78	De s'assurer que le prix de ces aliments reflète une légère prime qui soit acceptable pour le consommateur	4,20	x	x
4	64	De savoir si le consommateur distingue les aspects santé, fonctionnels et nutritifs de ces aliments	4,05	x	x
5	60	De prendre des initiatives peu coûteuses mais efficaces à mettre en place pour promouvoir ces aliments	3,90	x	x
6	39	De dispenser des formations au sujet de ces aliments aux détaillants et aux courtiers	3,85		x
7	36	De favoriser les partenariats entre les entreprises liées à la fabrication de ces aliments	3,70		x
8	67	De convaincre le détaillant de l'avantage de ces aliments comparativement aux aliments conventionnels	3,70		x

Appendix 2.7 Cluster statement list -Marketing strategies-

Odre d'importance de l'énoncé	No énoncé	Énoncés importants	Importance moyenne	Faisabilité (0-6mois)	Faisabilité (6mois-2ans)
1	66	De mener des études pour connaître la satisfaction perçue de ces aliments suite à leur consommation	4,35	x	x
2	65	De mener des études de comportement du consommateur pour connaître sa compréhension de l'aspect santé de ces aliments	4,15	x	x
3	77	De différencier constamment l'offre de l'entreprise de celle de ses concurrents	4,05	x	x
4	33	De connaître la sensibilité du consommateur face aux prix de ces aliments	3,90	x	x
5	3	D'améliorer le processus de gestion marketing de l'entreprise pour ces produits	3,75	x	x

CHAPITRE III

ARTICLE 2

IMPROVING THE DISTRIBUTION OF HEALTH ENHANCING FOODS: A QUALITATIVE SYSTEM DYNAMICS APPROACH

FOREWORD

This paper builds on results of Article 1 of this thesis. Following, the study conducted in Article 1, a conceptual framework was generated to help individual stakeholders in the health enhancing foods industry to identify and prioritize initiatives aimed at improving distribution of their products. These initiatives were grouped by participants into six clusters, namely: (1) Information and communication with consumers; (2) Market-oriented innovation management; (3) Retailers' relationship management; (4) Communication with health professionals and regulatory options; (5) Networking and institutional support; and (6) Marketing strategies. Thereby, it has been shown after handling concept mapping in Article 1 that the improvement of health enhancing food distribution goes beyond product/market boundaries and includes more contextual initiatives. Although, results of Article 1 can help marketing managers understand issues related to the distribution of their products, assist them in identifying potential useful actions for strategic planning and improve their decision making process, it does not provide a deeper understanding about the complexity of feedback loops between initiatives as they relate to the improvement of health enhancing food distribution. To do so, a qualitative System Dynamics (SD) approach was used in Article 2. According to Gharajedaghi (2006), Homer (1996), Luna-Reyes and Anderson (2003), Senge (1990) and Sterman (2000, 2001) SD help understand the underlying structure of complex systems.

SD was developed in 1958 by Jay W. Forrester to study complex systems in which several variables are interrelated (Sterman, 2001). The core premise in SD modeling is viewing all variables in a system as having both dependent and independent relationships (Luna-Reyes and Andersen, 2003; Sterman, 2000). Thus, the purpose of SD is to understand the system behavior and its evolution over time. It is based on systemic thinking rather than linear thinking that ignores side effects (Senge, 1990; Sterman, 2000). According to Cloutier (2001), SD has several advantages, it helps:

- Increase understanding of the impact of decisions over time;
- Identify strengths and weaknesses of available options;
- Provide a "safe" environment for discussing strategies;
- Identify strategies that meet business objectives;
- Provide analysis that represents multiple points of view;
- Disseminate information more quickly in the organization.

This paper focuses on interrelationships between initiatives aimed at improving the distribution of health enhancing foods. By using qualitative SD approach, this study takes into account the complexity, the structure to depict the uncertainty of the health enhancing foods industry and provides a systemic perspective.

ABSTRACT

This article develops an influence diagram (ID) to analyze interactions between a set of initiatives to be undertaken by a group of stakeholders working toward the improvement of health enhancing food distribution. The analysis is based on a conceptual framework designed for improving the distribution of health enhancing foods (El Ourabi, Cloutier and Filiatrault, 2015) and applies a qualitative System Dynamics (SD) approach. The ID emphasizes dynamic forces, namely communication and regulatory options dynamics, commercial and scientific dynamics. These dynamic forces are represented by the interrelationships amongst: (1) Information and communication with consumers, (2) Communication with health professionals and regulatory options, (3) Market-oriented innovation management, (4) Networking and institutional support, (5) Retailers' relationship management, and (6) Marketing strategies.

Data collected from unstructured individual interviews with experts in health enhancing foods and from two group discussion sessions with a heterogeneous group of 18 participants (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and in marketing, and government representatives) was used to represent these interactions.

The data was analyzed by applying inductive system diagram methods (Burchill and Fine, 1993, 1997) that combines aspects of grounded theory methods (Glaser, 1978; Glaser and Strauss, 1967; Strauss, 1987) and System Dynamics (Goodman, 1974; Randers, 1980).

The results show that the systemic improvement of the health enhancing food distribution depends simultaneously on the interaction amongst various initiatives related to communication and regulatory dynamics, commercial dynamics and scientific dynamics. The results bring some understanding of the interplay and complexity of feedback loops between regulatory, commercial and scientific-related variables and parameters as they relate to health enhancing food distribution.

KEY WORDS : System dynamics (SD), initiatives, inductive system diagram, distribution, health enhancing foods, qualitative analysis, influence diagram (ID).

RÉSUMÉ

Un diagramme d'influences (DI) a été élaboré dans cet article afin d'analyser les interactions entre les interventions spécifiques à entreprendre par les parties prenantes de l'industrie des aliments santé pour améliorer la distribution de ces produits. L'analyse se base sur un cadre conceptuel conçu pour l'amélioration de la distribution des aliments santé (El Ourabi, Cloutier et Filiatrault, 2015) et utilise une approche qualitative de la dynamique des systèmes (DS). Le DI met l'accent sur les forces dynamiques à savoir la communication et les possibilités réglementaires, la dynamique commerciale et la dynamique scientifique. Ces forces dynamiques sont représentées par les interrelations parmi : (1) Information et communication avec les consommateurs, (2) Communication avec les professionnels de la santé et possibilités réglementaires, (3) Gestion de l'innovation contextualisée avec le marché, (4) Réseautage et support institutionnel, (5) Gestion de la relation avec les détaillants, et (6) Stratégie marketing.

Des données recueillies à partir d'entrevues individuelles non structurées avec des experts en aliments santé et également à partir d'un groupe de discussion avec 18 participants (fabricants d'ingrédient, fabricants/transformateurs, experts et chercheurs en développement de la technologie, en sciences de la consommation, en distribution et en marketing alimentaire et des représentants du gouvernement) ont servi à la représentation de ces interrelations. L'analyse des données a été réalisée par l'utilisation de la méthode inductive du diagramme d'influence de la dynamique des systèmes (inductive system diagram method) (Burchill et Fine, 1993, 1997) qui combine des aspects de la théorie enracinée (Glaser, 1978; Glaser et Strauss, 1967; Strauss, 1987) et la dynamique des systèmes (Goodman, 1974; Randers, 1980). Les résultats montrent que l'amélioration de la distribution des aliments santé dépend simultanément de l'interaction entre différentes interventions liées à la dynamique de communication et réglementation, la dynamique commerciale et la dynamique scientifique. Les résultats approfondissent la compréhension de l'interaction entre les enjeux réglementaires, commerciaux et scientifiques dans l'amélioration de la distribution des aliments santé.

MOTS-CLÉS : Dynamique des systèmes (DS), interventions, méthode inductive du diagramme d'influence de la dynamique des systèmes (inductive system diagram method), distribution, aliments santé, analyse qualitative, diagramme d'influence (DI).

3.1 Introduction

Several factors affect the growth of an industry such as the competitive dynamics, customer power, technology and innovation, regulation and policy structures, system complexity, etc. (Fine, 1999). The health enhancing foods[60] industry is evolving and dynamic (Hobbs, 2002; Malla et al., 2013). It is characterized by changing consumer market and technology environments (Hobbs, 2002; Siedlok, Smart and Gupta, 2010), transformed supply chains (Hobbs, 2002) and changing regulations (Hobbs, 2002; Malla, Hobbs and Sogah, 2013; Siedlok, Smart and Gupta, 2010).

These characteristics pose both great opportunities and major challenges for companies and their marketing strategies. Indeed, food, pharmaceutical and retail companies alike enter the health enhancing foods market and are looking for ways to earn profits and gain a competitive advantage (Herath et al., 2008; Kleef et al., 2002; Lagorce, 2009). However, the characteristics of the food industry in general are challenging the static equilibrium assumptions of traditional economic theory (Boehlje, Roucan-Kane and Bröring, 2011). Indeed, managers are making decisions in a complex environment characterized by nonlinear processes, open systems, incomplete information, errors and biases in decisions (Boehlje, Roucan-Kane and Bröring,2011).

First, managers make decisions in a changing technology environment, a changing consumer market, an uncertain regulatory and highly competitive environment both

[60] Health enhancing food is a food that-beyond its basic nutritional value- provides demonstrated health benefits which can justify the use of nutritional, functional or risk reduction allegation (Corcuff et al., 2011). Comparatively to a conventional food product, health enhancing food has a native or induced composition or is developed from a particular technology aimed at improving its nutrient content and/or bioactive compounds and thus providing scientifically demonstrated health benefits (Cortuff et al., 2011). The health enhancing food category includes functional foods, natural health product (NHP), food supplement, etc.).

downstream and upstream the value chain (Bigliardi and Galati, 2013; Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002; Siedlok, Smart and Gupta, 2010)

Second, supply chains are very complex (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran and Mouly, 2007) fragmented and not well coordinated (Bröring, 2008). Third, the health enhancing food industry is evolving and dynamic (Hobbs, 2002; Malla et al., 2013). Food value chains are now being demand driven (Elfers, 2005; Evans and Lozinski 2004; Hodgins, 2011; Sakaran, 2005) with empowered and nutritionally aware consumers (Sakaran, 2005) and more consolidated and powerful retailers (Burch and Lawrence, 2005; Elfers, 2005; Hodgins, 2011). These challenges influence marketing managers' decision making process about how to improve the commercialization and distribution of health enhancing foods.

Furthermore, previous research in food and agribusiness has mostly used static analytical frameworks (Boehlje, Roucan-Kane and Bröring, 2011), while in marketing, decisions have indirect, delayed, nonlinear and multiple feedback effects, and multiple inputs and outputs (Sisodia and Hurley, 2002; Richardson and Otto, 2008). In fact, the decision process requires broader and more powerful analytical frameworks that must be dynamic both in time and uncertainty dimensions (Beinhocker, 2006; Boehlje, Roucan-Kane and Bröring, 2011). According to Boehlje, Roucan-Kane and Bröring (2011), firms in food and agribusiness industries must utilize qualitative and/or quantitative methods to determine the scope of possible outcomes and adjust their strategies accordingly.

Moreover, it has been argued recently, that mainstream research methods in marketing and in social science in general, focus on simple and unidirectional causal relationships between a few variables and therefore shun complexity, uncertainty and dynamics of the market (Gummesson, Kuusela and Närvänen, 2014). As a

consequence, strategic decision making in marketing is without systemic or holistic views and understanding of the market (Gummesson, Kuusela and Närvänen, 2014). Therefore, a new paradigm in marketing theory has recently emerged (Gummesson, Kuusela and Närvänen, 2014). It is based on integration, interdependency, network and systems thinking (Gummesson, Kuusela and Närvänen, 2014). This paradigm's emphasis is on all stakeholders, and thus, on complexity and higher level theory generation (Gummesson, Kuusela and Närvänen, 2014).

In response to this new paradigm and to the research needs identified by Boehlje, Roucan-Kane and Bröring (2011), the aim of this research is to identify and provide a better understanding of the dynamics between a set of initiatives to be undertaken by individual stakeholders working toward the improvement of health enhancing food distribution. The main research questions this paper answers are the following:

1) What is the structure of the initiatives aimed at improving the distribution of health enhancing foods?

2) How do the initiatives aimed at improving the distribution of health enhancing foods interact together?

A qualitative System Dynamics (SD) approach was used as a research method in this exploratory study to map interactions between a set of initiatives to be undertaken by individual stakeholders aimed at improving the distribution of health enhancing foods. The use of qualitative SD modeling in this research is appropriate because it supports managers understanding the interactions and the underlying structure of complex systems in which all variables have both dependent and independent relationships and therefore improve their decision making process (Gharajedaghi, 2006; Homer, 1996; Luna-Reyes and Anderson 2003; Sengè, 1990; Sterman, 2000, 2001). Moreover, SD is appropriate because managers are limited in their thinking by

bounded rationality and often adopt linear thinking that ignores feedback processes that impedes them to better know the complexity of their systems. Consequently, this may affect negatively their decision making process (Desthieux, Joerin and Lebreton, 2010; Eden, 1994; Größler, Millinga and Winch, 2004; Sterman, 2000). Finally, as suggested by Behara (1995), system thinking has maximum impact when applied to:

- Issues that span multiple disciplines and involve high degree of complexity and dynamic behavior that require a significant amount of management time.
- Situations involving chronic problems with multiple interconnected operational issues.
- Problem situations that have resisted traditional solutions.

The remainder of this article is organized as follows. In the next section, a literature review is presented. The paper then presents, in section 3.3, the research methods. The results are described in section 3.4. Findings are discussed in section 3.5. The paper concludes, in section 3.6, with a summary of managerial implications, limitations and avenues for future research.

3.2 Literature review

This section describes the context of the health enhancing foods industry and summarizes results of the literature. The challenging characteristics of the health enhancing foods industry are presented in subsection 3.2.1. Then, section 3.2.2, presents a conceptual framework for improving health enhancing food distribution (El Ourabi, Cloutier and Filiatrault, 2015) that this article builds on to map the interactions between a set of initiatives aimed at improving the distribution of these products.

3.2.1 The challenging characteristics of the health enhancing foods industry

The health enhancing foods industry exhibits a number of challenging characteristics. First, supply chains are complex (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran and Mouly, 2007), fragmented and not well coordinated (Bröring, 2008). Second, the supply chains are evolving and dynamic (Hobbs, 2002). They have evolved into being buyer driven (Elfers, 2005; Evans and Lozinski, 2004; Hodgins, 2011; Sakaran, 2005). Finally, the environment is highly volatile and uncertain (Boehlje, Roucan-Kane and Bröring, 2011; Hobbs, 2002; Siedlok, Smart and Gupta, 2010). Each of these challenging characteristic is described below.

a) Challenging characteristics: Complex supply chains

Several studies both on agri-food products (Boehlje, Roucan-Kane and Bröring, 2011; Pritchard and Burch, 2003; Yakovleva and Flynn, 2004) and health enhancing foods (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran and Mouly, 2007) stated supply chains are complex, fragmented and not well coordinated.

The complexity of supply chains of health enhancing foods is mainly due to the nature of functions[61], participants involved and their relationships (Hobbs, 2002; Sankaran 2005; Sakaran and Mouly, 2007). In fact, the functions within the health enhancing foods chains are numerous; they follow the commercialization pathway from idea/basic R&D, technology development, technology transfer, production/processing, product approval, and elaboration of marketing strategies (Herath et al., 2008; Hobbs, 2002). This process is complex and costly (Kleef et al., 2002, 2005). It requires resources from academic, commercial and regulatory interests (Jones and Jew, 2007).

[61]That are needed to turn an innovation into a marketable product (Herath et al., 2008).

First, significant research efforts are needed. This includes identifying bioactive compounds in foods and assessing their physiological effects, developing appropriate food matrix, taking into account bio-availability and possible changes during processing and food preparation and clinical trials on product efficacy to obtain health claims for marketing (Kotilainen et al., 2006). Second, strict legislative aspects must be taken into account when developing and commercializing health enhancing foods (Jones and Jew, 2007; Malla, Hobbs and Sogah, 2013). Finally, the marketing of health enhancing foods requires developing new markets, developing packaging and design, building strong marketing and branding programs, elaborating consumer education programs, etc. (Jones and Jew, 2007; Mark-Herbert, 2003; Siedlok, Smart and Gupta, 2010). Important financial resources over a long period of time are also required for basic research, technology development and commercialization, product approval, and elaboration of marketing strategies (Hobbs, 2002; Siedlok, Smart and Gupta, 2010).

Given the complexity of the health enhancing foods market (Hobbs, 2002; Sankaran 2005; Sakaran and Mouly, 2007; Siedlok, Smart and Gupta, 2010), multiple actors participate along the value chain and form complex relationships to better coordinate functions to be undertaken (Siedlok, Smart and Gupta, 2010). Hence, collaborative arrangements such as alliances, partnerships and joint ventures are formed between diverse partners along the supply chains (Chiaroni, Chiesa and Frederico, 2011; Khan et al., 2013; Hobbs, 2002; Sakaran, 2005; Siedlok, Smart and Gupta, 2010).

Moreover, research procedures and collaboration partners change several times during this process (Sakaran, 2005). As illustrated in Figure 3.1, a complex web of nontraditional actors are participating in the Canadian health enhancing foods industry such as pharmaceutical companies, food processors, research institutions,

universities, policy making agencies, farm inputs companies, retailers, consumers, health care givers, financial companies, etc. (Basu, Thomas and Acharya, 2007).

These actors form an interconnecting network for technological development and intellectual property, for clinical testing to prove health claims, and for brand development and market entry (Mark-Herbert, 2002; Sakaran, 2005). Furthermore, when firms go beyond a collectively shared knowledge framework to seek the expertise they lack through collaboration, they engage in 'knowledge networking' (Langlais, Janasik and Bruun, 2004). Collaboration between diverse actors is critical to deliver new products to the market (Bröring and Cloutier, 2008; Chiaroni, Chiesa and Frederico, 2011; Hobbs, 2002; Khan et al., 2013; Matthyssens,Vandenbempt and Berghman, 2008; Sarkar and Costa, 2008; Siedlok, Smart and Gupta, 2010).

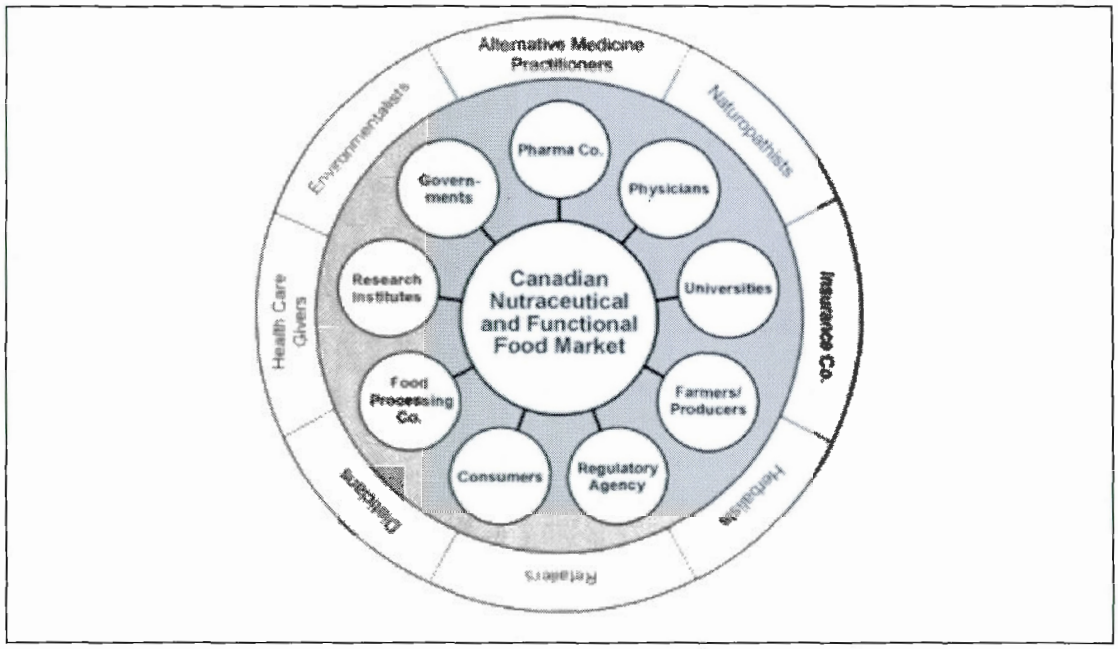


Figure 3.1 Principal stakeholders in the Canadian health enhancing foods industry. Source: Basu, Thomas and Acharya (2007, p. 2)

b) Challenging characteristics: Evolving and dynamic supply chains

The health enhancing foods is an evolving and a dynamic industry (Hobbs, 2002; Malla et al., 2013). In Canada, food supply chains are controlled by nontraditional actors at the consumption end rather than at the production end of the spectrum (Hodgins, 2011). Indeed, food value chains have evolved over time into being demand driven (Elfers, 2005; Evans and Lozinski, 2004; Hodgins, 2011; Sakaran, 2005) and controlled by powerful retailers (Burch and Lawrence, 2005; Elfers, 2005; Hodgins, 2011). Following major drivers in the health enhancing foods such as, consolidation (concentration), technology development, globalization and health shift from therapeutic to preventive (Hodgins, 2011), consumers are increasingly empowered and nutritionally aware (Sakaran, 2005) and retailers are more consolidated and operate in highly concentrated markets.

Regarding consumers, they are increasingly seeking products tailored to their needs, aimed to prevent chronic diseases such as osteoporosis, cardiovascular disease and Alzheimer's disease and optimize their health, for example by boosting the immune system and by increasing energy (Regmi and Gehlhar 2005; Sadler, 2005). Moreover, consumers are now telling the companies what they want as foods (Aguilera, 2006) and these requests have evolved into mass customization (Boland, 2008). Consequently, consumers are pulling products through diverse channel members rather than products being pushed through the system by manufacturers/suppliers.

Furthermore, the digital revolution such as e-commerce and social media has empowered customers (Deloite, 2014; Leeflang et al., 2014). By using these technologies, consumers play an active role as value co-creators (Vargo and Lush, 2008). However, this is challenging companies. For instance the social media content is affecting consumers more than advertising (Leeflang et al., 2014). Indeed, it has

been argued that more than 90% of consumers read online reviews before they buy products and 67% of all purchases are based on user-generated content (Codes and Silva, 2012). Consequently, this content plays an important role in consumer's decision making (Codes and Silva, 2012). Essentially, consumers read at least four reviews before making a purchase.

Concerning the grocery retail market, it is highly concentrated and vertically integrated into food distribution (OSEC[62], 2011).The six largest[63] food retailers in Canada account for 80% of total food sales. This retail market concentration makes the retailers very powerful (Burch and Lawrence 2005). As defined in the distribution and marketing channel literature, power is the ability to control the decision variables of another member (El-Ansary and Stern, 1972) or the ability to influence decision-making and actions of other parties (Wilkinson, 1973; 1996).

Retailers are solidifying their power in the marketplace by means of private labels (Elfers 2005; Hodgins, 2011; Lawrence and Burch, 2008). In Canada, private label packaged food reached a market value estimated at 6.6 billion dollars in 2012 and a market share of 12.7% (Euromonitor, 2013 in AAFC[64], 2013).

c) Challenging characteristics: Uncertain environment

The agribusiness industry in general is highly volatile and uncertain (Boehlje, Roucan-Kane and Bröring, 2011). The technological, regulatory, market, social and

[62]OSEC (2011).The Canadian Food Retail Sector. Opportunities for Swiss companies Available online at: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272

[63]Loblaws, Sobeys, Metro, Costco Canada, Safeway and Walmart Canada.

[64]Agriculture and Agri-Food Canada.

competition environments are uncertain (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). Following major societal, economic and technological changes (Bigliardi and Galati, 2013; Boehlje, Roucan-Kane and Bröring, 2011), the types and sources of uncertainties faced by the agribusiness decision makers have recently multiplied (Boehlje, Roucan-Kane and Bröring, 2011).

Table 3.1 summarizes key strategic uncertainties that agribusiness firms are facing and describes some exposures to each. Comparing to traditional risks, uncertainties are more complex and difficult to analyze and manage because they are not predictable in frequency and consequence (Boehlje, Roucan-Kane and Bröring, 2011). Although uncertainty cannot be quantified, firms cannot ignore it (Boehlje, Roucan-Kane and Bröring, 2011). In fact, uncertainty would have an effect on firm's objectives (Hillson, 2003). Accordingly, managers must be proactive in managing uncertainty to create long-term added value (Pascale, Millemann and Gioja, 2000).

Table 3.1 Strategic uncertainties in Agribusiness

Types of strategic uncertainty	Examples of exposures
Business/ Operational - Operations and business practices - Human resources - Strategic positioning	- Business interruption - Los s of key employees
Financial - Financing and financial structure - Financial markets	- Increasing interest rates - Loss of lender - Highly leveraged
Market conditions - Market prices and terms of trade - Competitors - Customer relationships - Reputation and image	- Pricing pressure/discounting by competitors - Loss of market share - Consolidation - Hyper competition
Technology -Technological change	- Limited acceptance of biotechnology - Slow to commercialize new products - Competitor has preferred standards/platforms
Business relationships - Business partners and partnerships - Distribution systems and channels	- Dependence on distributors - Not a preferred supplier to processor - Not a key account to suppliers
Policy and regulation - Political climate - Regulatory and legislative climate	- Changes in intellectual property - Changes in industry subsidies or tax policies - Local limits on technology adoption

Source: Adapted from Boehlje, Roucan-Kane and Bröring (2011)

The uncertainty of the health enhancing food industry is mainly due to the evolving nature of the technology environment, consumers' acceptance of these products, increased competition, and the uncertainty of the regulatory environment (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). Each of these uncertainties is described hereafter.

Technological uncertainty

Following advances in technology and in social trends, the food industry shifted from a traditionally low-technology industry into a high-technology industry (Khan et al., 2013; Siedlok, Smart and Gupta, 2010). The development and commercialization of health enhancing foods require novel knowledge, specialist skills and high technologies such as biotechnology, nanotechnology and genomics (Khan et al., 2013). As a consequence, the health enhancing foods industry is a high technology research-intensive industry (Siedlok, Smart and Gupta, 2010) and is considered under the umbrella of the bioeconomy (Gault, 2007).

Although critical to target new markets and develop radical innovative products, these high technologies bring additional challenge for firms (Siedlok, Smart and Gupta, 2010). They result in a much longer timeframe to market (Sakaran, 2005) because of the need for evidence based claims (Hobbs, 2002), perturb or transform the whole industry (Saives, 2009), transform or displace some or all of established supply networks (Siedlok, Smart and Gupta, 2010) and thus reinforce high levels of market and environmental uncertainties (Hobbs, 2002; Siedlok, Smart and Gupta, 2010). Following technological changes, firms have to manage, in an orchestrated way, discontinuities such as convergence, indeterminate industry boundaries, disintermediation and eco-sensitivity (consumers concerns and acceptance) (Siedlok, Smart and Gupta, 2010).

Competitive environment uncertainty

The health enhancing foods market is characterized by intensive upstream and downstream competition (Bigliardi and Galati, 2013; Hobbs, 2002; Lawrence and Burch, 2008). Regarding the upstream competition, health enhancing foods firms are competing with each other and with other conventional foods and pharmaceutical companies for both market share, shelf space (Hobbs, 2002) and also in attracting investments (Hodgins, 2011). Moreover, the pharmaceutical and food processing industries alike are concentrated in Canada (Hobbs, 2002).

According to AAFC (2009), the health enhancing food industry is dominated by large and already established firms that restrict market share gains by small companies. In fact, market concentration intensifies competition (Bigliardi and Galati, 2013). In such competitive situation, established companies maintain their market power through barriers to entry (economy of scales, multiple brands, etc.) and therefore limit the entry of small scale innovators. Consequently, small firms form strategic alliances or partnerships in upstream or downstream the supply chain to access financial and human capital resources (Hobbs, 2002; Malla et al., 2013).

Furthermore, as mentioned above, health enhancing foods manufacturers are also facing downstream competition from consolidated and highly concentrated food retailers. Besides, food retailing concentration, the enlargement of food supermarkets' sizes and the advent of nontraditional actors whose main activity is not food distribution such as Walmart, Dollarama, drugstores, etc., are challenging food manufacturers who create a fierce competition for shelf space (MAPAQ, 2007, 2009). In fact, it has been argued in the marketing literature that given their increasing size, their use of advanced technologies and sophisticated marketing strategies, retailers are gaining even more power (Betancourt and Goutschi, 1998; Matlack, 2009;

Messinger and Nasasimhan, 1995; Rosenbloom, 2012). This power is continuously reinforced by the means of private labels (Elfers 2005; Hodgins, 2011; Lawrence and Burch, 2008). This challenges food manufacturers by shortening their product-life cycle (Bröring, 2008; Ronteltalp et al., 2007), especially that consumers no longer buy private labels only for value pricing (Martínez-Ruiz et al., 2014) and consider them as lower quality substitutes (Hardy, 2010 in Khan et al., 2013; Tamilia, 1999).

Market acceptance

Despite the growing number of consumers who have some knowledge about the relationship between diet and diseases and their interest toward health enhancing foods to prevent chronic diseases or optimize their health (Sadler, 2005; Regmi and Gehlhar, 2005), consumers' acceptance of these products persists and translates into an uncertain future demand (Moorsel, Cranfield and Sparling, 2007; Siedlok, Smart and Gupta, 2010). In fact, health enhancing foods have credence attributes and consumers cannot adequately assess their properties, quality or safety before or even after purchase (Verbeke, 2005; Zou and Hobbs, 2006). Due to information asymmetry between buyers and sellers, market failures arise (Verbeke, 2005). In such situation, sellers have more knowledge concerning the production process, product origin, nutritional content, or about safety issues than buyers do (Verbeke, 2005). As a result, consumers are skeptical and lack trust regarding benefits of health enhancing foods (Hobbs, 2002; Siedlok, Smart and Gupta, 2010).

Given information asymmetry and credence attributes of health enhancing foods, it was argued that labelling plays a determinant role in helping consumers make informed choices (Garretson and Burton, 2000; Hailu et al., 2009; Kozup, Creyer and Burton, 2003; Roe, Levy and Derby, 1999; Wansink, 2003).

Regulatory environment uncertainty

In recent years, the Canadian regulatory environment for health enhancing foods has changed and evolved considerably. The major changes in the regulation relate to controls on health claims and approval of natural health products (NHP)[65] (Blandon, Cranfield and Henson, 2007; Malla, Hobbs and Sogah, 2013). In January 2004, a new regulatory regime for NHP was implemented (Health Canada, 2012). Following this new regime, nutraceuticals came under the broader category of NHP[66] (Cinnamon, 2007).

Regarding health claims, 26 structure/function claims[67] are currently approved in Canada for foods and nine disease risk reduction claims[68] are permitted both on foods and on NHP (Malla, Hobbs and Sogah, 2013). These disease risk reduction claims are the following (Malla, Hobbs and Sogah, 2013):

1. Low sodium and high potassium linked to the reduced risk of hypertension;
2. Adequate vitamin D and calcium intake, linked to reduced risk of osteoporosis;
3. A diet low in saturated fat and trans fat, and the reduced risk of heart disease;

[65] Such as herbal remedies, homeopathic medicines, vitamins, minerals, traditional medicines, probiotics, amino acids and essential fatty acids.

[66] Following some qualitative testing with the industry, NHP was the most commonly used and accepted (Cinnamon, 2007).

[67] Structure/function claims relate to the effects that a food has on the normal functions of the body. They are based on the role that the food or the food constituent plays when consumed at levels consistent with normal dietary patterns.(Canadian Food Inspection Agency, 2014). Available online at:http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=7#s13c7

[68] Disease risk reduction claim are statements that link a food to a reduced risk of developing a diet-related disease or condition in the context of the total diet (Canadian Food Inspection Agency, 2014). Available onlineat:http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14

4. A diet rich in vegetables and fruits, and the reduced risk of some types of cancer;

5. Maxima fermentable carbohydrates in gum, hard candy or breath-freshening products, and the reduced risk of dental caries.

6. Plant sterols and the lowing of blood cholesterol

7. Oat products and the lowing of blood cholesterol

8. Barley products and blood cholesterol lowering

9. Unsaturated fat and blood cholesterol lowering

Despite the positive impact of these changes on the health enhancing foods industry, considerable frustrations remain, especially for small and medium-sized enterprises (SMEs) concerning, for example the rate and the delay of approval and the ability to make product-specific claims (Blandon, Cranfield and Henson, 2007; Malla et al., 2013). According to Saives (2009) these changes leaded to a strategic dilemma for firms that do not have advanced technological capabilities and thus have to consider opening their product portfolio to others to register their products.

First, some studies stated that the Canadian regulatory system for health enhancing foods is still restrictive in comparison with that of other countries such as Japan, the United States and the European Union (Crowley, 2008; L'Abbé et al., 2008; Malla, Hobbs and Sogah, 2013). For instance, while seventeen disease risk reduction claims are permitted in the United States, only nine disease risk reduction claims are permitted in Canada (Malla, Hobbs and Sogah, 2013). Further, whereas the United States and Japan allow qualified health claims[69] and product specific claims[70] on

[69] Qualified health claims are claims that contain credible but inconclusive evidence (Malla, Hobbs and Sogah, 2013).

food, Canada prohibits them (Malla, Hobbs and Sogah, 2013). Moreover, most of structure/function claims in Canada are approved as disease risk reduction claim in the United States (Malla, Hobbs and Sogah, 2013). Ultimately, Canada regulates the NHPs differently than food by using a product specific system with a more substantial level of evidence. While, for example, in Japan NHPs are treated in a similar manner than food, and in the United States, they are considered distinct from food without imposing significant different regulations (Malla, Hobbs and Sogah, 2013).

Second, the regulatory regime is considered cumbersome and slow moving (Crowley, 2008; Malla et al., 2013). Indeed, the approval process did not follow the changes in the foods' industry and the underlying science (Crowley, 2008; Malla et al., 2013) and regulations do not follow the rate of innovation advances of health enhancing food companies (Crowley, 2008).

Finally, the Canadian regulatory environment is also considered to be uncertain (Hobbs, 2002; Malla et al., 2013). This is mainly due to the differences in international regulatory systems and differences in terminologies (Hobbs, 2002; Malla et al., 2013).

To sum up, it was argued that all these regulatory concerns act as barriers to the development and commercialization of new products, increase costs of bringing product to market, delay product launch, increase the risks of innovation (Burdock, Carabin and Griffiths, 2006; Coppens, Da Silva and Pettman, 2006) and cause distrust among health professionals and consumers (Malla et al., 2013).

---

[70] Product specific claims are used only by products that undergo a registration process for a claim that specifies a relationship between the food or food constituents and a health benefit (Malla, Hobbs and Sogah, 2013).

3.2.2 A conceptual framework for improving health enhancing food distribution

This article builds on a conceptual framework for improving health enhancing food distribution (El Ourabi, Cloutier and Filiatrault, 2015). While taking into account the challenges that health enhancing foods industry is facing, the conceptual framework identifies initiatives to be undertaken by individual stakeholders working toward the improvement of the distribution of their products by using an integrated mixed-method, namely concept mapping (Kane and Trochim, 2007).

The initiatives were generated and grouped by participants (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, consumer sciences, food distribution and marketing, and government representatives) into six (6) clusters namely: (1) Information and communication with consumers; (2) Market-oriented innovation management; (3) Retailers' relationship management; (4) Communication with health professionals and regulatory options; (5) Networking and institutional support and (6) Marketing Strategies. Figure 3.2 illustrates the conceptual framework for improving the distribution of health enhancing foods.

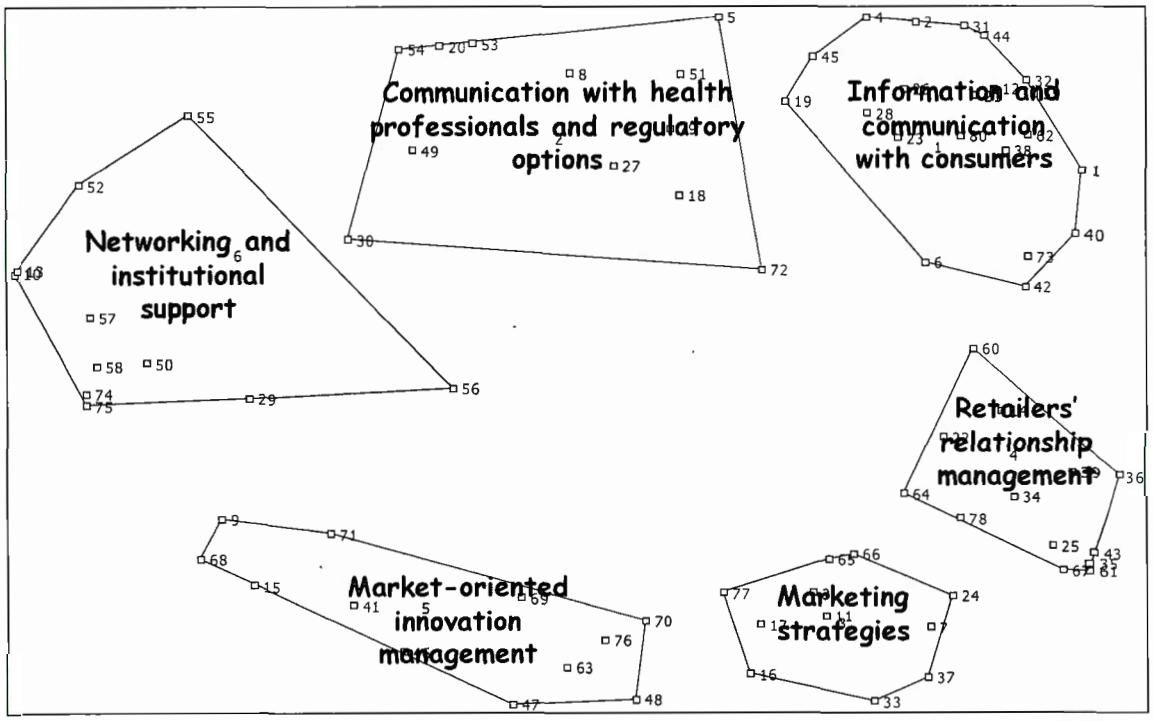


Figure 3.2 A conceptual framework for improving health enhancing food distribution
Source: El Ourabi, Cloutier and Filiatrault (2015)

Although, this framework offers a shared bottom-up conceptual framework of stakeholders involved in the improvement of the distribution of health enhancing foods, it does not provide an explanation of the structure of interaction that takes place between the initiatives that can be undertaken to improve the distribution of these products over time. To do so, the SD methodology was used in this study.

3.3 Research methods

This exploratory study applies qualitative SD (Forrester, 1969; Mayo, Callaghan and Dalton, 2001; Sterman, 2000; Sterman, Repenning and Kofman, 1997) to examine relationships between diverse initiatives aimed at improving the distribution of health

enhancing foods. Previous studies that have used qualitative SD have demonstrated its usefulness and capability in supporting decisions (Meadows et al., 1972; Morecroft and van der Heijden, 1992). SD can help understand patterns of interactions and the underlying structure of complex systems (Homer, 1996; Senge, 1990; Sterman, 2001). In fact, SD, as one of the system thinking approaches, is appropriate when applied to complex issues, dynamic behavior, and situations with numerous interconnected elements that span multiple disciplines (Behara, 1995). Especially, the environment of health enhancing foods firms is highly volatile, uncertain, complex, evolving and dynamic (Bröring, 2008; Hobbs, 2002; Malla et al., 2013; Sakaran, 2005; Sakaran and Mouly, 2007; Siedlok, Smart and Gupta, 2010) and consequently the decision process is characterized by nonlinearity , open systems, incomplete information, errors and biases in decisions (Boehlje, Roucan-Kane and Bröring, 2011). In this complex environment, both the system and agents within the system (stakeholders) influence the industry dynamics (Lane, 1995). Thereby, the use of qualitative SD in this research is appropriate.

In accordance with previous studies describing modeling processes (Sterman, 2000; Randers, 1980; Richardson and Pugh, 1981; Roberts et al., 1983; Wolstenholme, 1990), three stages were followed in this study, namely conceptualization, formulation and testing. Each of these stages is briefly described below.

a) Conceptualization stage

The conceptualization stage involves problem articulation and a dynamic hypothesis[71] formulation (Sterman, 2000) following the qualitative principles of SD (Coyle, 2000;

[71]According to Sterman (2000), a dynamic hypothesis provides an explanation of the dynamics characterizing the problem using feedback loops to show the the causal relationships amongst variables with arrows from a cause to an effect.

Wolstenholme, 1990), and the specific steps suggested by Luna-Reyes and Andersen (2003) (Table 3.2).

Table 3.2 System Dynamics modeling process and potential qualitative methods

Steps in the modeling process		**Qualitative methods potentially useful**	**Qualitative methods used in this study**
Conceptualization	Problem articulation	Techniques that can be used for problem identification and elaboration of a dynamic hypothesis:	-Unstructured interviews with two experts in health enhancing food sector
	System conceptualization	-Interviews (ranging from informal conversation to standardized, closed, fixed-field response interviews) -Oral history -Focus groups -Hermeneutics -Discourse analysis -Content analysis	-Two group discussion sessions with ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, consumer sciences, food distribution and marketing, and government representatives
Formulation	Model formulation	Techniques to guide model formulation: -Grounded theory -Ethnographic decision models	-Grounded theory.
Testing	Analysis of model behavior	Techniques to obtain expert judgment about model structure and behavior:	-Interviews with 3 experts in health enhancing foods industry
	Model evaluation	-Interviews -Focus groups -Delphi groups -Experimental approaches	

Adapted from Luna-Reyes and Andersen (2003)

Problem articulation

To scope the problem of this research, identify concepts/variables and the behavior that should be considered in this study, unstructured interviews with two experts in health enhancing foods was held in December 2011. According to these experts, the distribution of health enhancing foods is complex. It is affected by scientific, regulatory and commercial issues. In other words, the decision making process regarding the distribution of health enhancing foods depends on the simultaneous consideration of (1) scientific advancements in health enhancing foods' transformation and processing, (2) regulatory aspects concerning approval and labelling of such products, and (3) consumers' needs, expectations and commercial aspects. This is described in the following excerpt from experts' discourse:

> *«...Given complexity, there are many interventions to align. There are the science aspect, the regulatory aspect and the commercial aspect... It is a multitude of things that need to be connected...There is a collection of strategic information in the health enhancing foods' world that must be considered other than selling taste, selling pleasure. It's even more complex... it needs a good reflection».*[72]

During the unstructured interviews, the experts highlighted the need of convergence between what they called *«the Science Sphere»,* the *«Regulatory Sphere»*, and *«the Commercial Sphere»*. Besides, previous studies also demonstrated the importance of scientific, regulatory and commercial aspects in the development and commercialization of health enhancing foods (El Ourabi, Cloutier and Filiatrault, 2015; Jones and Jew, 2007; Mark-Herbert, 2003; Siedlok, Smart and Gupta, 2010). For example, in a recent study, El Ourabi, Cloutier and Filiatrault (2015) found that the improvement of the distribution of health enhancing foods depends

[72] To refer to the original excerpt in French, see excerpt #1 in Appendix 3.1.

simultaneously on initiatives related to scientific, communication and regulatory and commercial dynamics.

Based on unstructured interviews with experts and the literature, it can be inferred that these issues are critical and intertwined. Figure 3.3, illustrates the interrelationships between scientific, commercial and regulatory issues.

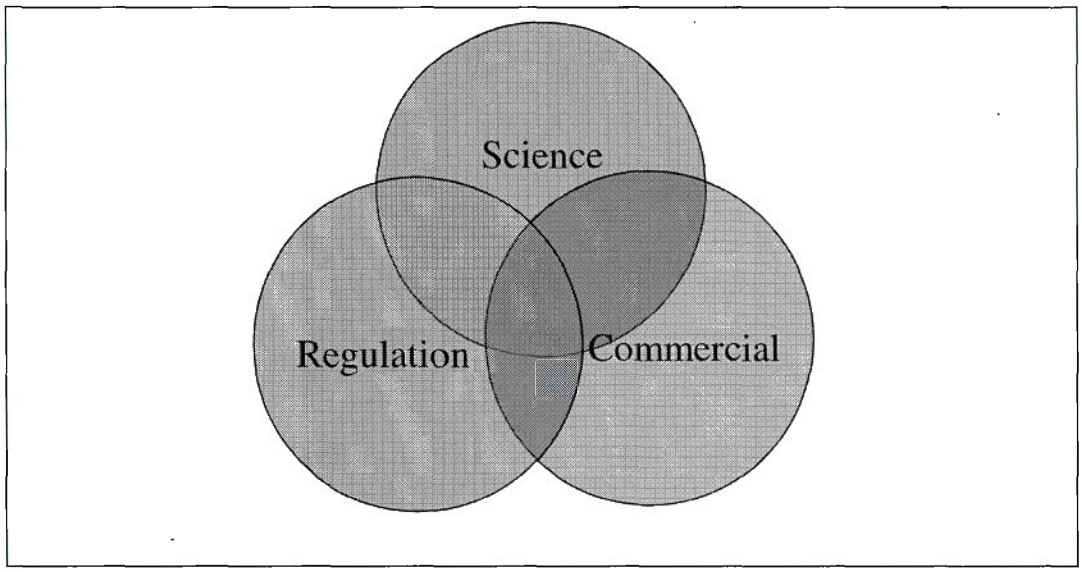


Figure 3.3 Problem articulation related to the distribution of health enhancing foods

Dynamic hyopothesis formulation

The dynamic hypothesis provides an explanation of the dynamics characterizing a problem in terms of feedback loops that show causal links amongst variables with arrows from a cause to an effect (Sterman, 2000). The determination of the dynamics of a system involves the identification and representation of the structure of feedback loops (Sterman, 2001). There are two types of feedback loops: reinforcing feedback loops (denoted 'R') and balancing feedback loops (denoted 'B'). A reinforcing

feedback loop (R)[73] tends to strengthen and amplify the behavior of a system. A balancing feedback loop (B)[74] is an equilibrating loop which is goal or balance-seeking. The interaction of these feedback loops generates the dynamic behavior of a system structure (Sterman, 2001).

To proceed with the formulation of the dynamic hypothesis, three steps were followed, namely: (1) identification of themes, (2) interrelationships between themes, and (3) feedback loop analysis of theme structure. These steps are described in detail in section 3.4.

b) Formulation stage

The formulation stage is based on a discussion of emerging feedback loops (Luna-Reyes and Andersen, 2003). To discuss the causal loops designed in this study, Luna-Reyes and Andersen (2003) propose grounded theory as a qualitative data analysis technique. This technique has a critical role in rigourous system dynamics efforts (Sterman, 2000). According to Burchill and Kim (1993; 1997), the combination of grouded theory and SD is called inductive system diagramming. While grounded theory can be used to identify variables that have explanatory power and are intimately tied to the data, the SD shows the cause and effect relationships amongst these variables (Burchill and Kim, 1993). The combination of grounded theory and causal-loop diagramming allows researchers to generate and communicate empirically-based theoretical propositions (Burchill and Kim, 1993). Following

[73] In this loop, the tendency is to reinforce the initial action that is, the variables have all the same signs (+) or (-).

[74] In this loop, the tendency is to oppose the initial action, that is the variables have opposite signs (+ and -)

Burchill and Kim (1993, 1997), inductive system diagram was used in this study to discuss emerging feedback loops.

c) Testing stage

In the testing stage, the model constructed should mirror the 'real world' (system) and therefore must not contradict known and existing knowledge about its structure (Luna-Reyes and Andersen, 2003). To do so, Forrester and Senge (1980) propose to: (1) review the model assumptions by persons highly knowledgeable about the real system, (2) compare the model assumptions with a description of decision making and organizational relationships found in relevant litterature.

The ID testing of this study was realized, based on the guidelines of Forrester and Senge (1980). Thereby, the empirical evidence supporting each loop of the ID was analyzed through data gathering techniques such as interviews with highly knowledgeable field experts[75] and supplemented by a comparison of the relationships with theoretical background of innovation, open innovation and networking.

Moreover, to ensure the trustworthiness of this qualitative study, triangulation was used. Triangulation increases credibility (internal validity) (Logman, 2011). In this study, we used both data triangulation and methodological triangulation. Data triangulation consists in combining diverse sources[76] when gathering data while methodological triangulation or analytical triangulation (Langley, 1999) requires using more than one method in interpreting data (Logman, 2011).

[75]Interviews were conducted with three experts in the field of health enhancing foods industry.

[76]Participants of this study have diverse perspectives: ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives.

3.4 Formulation of the dynamic hypothesis

The formulation of the dynamic hypothesis is not the ultimate goal but rather a mean to better understand the problem studied and reach a consensus on its representation (Vennix, 1996). As mentioned earlier, the formulation of the dynamic hypothesis takes the form of an ID that follows the three steps namely (1) identification of themes, (2) interrelationships between themes, and (3) feedback loop analysis of theme structure.

It should be noted here, that the elaboration of the dynamic hypothesis in this study was based on unstructured interviews conducted with experts in the health enhancing foods industry, results from El Ourabi, Cloutier and Filiatrault (2015)[77] and existing literature (e.g. Jones and Jew, 2007; Mark-Herbert, 2003; Siedlok, Smart and Gupta, 2010).

3.4.1 Identification of themes: Communication and regulatory options dynamics, commercial dynamics and scientific dynamics

The identification of themes was based on a previous study (El Ourabi, Cloutier and Filiatrault, 2015) that developed a conceptual framework for improving the distribution of health enhancing foods. According to this study, six clusters of initiatives aimed at improving the distribution of health enhancing foods can be grouped into three major themes[78]. As depicted in Figure 3.4, theme I (Communication and regulatory options dynamics) is composed of clusters 1 and 2 respectively *Communication with health professionals and regulatory options* and

[77]The first article of this thesis.

[78]This partition was approved by participants during the data interpretation step of the concept mapping project used in that study.

Information and communication with consumers. Theme II (Commercial dynamics) consists of clusters 3 and 4, namely: *Marketing strategies* of health enhancing foods' firm (cluster 3) and *Retailers' relationship management* with health enhancing foods manufacturers (cluster 4). Finally, theme III (Scientific dynamics) is made up of clusters 5 and 6, respectively: *Networking and institutional support* and *Market-oriented innovation management*.

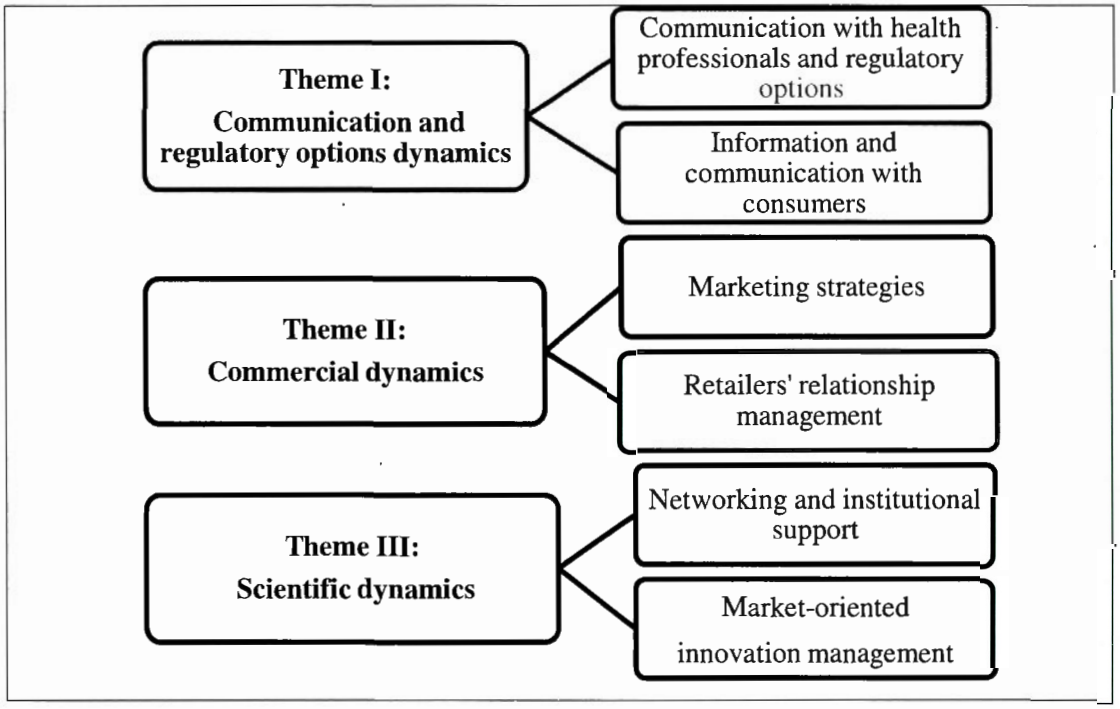


Figure 3.4 Themes related to the improvement of the distribution of health enhancing foods. Source: Adapted from El Ourabi, Cloutier and Filiatrault (2015)

3.4.2 Interrelationships between themes: Communication and regulatory options dynamics, commercial dynamics and scientific dynamics

As an iterative process (Sterman, 2000), SD modeling begins with a summary view of the interrelationships between themes. Figure 3.5 depicts the interaction between

communication and regulatory options dynamics (theme I), commercial dynamics (theme II) and scientific dynamics (theme III).

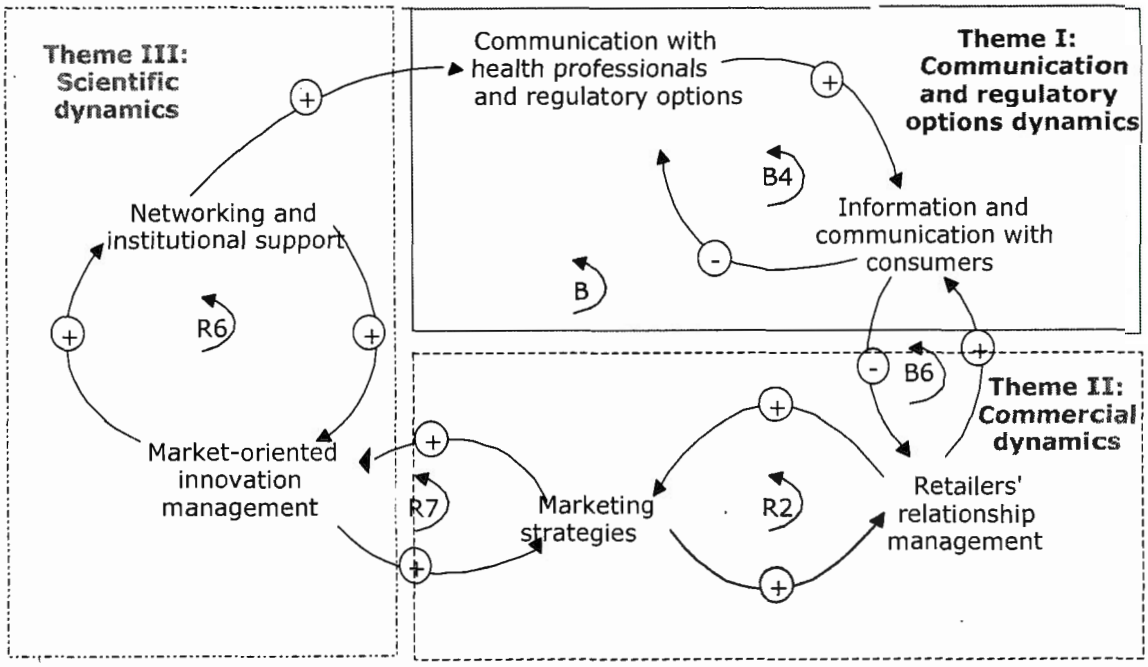


Figure 3.5 Interrelationships between themes

Communication and regulatory options dynamics (theme I) interact with commercial dynamics (theme II). This interrelationship is represented by the balancing feedback loop B6. In fact, initiatives related to *Information and communication with consumers* affect negatively those associated with *Retailers' relationship management*. These last initiatives support initiatives related to *Information and communication with consumers*. Furthermore, the commercial dynamics (theme II) influences the scientific dynamics (theme III) and vice versa. This interaction is represented by the reinforcing feedback loop (R7). Thereby, initiatives related to *Marketing strategies* affect positively those related to *Market-oriented innovation management* and vice versa (R7). Finally, scientific dynamics (theme III) has an impact on communication

and regulatory options dynamics (theme I). Indeed, initiatives related to *Networking and institutional support* influence positively *Communication with health professionals and regulatory options.*

The description of interactions between the themes associated with the improvement of health enhancing food distribution (Figure 3.5) provides only insights about the macro behavior of the themes' dynamics. The microstructure responsible for the macro behavior depicted in figure 3.5 is described hereafter by a dynamic hypothesis.

For each of the three themes multiple feedback loops represented in the ID are formulated and documented.

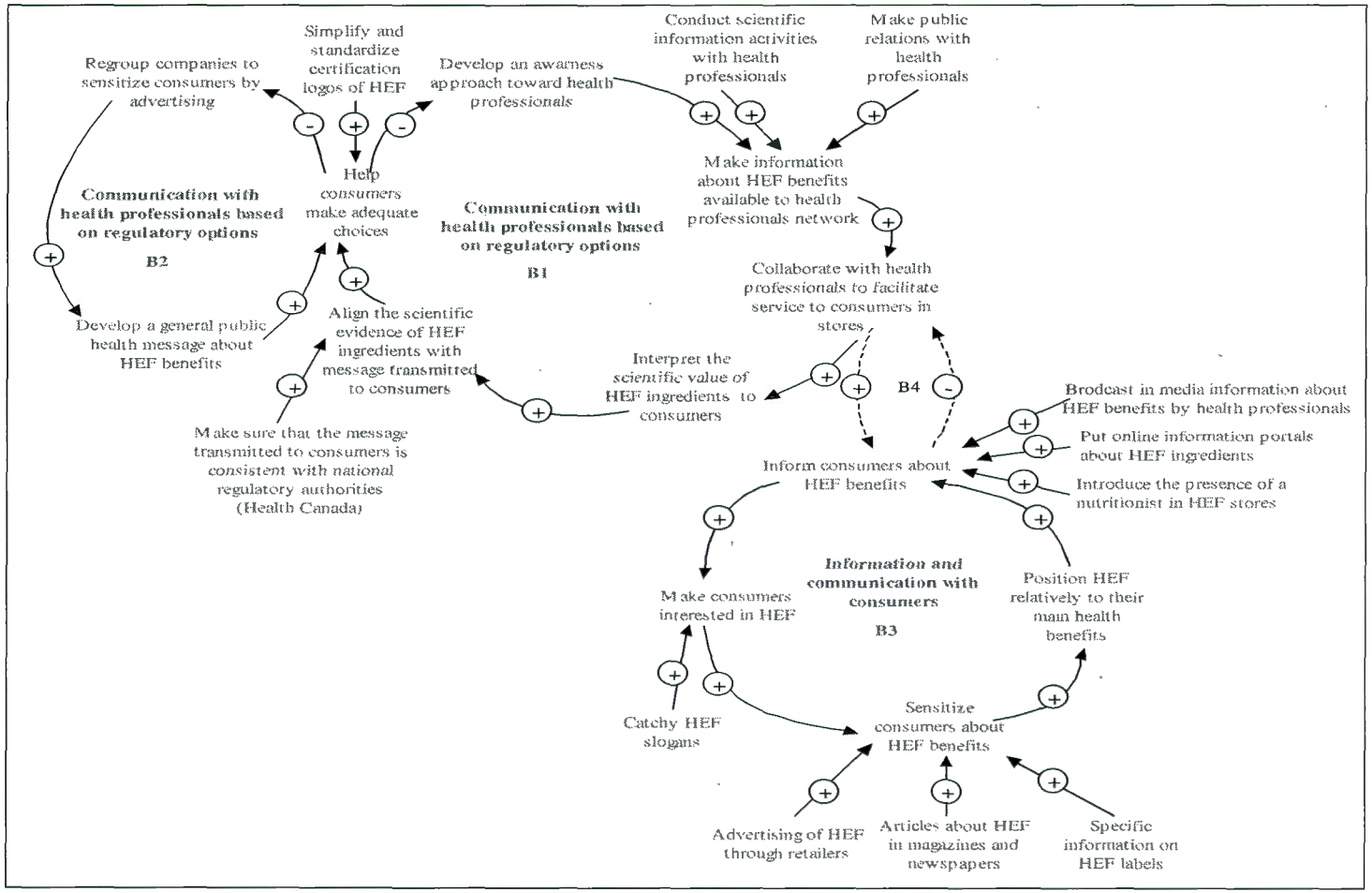
3.4.3 Feedback loop analysis of identified theme structure

a) Theme I: Communication and regulatory options dynamics

Theme I describes the communication and regulatory options dynamics related to the improvement of the distribution of health enhancing foods. As illustrated earlier in Figure 3.4, the communication and regulatory options dynamics theme is made up of two clusters, namely: *Communication with health professionals and regulatory options* and *Information and communication with consumers.*

Figure 3.6 illustrates the feedback loops related to these clusters and the interaction between them. Indeed, the balancing feedback loops B1 and B2, labeled both *Communication with health professionals and regulatory options*, depict the dynamics of initiatives related to *Communication with health professionals and regulatory options* that aim at improving the distribution of health enhancing foods.

The balancing feedback loop B3, named *Information and communication with consumers*, captures the dynamics of initiatives related to *Information and communication with consumers* and therefore aimed at improving the distribution of health enhancing foods. Finally, the balancing feedback loop B4 shows the interrelationships between *Communication with health professionals and regulatory options* (B1 and B2) and *Information and communication with consumers* (B3). A description of the feedback loops B1, B2 and B3 followed by an analysis of their interaction, as delineated by (B4) is presented hereafter.



Abbreviations: HEF = Health enhancing foods

Figure 3.6 Theme I: Communication and regulatory options dynamics

At the top of Figure 3.6, an illustration of the balancing feedback loops B1 and B2 (*Communication with health professionals and regulatory options)* is provided. In fact, the more health enhancing food companies make the information available about the health benefits of their products to health professionals (for example through awareness approaches, information activities, and public relations), the more they favor collaboration with them. Furthermore, the collaboration between health enhancing foods firms and health professionals facilitates the interpretation of the scientific value of health enhancing foods ingredients to consumers. For instance, when a nutritionist in a store or supermarket, provides information to consumers about the benefits of these products and their ingredients, the service to consumers would then be improved. This interpretation and dissemination of the scientific value of health enhancing foods ingredients to consumers leads to an alignment of the scientific evidence of health enhancing foods ingredients with the message sent to consumers. Thus, it helps consumers with health enhancing foods choices. Finally, when consumers are assisted with health enhancing foods choices through (1) the alignment of the transmitted message with the scientific evidence of health food ingredients, (2) the simplification and standardization of health enhancing foods certification logos, and (3) the conception of a general public health message related to health benefits, the health enhancing food companies will be less inclined to develop awareness approaches toward health professionals. At the same time, health enhancing food companies will undertake fewer initiatives aimed to consumer sensitization and advertising. This, however, will negatively affect the conception of a general public health message and therefore engenders less consumer support.

At the bottom of Figure 3.6, the balancing loop B3 *Information and communication with consumers* is illustrated. The more health enhancing food companies inform consumers about benefits of their products by means of diverse initiatives (for example, information dissemination by health professionals in media, online portals,

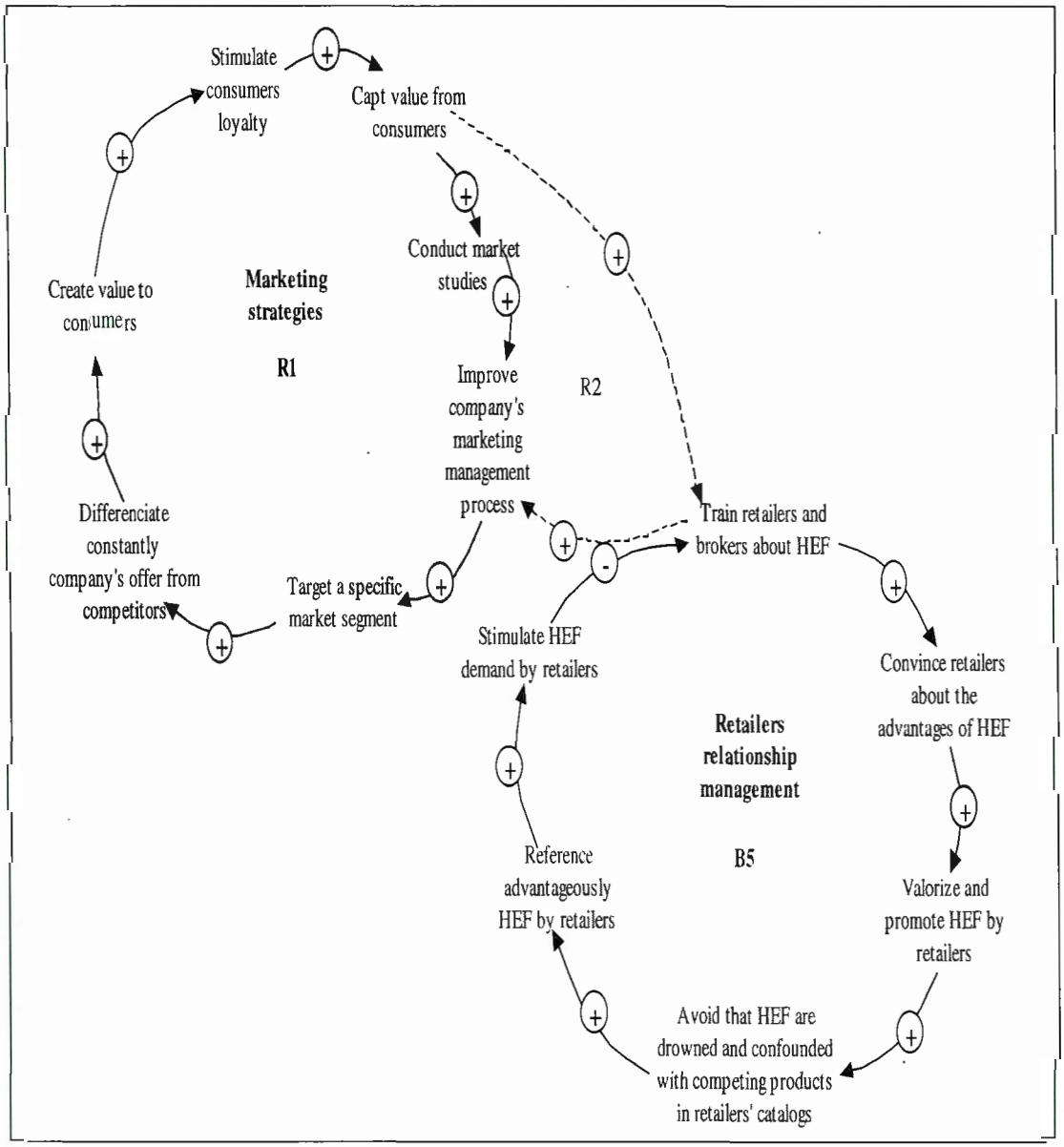
the presence of a nutritionist in a health food store and vulgarization of the technical and scientific terms), the easier they get them interested in their offers. Moreover, the more consumers are interested in health enhancing foods, the easier health enhancing food companies can sensitize them about benefits of such products and consequently the easier they can clearly position their products relatively to their main benefits. However, when health enhancing foods are clearly positioned in consumers' minds relatively to their perceived benefits, health enhancing food companies will be brought to put less effort to inform their consumers about benefits of their products.

The Balancing feedback loop B4 depicts the interaction between *Communication with health professionals and regulatory options* (B1 and B2) and *Information and communication with consumers* (B3). The more health enhancing food companies collaborate with health professionals, the more consumers are well-informed about the benefits of these products. However, the more consumers are informed, the less health enhancing food companies feel the necessity to put much emphasis on collaboration with health professionals.

b) Theme II: Commercial dynamics

As mentioned earlier, theme II delineates the commercial dynamics associated with the improvement of the distribution of health enhancing foods. As depicted earlier in Figure 3.4, the commercial dynamics theme is composed of initiatives related to *Marketing strategies* (cluster 3) and *Retailers' relationship management* (cluster 4). Figure 3.7 illustrates the feedback loops related to *Marketing strategies* (cluster 3), *Retailers' relationship management* (cluster 4) and their interrelationships. Thereby, the reinforcing feedback loop R1 labeled *Marketing strategies*, shows the interrelationships between initiatives related to *marketing strategies* aimed at improving the distribution of health enhancing foods. The balancing feedback loop

B5, labeled *Retailers' relationship management,* captures the interaction between initiatives related to *retailers' relationship management.* Finally, the reinforcing feedback loop R2 shows the interrelationship between the feedback loops *Marketing strategies* (R1) and *Retailers' relationship management* (B5). A description of each feedback loop (R1) and (B5) followed by an analysis of the feedback loop (R2) is presented below.



Abbreviations: HEF = Health enhancing foods

Figure 3.7 Theme II: Commercial dynamics

A representation of the reinforcing feedback loop R1 *Marketing strategies* is provided in Figure 3.7. Hence, the more health enhancing foods firms conduct market surveys (for example on consumers' satisfaction, consumers understanding of health aspects of foods or on consumers' price sensitivity, etc.), the more they improve their marketing management process. In fact by conducting surveys on consumers, health enhancing food companies learn more about and understand consumers needs and wants toward health enhancing foods and can therefore target specific market segments and differentiate constantly their products from competition. By doing so, companies can then create more value to their consumers and consequently stimulate customers' loyalty. The more companies stimulate consumers' loyalty, the more they build long-term customer equity (Armstrong and Kotler, 2011). Similarly, the more companies capture value (revenues, loyalty, customer equity) from their customers the more they have resources to conduct market surveys.

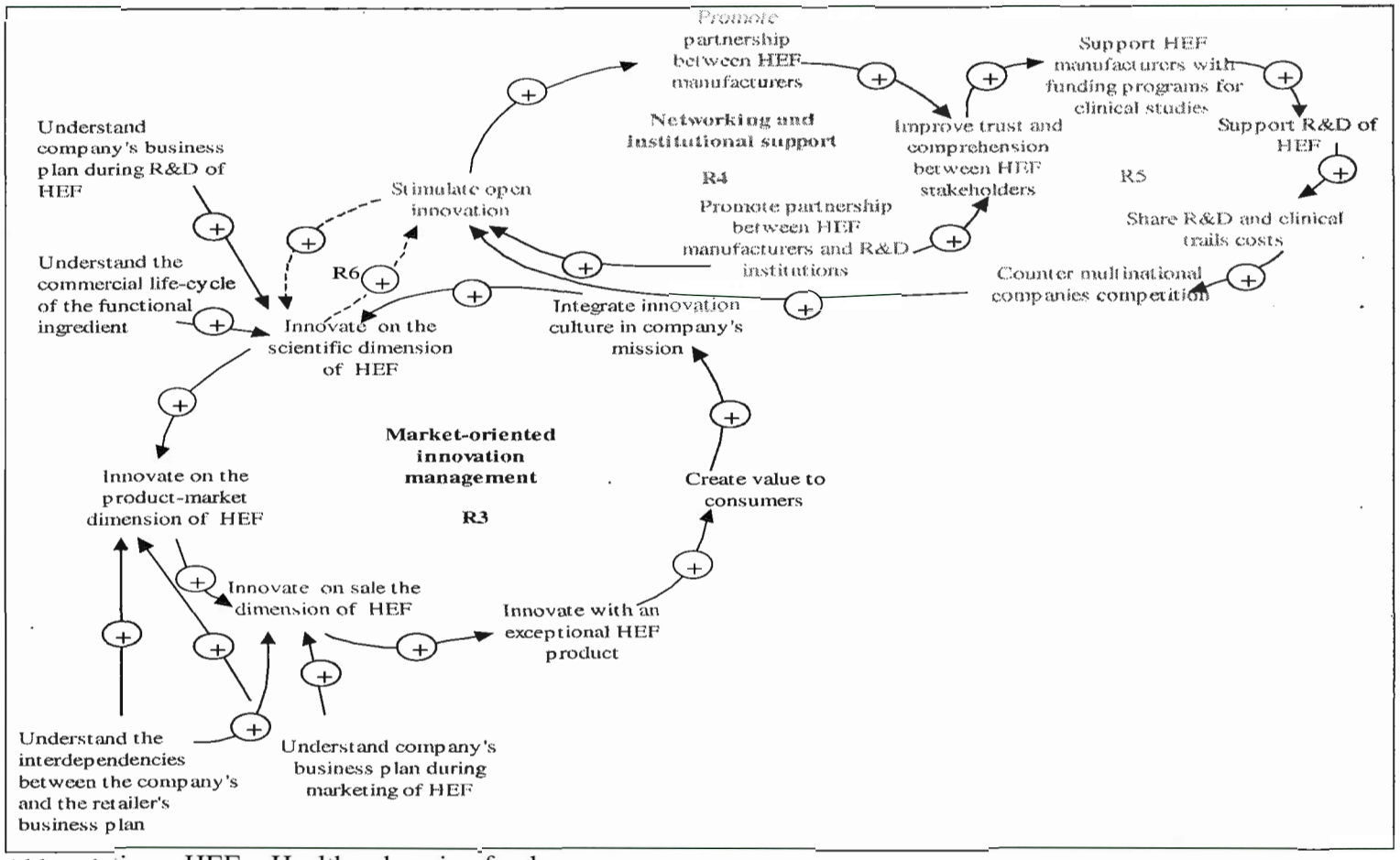
Figure 3.7 also shows the balancing feedback loop B5, *Retailers' Relationship management*. An increase of retailers' and brokers' training about health enhancing foods make them more convinced about the price premium of these products comparatively to conventional foods. Similarly, the more retailers are convinced, the more they will valorize and promote health enhancing foods. Thereby, the more retailers promote and valorize health enhancing foods, the more manufacturers can list advantageously their products on retailers' shelf space. The more health enhancing food products are advantageously listed on retailers' store shelves, the more the demand for the product is stimulated. However, an increase in demand for health enhancing foods can engender a decrease in training typically provided by health enhancing food manufacturers to retailers and brokers since consumers are becoming increasingly aware about benefits of health enhancing foods.

The reinforcing feedback loop R2 depicts the interaction between *Marketing strategies* (R1) and *Retailers' relationship management* (B5). The more companies capture value from their customers, the more they can afford training sessions to retailers about health enhancing foods and consequently the more they improve their marketing management process.

c) Theme III: Scientific dynamics

Theme III describes the scientific dynamics related to the improvement of the distribution of health enhancing foods. As mentioned earlier in figure 3.4, the scientific dynamics theme is made up of two clusters, namely: *Market-oriented innovation management* (cluster 5) and *Networking and institutional support* (cluster 6).

Figure 3.8 illustrates the feedback loops related to *Market-oriented innovation management* (cluster 5), *Networking and institutional support* (cluster 6) and their interrelationships. In fact, the reinforcing feedback loop R3 named *Market-oriented innovation management,* captures the dynamics of initiatives aimed at improving the distribution of health enhancing foods related to *Market-oriented innovation management*. The reinforcing feedback loops (R4 and R5) are labeled conjointly *Networking and institutional support* (cluster 6). They both illustrate the dynamics of initiatives aimed at improving the distribution of health enhancing foods related to *Networking and institutional support*. Finally, the reinforcing feedback loop R6 depicts the interrelationships between the feedback loops *Market-oriented innovation management* (R4) and *Networking and institutional support* (R5 and R6). A description of the reinforcing feedback loops R3, R4 and R5 followed by a description of R6 is provided hereafter.



Abbreviations: HEF = Health enhancing foods

Figure 3.8 Theme III: Scientific dynamics

An illustration of the reinforcing feedback loop R3 *Market-oriented innovation management* is provided in Figure 3.8. Here, an increase in innovation on the scientific dimension of health enhancing foods leads to an increase of innovation on the product/market dimension of health enhancing food products. Similarly, more innovation on the product/market dimension, leads to more innovation on the sale dimension of health enhancing foods and consequently engenders more original and novel health enhancing food with a more added value to consumers. An increase of consumers' added value leads to an increase in the innovation culture of health enhancing foods firms. Finally, the more a health enhancing foods firm integrates the innovation culture into its mission, the more it brings in opportunities for innovation on the scientific dimension through open innovation. To illustrate this, an example of the commercialization of a new food supplement is provided in what follows. The commercialization of a hydrolyzed whey protein targeting blood pressure required the development of a technology to identify a new protein sequence that regulates blood pressure and the elaboration of successfully marketing strategies to launch the product on the nutraceuticals' market (Bröring and Cloutier, 2008). Following Bröring and Cloutier's example, the more a company innovates on the scientific dimension (e.g. new technology development), the more it comes with an innovation on the product/market dimension (new product targeting a new market of food supplement) and the more it can therefore innovate on the sale dimension (e.g. the presence of a nutritionist in a health food store).

The reinforcing feedback loops R4 and R5 on *Networking and institutional support* is provided in Figure 3.8. The more health enhancing food companies stimulate open innovation, the more they promote partnerships with other stakeholders such as R&D institutions, government, etc., at one hand, and with other health enhancing foods manufacturers, at the other hand. These partnerships improve trust between all industry stakeholders, yielding to an increase of financial support to health enhancing

food companies through funding programs to conduct clinical studies and trials. The more R&D activities of health enhancing food companies are supported, the more R&D and clinical trials costs are shared between all stakeholders. Similarly, the more R&D and clinical trials costs are shared through collaboration and partnerships, the more health enhancing food companies are able to counter multinational companies' competition. Finally, the more they counter competition, the more open innovation will be stimulated.

The reinforcing feedback loop R6 depicts the interrelationship between *Market-oriented innovation management* (R3) and *Networking and institutional support* (R4 and R5). The more health enhancing foods companies innovate on the scientific dimension, the more they foster open innovation. In the same way, the more they encourage open innovation, the more they will innovate on the scientific dimension of their health enhancing foods. Indeed, as shown in the example of Bröring and Cloutier (2008). The development of new technology (innovation on the scientific dimension) prior to product conception leads health enhancing food companies to look for open innovation through collaborations at different levels: inter-firm, inter-industrial and inter-institutional level (Bröring and Cloutier, 2008; Siedlok, Smart and Gupta, 2010).

3.5 Discussion

Following the analysis of the dynamic hypothesis developed in the context of the improvement of the distribution of health enhancing foods, conducted using the principles of System Dynamics (SD), the themes, namely: communication and regulatory options dynamics, commercial dynamics and scientific dynamics, can be used to answer the research questions of this article: (1) What is the structure of

initiatives aimed at improving the distribution of health enhancing foods interact together? (2) How do the initiatives aimed at improving the distribution of health enhancing foods interact together?

To answer the research questions of this study, the results were discussed, first accordingly to communication and regulatory options dynamics, commercial dynamics and scientific dynamics then relatively to the interaction between all these factors and outcomes.

Communication and regulatory options dynamics

The study revealed that there is an interaction between initiatives related to *Communication with health professionals and regulatory options* (cluster 1) and those associated with *Information and communication with consumers* (cluster 2). This is supported by the literature as well as by the qualitative data from group discussion sessions held during this study.

Given consumers' risk aversion toward health enhancing foods and their concern about technologies used to develop such products, several previous studies demonstrated the importance of information activities targeted to consumers and health professionals (Garreston and Burton, 2000; Hailu et al., 2009; Kozup, Creyer and Burton, 2003; Malla, Hobbs and Perger, 2005; Roe, Levy and Derby, 1999; Siedlok, Smart and Gupta, 2010; Wansink, 2003) and the need of regulatory structures to validate the safety and efficacy of health enhancing foods to boost consumers' confidence (Ray, 2004; Siedlok, Smart and Gupta, 2010).

Furthermore, this study is consistent with these findings. In fact, participants to this study clearly stated the following:

> *«...If we want to highlight the nutritional claim, functional claim, or risk reduction claim, there are, from a regulatory point of view, three (3) different ways. These are three levels of interpretation at the consumer level that are completely different ... all stakeholders must understand that this is not the same level of intervention because ultimately it is not the same understanding of the health benefit that we'd like to promote».* [79]

This study extends the existing literature and provides a better understanding of the interaction between initiatives related to communication with health professionals, consumers, and regulation aspects alike to overcome with market uncertainty that characterizes the health enhancing foods industry.

Commercial dynamics

Given intensive upstream and downstream competition in health enhancing foods (Bigliardi and Galati, 2013; Hobbs, 2002; Lawrence and Burch, 2008), firms are increasingly required to use sophisticated techniques to better understand consumers needs and wants (De Jong et al., 2006; Mark-Herbert, 2003) and to develop collaborations and partnerships with diverse channels (Sarkar and Costa, 2008) to improve the scope and speed to market. According to these studies, marketing strategies and relationships with retailers are critical.

These studies did not provide an explanation about the interaction between marketing actions and strategies and relationships with channel intermediaries. However, the present study brings some clarifications on the interaction between initiatives related to marketing strategies and retailers' relationship management that play a role in

[79] To refer to the original excerpt in French, see excerpt #2 in Appendix 3.1.

improving the distribution of health enhancing foods. It highlights how affording training to retailers coupled with manufacturers' marketing strategies improves health enhancing food distribution and therefore create value to consumers. In fact, given the credence nature of these products (Verbeke, 2005; Zou and Hobbs, 2006) and consequently consumers' skepticism (Moorsel, Cranfield and Sparling, 2007; Siedlok, Smart and Gupta, 2010), retailers play a critical role in transmitting and getting from consumers valuable information about health benefits.

During group discussion sessions of this study, participants highlighted both marketing actions and strategies and relationships with retailers. This is depicted in the following excerpts from participants' discourse:

> *« The important thing to understand is, ultimately, what the consumer understands about these products? Where is he to receive the health aspect? ...the firm must consider how it would like to position itself? ... With good consumer behavior studies, we can understand what the consumer is capable to receive as information? What to do with this? What we'd like to accomplish with these products? Once we understand this we will look at the distribution channel and will also analyze what the distribution channel has as business model? Because, as we know, in distribution channels there are mass markets versus niche markets (specialized channels). So once again, if a company does not engage in a process for understanding this, it will be difficult to define the right positioning and to be effective».*[80]

> *«...How to sell our product to a retailer who is seeking transactions, volume and sales... and we want to come up with products improved nutritionally, it's attractive and we'd like to sell them ...hence, we must convince the retailer».*[81]

> *«Our intervention is to provide training to retailers to raise their awareness to our product. We provide training sessions directly to vendors on the floor or sometimes through the distribution network. What we noticed is that providing this type of training to vendors (who are in direct contact with the consumer)*

[80] To refer to the original excerpt in French, see excerpt #3 in Appendix 3.1.

[81] To refer to the original excerpt in French, see excerpt #4 in Appendix 3.1.

> *we have a lot of feedback from these people (what the consumer likes, what he does not like, etc.). What we found interesting is that having an indirect contact with the consumer via the distributor, we gain very interesting information».*[82]

Scientific dynamics

Considering the advances in technology and innovation and the changes in social trends, inter-firm, inter-industrial and inter-institutional collaborations are critical for the development and commercialization of health enhancing foods (Bröring and Cloutier, 2008; Khan et al, 2013; Matthyssens et al., 2008; Siedlok, Smart and Gupta, 2010). Furthermore, it was stated, during group discussion sessions, that innovation and networking are both critical for the development and commercialization of health enhanced foods. The following excerpts from participants emphasize these factors:

> *«It is important to work together for innovation as well as for consumer awareness...There are four (4) companies working on products without nitrates including competitors ».*[83]

> *«At MAPAQ*[84]*, we are currently conducting with the federal government a program to support innovation and see if we can fund clinical studies for firms. This is important for firms to pursue their innovation».*[85]

Compared to previous studies, this study highlights the interaction between networking and innovation and how these scientific antecedents and consequences can improve the distribution of health enhancing foods.

---

[82] To refer to the original excerpt in French, see excerpt #5 in Appendix 3.1.
[83] To refer to the original excerpt in French, see excerpt #6 in Appendix 3.1.

[84] Ministère de l'Agriculture, des Pêcheries et de l'Alimentation Québec.

[85] To refer to the original excerpt in French, see excerpt #7 in Appendix 3.1.

- Interactions between scientific, commercial and communication and regulatory options dynamics

Results of this research show that the improvement of the distribution of health enhancing foods is a complex task. In order to enhance the distribution of their products, health enhancing foods firms should undertake a set of interdependent initiatives related to scientific dynamics, commercial and communication and regulatory dynamics alike. Given the complexity of supply chains (Bröring, 2008; Hobbs, 2002; Sakaran, 2005; Sakaran and Muly, 2007), the uncertainty and volatility of the technological, regulatory, market, social and competition environments (Hobbs, 2002; Siedlok, Smart and Gupta, 2010) and the dynamic and evolving nature of supply chains (Hobbs, 2002), firms are not only required to undertake a set of initiatives but also understand the interaction between their initiatives, the dynamics that took place between commercial, scientific and regulatory issues and how these dynamics affect their decision making. This was also highlighted during group discussion sessions by the following quotation:

> *«...So what we're trying to do is to undertake interventions on the 'science' aspect, that is, what is in the 'science' that has some credible value for the consumer? What is at the regulatory level feasible? We must align three planets: 'science' planet, regulatory planet and consumer planet and find an interface between the three... it is not easy to find, there is no magic recipe».*[86]

As seen in the existing literature (Jones and Jew, 2007; Mark-Herbert, 2003; Siedlok, Smart and Gupta, 2010), this study has stressed that consumer, regulatory and scientific and technological aspects are critical for the development and commercialization of health enhancing foods. However, this study brings additional

[86] To refer to the original excerpt in French, see excerpt #8 in Appendix 3.1.

information of the systemic interactions between scientific, commercial and regulatory dynamics, as depicted in figure 3.5. A discussion of these interactions is provided below.

- Interaction between scientific dynamics and commercial dynamics

This interaction was evidenced by Baden-Fuller and Haefliger (2013). Accordingly changes in the business model[87] influence technological innovation and vice versa. The interaction between scientific dynamics and commercial dynamics was highlighted by the reinforcing loop R7 as illustrated in Figures 3.5 and 3.9. In fact when health enhancing foods firms innovate by introducing new technology, they offer new products that create value for consumers. This value creation reinforces the innovation culture of companies and stimulates their openness and collaboration with diverse stakeholders. As stated by Baden-Fuller and Haefliger (2013, p.424):

> *«Different stakeholders perceive different domains as more central or dominant. Technology developers understand the agenda and possibilities for a technology to be used but may miss the implications for monetization or market demand. On the other hand, marketing experts may hold deep insights into customer behavior but may not understand what a given technology could be expected to deliver».*

Furthermore, during group discussion sessions, it was stated that:

> *«...Innovation in this sector is complex. Why? Because, it is a world of cleverness. We must communicate differently, we must find the exception. So imagine, innovation is not just in the science aspect and in the product aspect that we want to sell but also in the sale aspects to finally align the planets».*[88]

[87] According to Baden-Fuller and Haefliger (2013), business model is a framework by which firms create value and capture value from consumers.

[88] To refer to the original excerpt in French, see excerpt #9 in Appendix 3.1.

- Interaction between commercial dynamics and communication and regulatory options dynamics

Some previous studies mentioned the importance of regulatory aspects and commercial aspects for the development and marketing for health enhancing foods (Mark-Herbert, 2003, 2004). The interactions between commercial dynamics and communication, and the regulatory option dynamics is exemplified in Figures 3.5 and 3.9 by the balancing feedback loop B6. Indeed, the collaboration between health enhancing foods firms and retailers reinforces consumers' interest toward these products. However, the more consumers are informed about health enhancing foods' benefits, the less health enhancing foods' manufacturers will seek to collaborate with retailers.

In addition, this was also argued during group discussion sessions. The following excerpt emphasizes the need for both marketing and regulatory considerations:

> *«We are very concerned...In marketing it is also what is allowed to say to consumers. You can have a good marketing study but what Health Canada will allow you to say to consumers? This is our main problem... There are many ingredients, interesting things, that can be added to a food product but how fast will it be approved? What are we going to say? What will the consumer understand?* [89].

- Interaction between scientific dynamics and communication and regulatory options dynamics

According to Siedlok, Smart and Gupta (2010), the combination of scientific aspects for health enhancing foods with public policy support from governments and mass education are critical to help alleviate consumers' concerns. Although these authors have shown the importance of science and regulation to reduce consumers' skepticism

[89] To refer to the original excerpt in French, see excerpt #10 in Appendix 3.1.

toward health enhancing foods, they did not bring in further explanation about their relationships. In this study, the link between scientific dynamics and communication and regulatory options dynamics was evidenced in Figures 3.5 and 3.9. Indeed, in innovating and in seeking partnerships with diverse stakeholders, health enhancing food companies can put their efforts together to sensitize and educate consumers and develop awareness approaches toward health professionals. This was also stated by participants during group discussion sessions of this study in the following excerpts:

> *«For the products we make, we conducted a pan Canadian study on the consumers' perception about these products ... There are consumers to whom it gives some scare. They think it is a bit too scientific, a bit too medicinal for a food. So it's a balance between what the ingredient that you make can do, what you can say on the product package that is allowed by regulation and that does not scare the consumer... because ultimately we do not want to be in the NHP section. We want to stay in the mass market... This is the biggest challenge».*[90]

> *«In addition to well-established scientific evidence required by Health Canada, it is also important to send a clear message to the consumer. We can transmit the statements of science to the consumer but we must ensure that he understands them... Training and the impact of health professionals is important in this case. They are important in consumer's understanding, adoption and use of the product ...Health professionals are a good vehicle. We participated in seminars of 'Ordre Professionnel Des Diététistes Du Québec'. We distributed free samples of our product, we explained our product to them... they are good ambassadors ».*[91]

3.6 Conclusion and future research

The main objective of this research was to identify and provide a better understanding of the dynamics between a set of initiatives to be undertaken by individual stakeholders working toward the improvement of the distribution of health enhancing foods. To achieve this objective, a dynamic hypothesis that describes the

[90] To refer to the original excerpt in French, see excerpt #11 in Appendix 3.1.
[91] To refer to the original excerpt in French, see excerpt #12 in Appendix 3.1.

microstructure responsible for the macro behavior of the dynamics that took place between these initiatives has been elaborated. A qualitative System Dynamics (SD) approach was applied to structure the dynamic hypothesis using data collected from unstructured interviews with experts in health enhancing foods and two group discussion sessions held with a heterogeneous group of 18 participants, representing a vast range of stakeholders (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives) in the health enhancing foods industry.

The article presents an influence diagram (ID) that envisions scientific dynamics, commercial dynamics and communications and regulatory options dynamics, each playing a role in the improvement of the distribution of health enhancing foods.

The present study contributes to the advancement of the existing literature. In fact, following the new paradigm in marketing (Gummesson, Kuusela and Närvänen, 2014) concerning complexity, uncertainty and dynamics of markets, this study focuses on interdependencies between a set of initiatives aimed at improving the distribution of health enhancing foods and uses system thinking by elaborating a dynamic hypothesis. This study also takes into account the complexity, the dynamics and the uncertainty of the health enhancing foods industry and provides therefore systemic and holistic views.

From a managerial standpoint, the description of the systemic behavior obtained in this study could support managers of health enhancing food companies in their decision making process. It provides a better understanding of complex interactions between initiatives that can be undertaken to improve the distribution of their

products and enable them to better assess the scope and consequences of their initiatives.

Finally, the results of this study were based on qualitative modeling and thus have not been tested by a simulation using a formal quantitative model. Although static, the ID developed in this paper can only provide a better static understanding of the complexity among initiatives aimed at improving the distribution of health enhancing foods. Future studies should conduct a quantitative simulation model (level-rate model) to better understand the systemic behavior of initiatives aimed at improving the distribution of health enhancing foods. Moreover, improving health enhancing food distribution may differ in other Canadian provinces and of course in other countries. Further studies should compare the dynamics forces between various regions and countries.

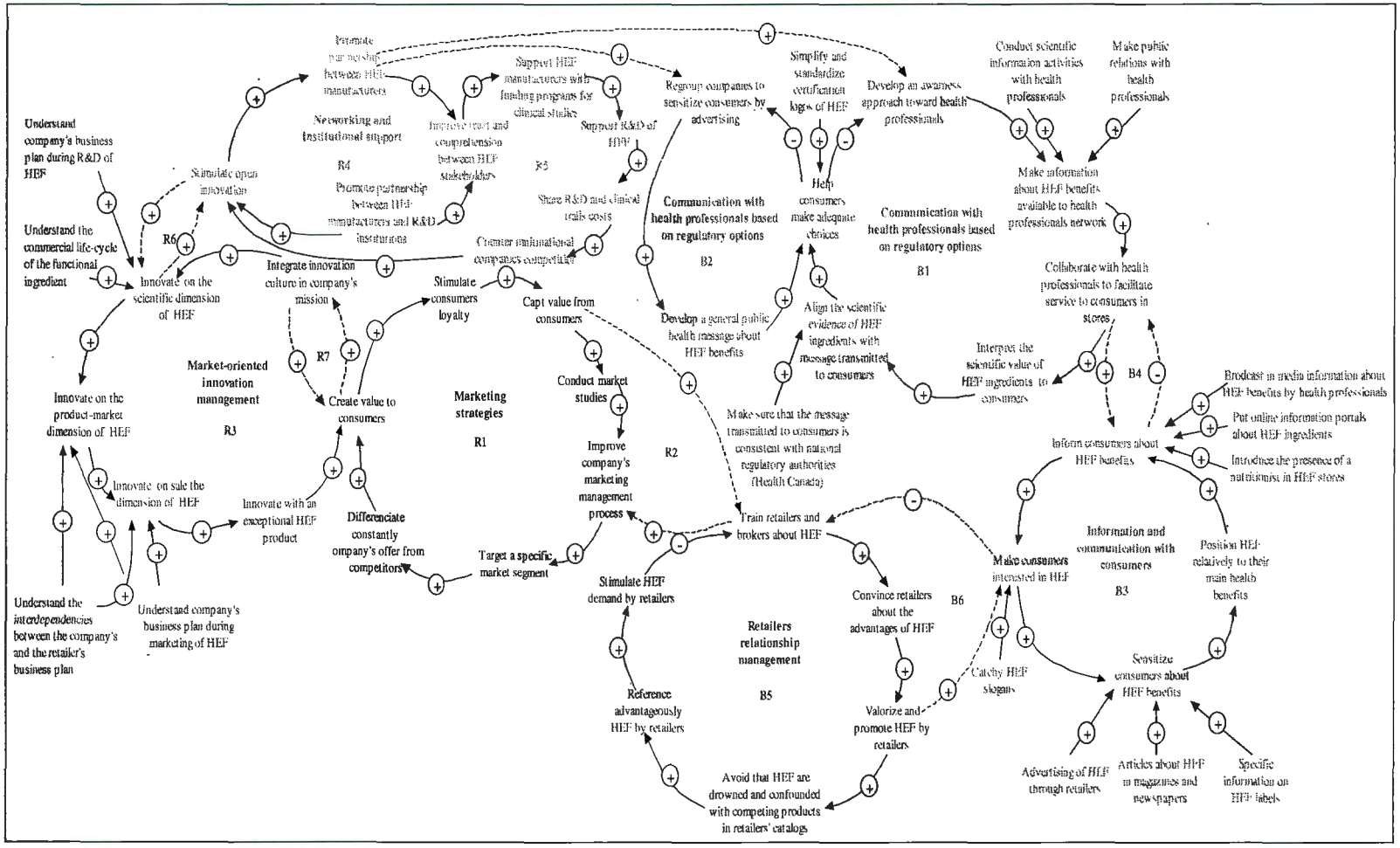


Figure 3.9 Comprehensive inductive system diagram

REFERENCES

Agriculture and Agri-Food Canada (AAFC) (2009). *Market Analysis Report* – Dec 2009. Available online at: http://www.gov.mb.ca/agriculture/statistics/pdf/marketanalysis%20report functional foods-en.pdf (Accessed April, 2014).

Agriculture and Agri-Food Canada (AAFC) (2013). *Private label trends-Packaged food in Canada*. Available online at: http://www.aquaculture.ca/files/documents/PrivateLabelPackagedFoodCanadaENG.pdf (Accessed March, 2014).

Aguilera, J. M. (2006). Seligman lecture 2005 food product engineering: Building the right structures. *Journal of the Science of Food and Agriculture*, 86(8), 1147-1155.

Armstrong, G. & Kotler, P. (2011). *Marketing: An Introduction*. New Jersey: Global Edition, 10th edition.

Baden-Fuller, C. & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning*, 46(6), 419-426.

Basu, S. K., Thomas, J. E. & Acharya, S. N. (2007). Prospects for growth in global nutraceutical and functional food markets: A canadian perspective. *Australian Journal of Basic and Applied Sciences*, 1(4), 637-649.

Behara, R. (1995). Systems theoretic perspectives in service management. *Advances in Services Marketing and Management*, 4, 289-312.

Beinhocker, E. D. (2006). *The origin of wealth. Evolution, complexity, and the radical remaking of economics*, *Harvard Business School Press*, Boston, 254-258. Available at: http://olms1.cte.jhu.edu/olms/data/resource/2631/bein.pdf (Accessed February, 2014).

Betancourt, R. & Goutschi, D. A.(1998). Distribution services and economic power in a channel. *Journal of Retailing*, 74(1), 37-60.

Bigliardi, B. & Galati, F. (2013). Innovation trends in the food industry: The case of functional foods. *Trends in Food Science & Technology*, 31(2), 118-129.

Blandon, J., Cranfield, J. & Henson, S. (2007). *Functional Food and Natural Health Product Issues: The Canadian and International Context.* International Food Economy Research Group Department of Food, Agricultural and Resource Economics. Available online at: http://www4.agr.gc.ca/resources/prod/doc/misb/fb-ba/nutra/pdf/u_of_guelph_functional_foods_review_final_25jan2008_en.pdf (Accessed September, 2012).

Boehlje, M., Roucan-Kane, M. & Bröring, S. (2011). Future agribusiness challenges: Strategic uncertainty, innovation and structural change. *International Food and Agribusiness Management Review*, 14(5), 53-81.

Boland, M. (2008). Innovation in the food industry: Personalized nutrition and mass customization. *Innovation: Management, Policy & Practice*, 10(1), 53-60.

Bröring, S. (2008). How systemic innovations require alterations along the entire supply chain: The case of animal-derived functional foods. *Journal on Chain and Network Science*, 8(2), 107-119.

Bröring, S. & Cloutier, L. M. (2008). Value-creation in new product development within converging value chains: An analysis in the functional foods and nutraceutical industry. *British Food Journal*, 110(1), 76-97.

Burch, D. & Lawrence, G. (2005). Supermarket own brands, supply chains and the transformation of the agri-food system. *International Journal of Sociology of Agriculture and Food*, 13(1), 1-17.

Burchill, G. & Kim, D. H. (1993). *Inductive system diagrams: An empirically based theory generation technique.* Available online at: http://dspace.mit.edu/bitstream/handle/1721.1/48217/inductivesystemd00burc.pdf (Accessed March, 2014).

Burchill, G. & Fine, C. H. (1997). Time versus market orientation in product concept development: Empirically-based theory generation. *Management Science*, 43(4), 465-478.

Burdock, G. A., Carabin, I. G. & Griffiths, J. C. (2006). The importance of GRAS to the functional food and nutraceutical industries. *Toxicology*, 221(1), 17-27.

Canadian Food Inspection Agency (CFIA) (2014). *Health claims: Definitions.* Available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14 (Accessed April, 2014).

Cinnamon, B. (2007). *Results from the 2007 functional foods and natural health products survey. Statistics Canada*. Ottawa. Available online at: http://www.statcan.gc.ca/pub/88f0006x/88f0006x2009001-eng.pdf (Accessed September, 2012).

Chiaroni, D., Chiesa, V. & Frattini, F. (2011). The open innovation journey: How firms dynamically implement the emerging innovation management paradigm. *Technovation*, 31(1), 34-43.

Cloutier, L. M. (2001). *L'information simulée en soutien à la prise de décision: Concepts et applications en financements d'entreprises*. Document de travail. Département de management et technologie. École des sciences de la gestion. Montréal, QC: Université du Québec à Montréal.

Cortuff, R., Couture, F., Lemieux, S., Michaud, R., Paquin, P. & Pomerleau, S. (2011). *Critères d'évaluation d'un aliment à valeur nutritive améliorée ou santé et de son caractère innovant*. Document présenté à TRANSAQ, Institut sur la Nutrition et Aliments Fonctionnels (INAF). Université Laval, 11 juin 2011.

Coppens, P., Da Silva, M. F. & Pettman, S. (2006). European regulations on nutraceuticals, dietary supplements and functional foods: A framework based on safety. *Toxicology*, 221(1), 59-74.

Coyle, R. G. (2000). Qualitative and quantitative modelling in system dynamics: Some research questions. *System Dynamics Review,* 16(3), 225-244.

Crowley, L. (2008). *Canada seeks opinion on health claims review*. News Release. Available online at: http://www.nutraingredients-usa.com/Regulation/Canada-seeks-opinion-on-health-claims-review (Accessed January, 2014).

De Jong, J., van Kleef, E., Frewer, L. J. & Renn, O. (2006). *Perceptions of Risk, Benefit and Trust Associated with Consumer Food Choice*. In L. J. Frewer, & H. C. M. van Trijp (Eds.), *Understanding Consumers of Food products* (p. 125-150). Cambridge, England: Woodhead Publishing.

Deloitte (2014). Global Powers of Retailing, Deloitte, London. Available online at: http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Consumer-Business/dttl_CB_Global-Powers-of-Retailing-2014.pdf (Accessed April, 2014).

Desthieux, G., Joerin, F. & Lebreton, M. (2010). Ulysse: A qualitative tool for eliciting mental models of complex systems. *System Dynamics Review*, 26(2), 163-192.

Eden, C. (1994). Cognitive mapping and problem structuring for system dynamics model building. *System Dynamics Review*, 10(2-3), 257-276.

El-Ansary, A. & Stern, L. (1972). Power measurement in the distribution channel. *Journal of Marketing Research*, 9(1), 47-52.

Elfers, J. (2005). *What is happening in our stores? Who is there? What is food retailing today? Managing a shifting centre of gravity. The CIES World Food Business Summit.* Budapest. Available online at: http://www.theconsumergoodsforum.com/PDF/Executive_Summaries/2005_The_Global_Summit_Budapest_Executive_Summary.pdf (Accessed December, 2013).

El Ourabi, H., Cloutier, M. & Filiatrault, P. (2015). *Development of a Conceptual framework for improving the distribution of health enhancing foods.* Article 1, unpublished thesis, ESG-UQAM.

Evans, K. & Lozinski, S. (2004). *Agri-food manufacturing framework.* Saskatchewan Agriculture and Food. Saskatoon.

Fine, Charles H. (1999). *Clockspeed.* Cambridge, Massachussets: Perseus Books.

Forrester, J. W. (1969). *Urban dynamics.* Cambridge, MA: Productivity Press.

Forrester, J.W. & Senge, P. M. (1980). *Tests for Building Confidence in System Dynamics Models.* In *System Dynamics.* Ed. Legasto, A. A., J. W., Forrester, and J. M., Lyneis. Amsterdam: North Holland.

Gault, F. (2007). *The Bioeconomy.* Statistics Canada.Ottawa.

Garretson, J. A. & Burton, S. (2000). Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust. *Journal of Public Policy & Marketing*, 19(2), 213-227.

Gharajedaghi J. (2006). *Systems Thinking: managing chaos and complexity: a platform for designing business architecture.* Burlington, MA: Elsevier.

Glaser, B. G. & Strauss, A L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicago, IL: Aldine Publishing Company.

Glaser, B. G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory.* Mill Valley, CA: Sociology Press.

Godes, D. & Silva, J. C. (2012). Sequential and temporal dynamics of online opinion. *Marketing Science*, 31(3), 448–473.

Goodman, M. (1974). *Study Notes in System Dynamics*. Cambridge, MA: MIT Press.

Größler, A., Millinga, P. & Winch, G. (2004). Perspectives on rationality in system dynamics: A workshop report and open research questions. *System Dynamics Review* 20(1), 75-87.

Gummesson, E., Kuusela, H. & Närvänen, E. (2014). Reinventing marketing strategy by recasting supplier/customer roles. *Journal of Service Management*, 25(2), 228-240.

Hailu, G., Boecker, A., Henson, S. & Cranfield, J. (2009). Consumer valuation of functional foods and nutraceuticals in Canada: A conjoint study using probiotics. *Appetite*, 52(2), 257-265.

Herath, D., Cranfield, J., Henson, S. & Sparling, D. (2008). Firm, market, and regulatory factors influencing innovation and commercialization in Canada's functional food and nutraceutical sector. *Agribusiness*, 24(2), 207-230.

Hillson, D. (2003). Gaining strategic advantage. *Strategic Risk,* June, 27-28.

Hobbs, J. E. (2002). Evolving supply chains in the nutraceuticals and functional foods industry. *Canadian Journal of Agricultural Economics*, 50(4), 559-568.

Hodgins, M. E. (2011). Innovation policy in Canada's agri-food system: The functional food and natural health products' segment. Unpublished Doctoral thesis, City University London. Available online at: http://openaccess.city.ac.uk/1121/1/Hodgins, Mary Ellen.pdf (Accessed July, 2013).

Homer, J. B. (1996). Why we iterate: Scientific modeling in theory and practice. *System Dynamics Review*, 12(1), 1-19.

Jones, P. J. & Jew, S. (2007). Functional food development: Concept to reality. *Trends in Food Science & Technology*, 18(7), 387-390.

Kane, M. & Trochim, W. M. K. (2007). *Concept Mapping for Planning and Evaluation*. Thousand Oaks, CA: Sage.

Khan, R. S., Grigor, J., Winger, R. & Win, A. (2013). Functional food product development-opportunities and challenges for food manufacturers. *Trends in Food Science & Technology*, 30(1), 27-37.

Kleef, E., van Trijp, H., Luning, P. & Jongen, W. M. (2002). Consumer-oriented functional food development: How well do functional disciplines reflect the 'voice of the consumer'? *Trends in Food Science & Technology*, 13(3), 93-101.

Kleef, E., van Trijp, H. & Luning, P. (2005). Functional foods: Health claim-food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite*, 44(3), 299-308.

Kotilainen, L., Rajalahti, R., Ragasa, C. & Pehu, E. (2006). *Health enhancing foods. World Bank.* Available online at:http://siteresources.worldbank.org/INTARD/Resources/Health_Enhacing_Foods_ARD_DP_30_final.pdf (Accessed January, 2014).

Kozup, J. C., Creyer, E. H. & Burton, S. (2003). Making healthful food choices: The influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing*, 67(2), 19-34.

L'Abbé, M. R., Dumais, L., Chao, E. & Junkins, B. (2008). Health claims on foods in Canada. *The Journal of Nutrition*, 138(6), 1221S-1227S.

Lagorce, A. (2009). *Functional foods bring healthy returns - MarketWatch.com.* Available online at: http://www.marketwatch.com/story/functionalfoods-bring-healthy-returns-2009-12-09 (Accessed January, 2014).

Lane, D. C. (1995). On a resurgence of management simulations and games. *Journal of the Operational Research Society*, 46(5), 604-625.

Langlais, R., Janasik, N. & Bruun, H. (2004). Managing knowledge network processes in the commercialization of science: Two probiotica discovery processes in Finland and Sweden. *Science Studies*, 17(1), 34-56.

Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management Review*, 24(4), 691-710.

Lawrence, G. & Burch, D. (2008). *The 'wellness' phenomenon: Implications for global agri-food systems.* Paper presented at the *XII World Congress of Rural Sociology Envisioning Prosperous Rural Futures in a Globalizing World*, Goyang, Korea 6-11 July. Available online at: http://www.irsa-world.org/XII/papers/3-2.pdf (Accessed January, 2014).

Leeflang, P. S., Verhoef, P. C., Dahlström, P. & Freundt, T. (2014). Challenges and solutions for marketing in a digital era. *European Management Journal*, 32(1), 1-12.

Logman, M. (2011). Realism versus simplicity in strategic marketing planning: The impact of temporality. *Marketing Intelligence & Planning*, 29(7), 662-671.

Luna-Reyes, L. F. & Andersen, D. L. (2003). Collecting and analyzing qualitative data for system dynamics: Methods and models. *System Dynamics Review*, 19(4), 271-296.

Malla, S. M., Hobbs, J. E. & Perger, O. (2005). Estimating the health care savings from trans fat-free canola in Canada. *Food Economics*, 2(3-4): 175-184.

Malla, S., Hobbs, J. E. & Sogah, E. K. (2013). *Functional foods and natural health products regulations in Canada and around the world: Nutrition labels and health claims. Canadian Agricultural Innovation and Regulation Network.* Available online at:http://www.ag-innovation.usask.ca (Accessed April, 2014).

Malla, S., Hobbs, J. E., Sogah, E. K. & Yeung, M. T. (2013). *Assessing the functional foods and natural health products industry: A comparative overview and literature review. Canadian Agricultural Innovation and Regulation Network.* Available online at:http://www.ag-innovation.usask.ca (Accessed April, 2014).

Mark-Herbert, C. (2002). *Functional Foods for Added Value: Developing and marketing a new product category.* Unpublished PhD thesis, Agraria 313, Acta UniversitatisAgriculturae Suesciae. Available online at: http://pub.epsilon.slu.se/298/1/cillamark-herbertavhandling2002-3.pdf (Accessed February, 2014).

Mark-Herbert, C. (2003). Development and marketing strategies for functional foods. *The Journal of Agrobiotechnology Management and Economics*, 6 (1-2), 75–78.

Mark-Herbert, C. (2004). Innovation of a new product category-Functional foods. *Technovation*, 24(9), 713-719.

Martínez-Ruiz, M. P., Ruiz-Palomino, P., Martinez-Canas, R. & Blázquez-Resino, J. J. (2014). Consumer satisfaction and loyalty in private-label food stores. *British Food Journal*, 116(5), 849-871.

Matlack, C. (2009). A French Wal-Mart's Global Blitz. *Bloomberg Business Week*, December 21, G4-G6.

Matthyssens, P., Vandenbempt, K. & Berghman, L. (2008). Value innovation in the functional foods industry: Deviations from the industry recipe. *British Food Journal*, 110(1), 144-155.

Mayo, D. D., Callaghan, M. J. & Dalton, W. J. (2001). Aiming for restructuring success at London underground. *System Dynamics Review*, 17(3), 261-289.

Meadows, D., Meadows, D., Randers, J. & Behrens, W. (1972). *The limits to growth: A report for the Club of Rome's Project on the predicament of mankind.* New York, NY: Universe Books.

Messinger, P. R. & Narasimhan, C. (1995). Has power shifted in the grocery channel? *Marketing Science*, 14(2), 189-223

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2007). La dynamique de la distribution alimentaire d'hier à aujourd'hui. *Bioclips plus*, 10(2), 1-12. Available online at: http://collections.banq.qc.ca/ark:/52327/bs15524 (Accessed April, 2014).

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2009). Étude de la dynamique et des tendances des marchés au sein du secteur agroalimentaire. *Bioclips plus*, 12(2), 1-12. Available online at: http://www.mapaq.gouv.qc.ca/SiteCollectionDocuments/Bioclips/BioClipsplus_Vol_12_no2.pdf (Accessed September, 2012).

Moorsel, D. V, Cranfield, J. A. & Sparling, D. (2007). Factors affecting biotechnology innovation in Canada: Analysis of the 2001 biotechnology use and development survey. *International Journal of Biotechnology*, 9(1), 39-59.

Morecroft, J. D. & van der Heijden, K. A. (1992). Modelling the oil producers: Capturing oil industry knowledge in a behavioural simulation model. *European Journal of Operational Research*, 59(1), 102-122.

OSEC (2011). *The canadian food retail sector. Opportunities for swiss companies.* Available online at: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272 (Accessed April, 2014).

Pascale, R. T., Millemann, M. & Gioja, L. (2000). *Surfing the Edge of Chaos: The Laws of Nature and the New Laws of Business.* New York: Crown Business.

Pritchard, B. & Burch, D. (2003). *Agri-food globalization in perspective: International restructuring in the processing tomato industry.* Hampshire: Ashgate Publishing Limited.

Randers, J. (1980). *Elements of the system dynamics method.* Cambridge, MA: MIT Press.

Ray, K. (2004). *A strategic Analysis of New Product Entry into the Nutraceuticals, Functional Foods, and Vitamins and Supplements Market*. Unpublished masters, University of Victoria.

Regmi, A. & Gehlhar, M. J. (2005). *New directions in global food markets*. US Department of Agriculture. Available online at:http://ageconsearch.umn.edu/bitstream/33751/1/ai050794.pdf (Accessed December, 2013).

Richardson, G. P. & Pugh, A. I. (1981). *Introduction to system dynamics modeling with DYNAMO*. Cambridge, MA: MIT Press.

Richardson, G. P. & Otto, P. (2008). Applications of system dynamics in marketing: editorial. *Journal of Business Research*, 61(11), 1099-1101.

Roberts, N., Andersen, D. F., Deal, R. M., Garet, M. S. & Shaffer, W. A. (1983). *Introduction to computer simulation: The system dynamics approach*. Don Mills: Addison-Wesley Publishing Company.

Roe, B., Levy, A. S. & Derby, B. M. (1999). The impact of health claims on consumer search and product evaluation outcomes: Results from FDA experimental data. *Journal of Public Policy & Marketing*, 18(1), 89-105.

Ronteltap, A., van Trijp, J. C. M., Renes, R. J. & Frewer, L. J. (2007). Consumer acceptance of technology-based food innovations: Lessons for the future of nutrigenomics. *Appetite*, 49(1), 1-17.

Rosas, S. R. & Camphausen, L. C. (2007). The use of concept mapping for scale development and validation in evaluation. *Evaluation and program planning*, 30(2), 125-135.

Rosenbloom, B. (2012). *Marketing Channel: Management View*. Mason, Ohio: South-Western, 8th edition.

Sadler, J. (2005). *Innovation in functional food and drinks*. Business Insights Ltd. Available online at: http://www.globalbusinessinsights.com/rbi/content/rbcg0142t.pdf (Accessed October, 2013).

Saives, A. L. (2009). Modularity and strategic dilemmas within an innovative industry: The functional foods and nutraceuticals (FFN) case in Canada. *International Journal of Entrepreneurship and Innovation Management*, 10(3), 323-341.

Sankaran, J. K. (2005). *Innovation and Value-chains of Nutraceuticals: The Case of Marine Natural Products*. Department of Information Systems and Operations Management, University of Auckland. Available online at: http://docs.business.auckland.ac.nz/Doc/WP-289-Innovation-and-value-chains-of-nutraceuticals-The-case-of-marine-natural-products.pdf (Accessed October, 2013).

Sankaran, J. K. & Mouly, V. S. (2007). Managing innovation in an emerging sector: The case of marine-based nutraceuticals. *R&D Management*, 37(4), 329-344.

Sarkar, S. & Costa, A. I. (2008). Dynamics of open innovation in the food industry. *Trends in Food Science & Technology*, 19(11), 574-580.

Senge, P. M. (1990). *The Fifth Discipline: The Art of Practice of the Learning Organization*. New York: Doubleday Currency.

Siedlok, F., Smart, P. & Gupta, A. (2010). Convergence and reorientation via open innovation: The emergence of nutraceuticals. *Technology Analysis & Strategic Management*, 22(5), 571-592.

Sisodia, R. S. & Hurley, T. (2002). *System dynamics and marketing productivity*. Available online at: http://www.systemdynamics.org/conferences/2002/proceed/papers/Sisodia1.pdf (Accessed July, 2013).

Sterman, J. D., Repenning, N. P. & Kofman, F. (1997). Unanticipated side effects of successful quality programs: Exploring a paradox of organizational improvement. *Management Science*, 43(4), 503-521.

Sterman, J. D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston, MA: Irwin/McGraw-Hill.

Sterman, J. D. (2001). System dynamics modeling. *California Management Review*, 43(4), 8-25.

Strauss, A. L. (1987). *Qualitative Analysis for Social Scientists*. Cambridge: Cambridge University Press.

Tamilia, R. D. (1999). *The logistics revolution: Is logistics management now more important than marketing*? Working paper no 04-99, Centre de recherche en gestion, Université du Québec à Montréal.

Vargo, S. L. & Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1-10.

Vennix, J. A. (1996). *Group Model Building: Facilitating Team Learning Using System Dynamics*. West Sussex, UK: John Wiley & Sons.

Verbeke, W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics*, 32(3), 347-368.

Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? *Journal of Consumer Affairs*, 37(2), 305-316.

Wilkinson, I. F. (1973). Power and influence structures in distribution channels, *European Journal of Marketing*, 7(2), 119-129.

Wilkinson, I. F. (1996). Distribution channel management: Power considerations, *International Journal of Physical Distribution & Logistics Management*, 26(5), 31-41.

Wolstenholme, E. F. (1990). *System Enquiry: A System Dynamics Approach*. New York: John Wiley & Sons, Inc.

Yakovleva, N. & Flynn, A. (2004). *The food supply chain and innovation: A case study of potatoes*. Working paper series no. 15, The Centre for Business Relationships, Accountability, Sustainability and Society. Cardiff University. United Kingdom. Available at: http://www.researchgate.net/publication/235655470_The_Food_Supply_Chain_and_Innovation_a_Case_Study_of_Potatoes/file/79e4151254255725ca.pdf (Accessed December, 2013).

Zou, N. & Hobbs, J. E. (2006). *Modeling functional food choice and health care impacts: A literature review*. Working paper, Research Project Number CMD-06-02, Consumer and Market Demand Agricultural Policy Research Network. Available online at: http://consumerdemand.ualberta.ca/Portals/22/ConsumerDemanDocuments/CMD_06-02.pdf (Accessed April, 2014).

APPENDICES

Appendix 3.1 Translation (French to English) of excerpts from participants' discourse

#	Excerpts in French	English translation
1	*«...Il y a une collection d'interventions à aligner compte tenu de la complexité, il y a l'aspect science, l'aspect réglementaire et l'aspect commercial...c'est une multitude de choses qu'il faut connecter.... il ya une collection d'information stratégique dans le monde des aliments santé qu'on doit prendre en considération autre que vendre du goût, que vendre du plaisir, c'est encore plus complexe, ...il faut faire une bonne réflexion»*	*«...Given complexity, there are many interventions to align. There is the science aspect, the regulatory aspect and the consumer aspect... It is a multitude of things that need to be connected...There is a collection of strategic information in the health enhancing foods' world that must be considered other than selling taste, selling pleasure. It's even more complex... it needs a good reflection»*
2	*«... Si on veut mettre en valeur l'aspect nutritif, fonctionnel ou l'aspect réduction de risque face à la santé, c'est trois (3) chemins différents d'un point de vue réglementaire. C'est trois (3) niveaux d'interprétation au niveau du consommateur qui sont complètement différents...il faut comprendre ça...Tous les intervenants doivent comprendre que ce n'est pas les mêmes niveaux d'intervention parce que ce n'est pas la même compréhension en bout de ligne de l'effet santé qu'on veut promouvoir»*	*«...If we want to highlight the nutritional claim, functional claim, or risk reduction claim, there are, from a regulatory point of view, three (3) different ways. These are three levels of interpretation at the consumer level that are completely different ... all stakeholders must understand that this is not the same level of intervention because ultimately it is not the same understanding of the health benefit that we'd like to promote»*

Appendix 3.1 Translation (French to English) of excerpts from participants' discourse (continued…)

#	Excerpts in French	English translation
3	*«L'important c'est de comprendre ce que le consommateur comprend en bout de piste. Il en est où pour recevoir finalement l'aspect santé? Il faut à un moment donné réfléchir comment on veut se positionner?... Avec de bonnes analyses de comportement de consommation on peut comprendre qu'est ce que le consommateur est capable de recevoir et pis c'est quoi qu'on peut faire avec ça? C'est quoi qu'on veut accomplir avec ces produits? Une fois qu'on comprend ça on va regarder le réseau de distribution et on va aussi analyser ce que le réseau de distribution a aussi comme modèle d'affaire parce qu'on sait qu'au niveau des réseaux de distribution il y en des spécialisés, il y en a des plus nichés et il y en a des moins nichés. C'est donc la problématique de marché de masse versus marché de niche. Si encore une fois l'entreprise ne fait pas cette démarche de compréhension là, et bien ça va être difficile de se positionner et d'être efficace»*	*«The important thing to understand is, ultimately, what the consumer understands about these products? Where is he to receive the health aspect? …The firm must consider how it would like to position itself? ... With good consumer behavior studies, we can understand what the consumer is capable to receive as information? What to do with this? What we'd like to accomplish with these products? Once we understand this we will look at the distribution channel and will also analyze what the distribution channel has as business model? Because, as we know, in distribution channels there are mass market versus niche market (specialized channels). So once again, if a company does not engage in a process for understanding this, it will be difficult to be positioned and to be effective»*
4	*«Comment vendre notre produit à un distributeur qui veut faire la transaction et le volume et pis un chiffre d'affaire précis…et pis on veut arriver avec des produits à valeur nutritive améliorés, c'est sexy et on veut passer ça, beh.. là il faut convaincre le distributeur de ça»*	*«…How to sell our product to a retailer who is seeking transactions, volume and sales... and we want to come up with nutritionally improved products, it's attractive and we'd like to sell them …hence, we must convince the retailer»*

Appendix 3.1 Translation (French to English) of excerpts from participants'discourse (continued…)

#	Excerpts in French	English translation
5	*«La manière dont on intervient c'est qu'on va donner une formation à ceux qui vont distribuer notre produit pour les conscientiser par rapport à notre produit. Pis on va donner des formations aux vendeurs sur le plancher par le biais du réseau de distribution qu'on a ou parfois en direct. Ce que nous avons réalisé, c'est d'aller donner ce type de formation aux vendeurs, aux personnes qui sont en contact direct avec le consommateur (qu'est ce que le consommateur aime, qu'est ce qui l'intéresse, qu'est ce qui ne l'intéresse pas) on a énormément de feedback de ces gens là. là où on a trouvé un intérêt c'est d'avoir un lien indirect avec le consommateur via le distributeur on se retrouve avec des informations très intéressantes»*	*« Our intervention is to provide training to retailers to raise their awareness to our product. We provide training sessions directly to vendors on the floor or sometimes through the distribution network. What we noticed is that providing this type of training to vendors (who are in direct contact with the consumer) we have a lot of feedback from these people (what the consumer likes, what he does not like, etc.). What we found interesting is that having an indirect contact with the consumer via the distributor, we gain very interesting information»*
6	*«C'est important de travailler ensemble au niveau de l'innovation et également au niveau de la conscientisation du consommateur. Il y a quatre (4) entreprises qui travaillent sur des produits sans nitrates dont des compétiteurs»*	*«It is important to work together for innovation as well as for consumer awareness...There are four (4) companies working on products without nitrates including competitors»*
7	*«Au niveau du MAPAQ, on est en train de mener un programme de soutien à l'innovation avec le fédéral pour voir si on peut financer des études cliniques. Ceci est important pour les entreprises pour toujours innover»*	*«At MAPAQ, we are currently conducting with the federal government a program to support innovation and see if we can fund clinical studies for firms. This is important for firms to pursue their innovation»*

Appendix 3.1 Translation (French to English) of excerpts from participants' discourse (continued…)

#	Excerpts in French	English translation
8	*«… Alors ce qu'on essaye de faire c'est d'avoir des interventions sur l'aspect science c'est à dire qu'est ce qu'il y a dans la science qui a une certaine valeur crédible pour le consommateur, qu'est ce qui est au niveau réglementaire est faisable. Il faut aligner trois planètes la planète science, la planète réglementaire et la planète consommateur et trouver une interface entre les trois ...pis ce n'est pas facile à trouver, il n'y a pas de recette magique»*	*«…So what we're trying to do is to undertake interventions on the 'science' aspect, that is, what is in the 'science' that has some credible value for the consumer? What is at the regulatory level feasible? We must align three planets: 'science' planet, regulatory planet and consumer planet and find an interface between the three... it is not easy to find, there is no a magic recipe»*
9	*«L'innovation dans ce secteur là est complexe. Pourquoi? Parce que c'est un monde d'astuces. Il faut communiquer différemment, il faut trouver l'exception....Alors imaginez-vous, l'innovation n'est pas juste dans l'aspect science pis dans l'aspect produit qu'on veut vendre mais sur l'aspect vente pur et simple pour aligner les planètes»*	*«Innovation in this sector is complex. Why? Because, it is a world of cleverness. We must communicate differently, we must find the exception. So imagine, innovation is not just in the science aspect and in the product aspect that we want to sell but also in the sale aspects to finally align the planets»*
10	*«On est très concernés…au niveau marketing c'est aussi ce qui est permis. On peut avoir une bonne étude marketing mais qu'est ce que Santé Canada va permettre de dire. Ceci est notre principale problématique.... Il y a un paquet de d'ingrédients intéressants, de choses intéressantes qu'on peut mettre dans un aliment mais à quelle vitesse ça va être approuvé? pis qu'est ce qu'on va pouvoir dire? et pis qu'est ce que le consommateur va comprendre?»*	*«We are very concerned…In marketing it is also what is allowed to say to consumers. You can have a good marketing study but what Health Canada will allow you to say to consumers? This is our main problem… There are many ingredients, interesting things, that can be added to a food product but how fast will it be approved? What are we going to say? What will the consumer understand?»*

Appendix 3.1 Translation (French to English) of excerpts from participants' discourse (continued…)

#	Excerpts in French	English translation
11	*«Au niveau des produits qu'on fabrique, nous avons mené une étude pan canadienne sur la perception des consommateurs à l'égard de ces produits… Il y a des consommateurs que ça leur fait un peu peur. Ils trouvent que c'est un peu trop scientifique, un peu trop médicinal pour un aliment. Donc c'est un équilibre entre ce que l'ingrédient que vous faites peut donner pis ce que qu'on peut dire d'un point de vue réglementaire sur l'emballage qui ne fait pas peur au consommateur car en bout de ligne on ne veut pas se retrouver dans la section des PSN (produits de santé naturels). On veut rester dans la masse...Fait que le plus gros défi c'est ça»*	*«For the products we make, we conducted a pan Canadian study on the consumers' perception about these products ... There are consumers to whom it gives some scare. They think it is a bit too scientific, a bit too medicinal for a food. So it's a balance between what the ingredient that you make can do, what you can say on the product package that is allowed by regulation and that does not scare the consumer… because ultimately we do not want to be in the NHP section. We want to stay in the mass market... This is the biggest challenge»*

Appendix 3.1 Translation (French to English) of excerpts from participants' discourse (continued…)

#	Excerpts in French	English translation
12	*«En plus d'une preuve scientifique bien établie, exigée par Santé Canada, il faut aussi un discours clair au consommateur. On peut transiter les énoncés de la science au consommateur mais il faut s'assurer que ce dernier comprenne…la formation et l'impact des professionnels de la santé est important dans ce cas. Ce sont des éléments importants dans la compréhension, l'adoption et l'utilisation du produit par le consommateur… Les professionnels de la santé sont un bon véhicule. On a participé à maintes reprises à des colloques de l'Ordre Professionnel Des Diététistes Du Québec', on leur a donné des échantillons de notre produit, on leur a expliqué c'est quoi notre produit… Ce sont de bons ambassadeurs»*	*«In addition to well-established scientific evidence required by Health Canada, it is also important to send a clear message to the consumer. We can transmit the statements of science to the consumer but we must ensure that he understands them... Training and the impact of health professionals is important in this case. They are important in consumer's understanding, adoption and use of the product …Health professionals are a good vehicle. We participated in seminars of 'Ordre Professionnel Des Diététistes Du Québec'. We distributed free samples of our product, we explained our product to them... they are good ambassadors »*

CHAPITRE IV

ARTICLE 3

EFFECTS OF TRACEABILITY, HEALTH CLAIMS AND VERIFICATION OF HEALTH CLAIMS ON CONSUMERS' BEHAVIORAL INTENTIONS TOWARD FOODS ENRICHED WITH OMEGA-3 FATTY ACIDS

FOREWORD

The purpose of this foreword is to highlight the relationship of Article 3 with the previous Articles (1 and 2) of this thesis. While, the focus of both Articles 1 and 2 is on the representation of the whole health enhancing food (functional foods, natural health products (NHP), etc.) distribution system, the emphasis of Article 3 is on consumers' behavioral intentions toward functional foods, and more specifically, foods enriched with omega-3 fatty acids. In Article 1 a set of initiatives aimed at improving health food distribution were identified and prioritized by a group of diverse stakeholders (ingredient-makers, food manufacturers/processors, experts and researchers in food technology development, in consumer sciences, in food distribution and marketing, and government representatives). In Article 2, an influence diagram was developed to describe the dynamics that took place between these initiatives by using a qualitative System Dynamics (SD) approach. Unlike the first two papers, Article 3 focuses only on specific initiatives related to the improvement of health enhancing food distribution. In fact it has been shown in Article 1that '*Information and communication with consumers*' cluster contains very important[92] initiatives to be undertaken for improving the distribution of health enhancing foods. These initiatives are related to health claims, product labelling, and certification logos. Thus, a part of the findings of Article 1 were used to conduct the study in Article 3. Specifically, the aim of Article 3 is to investigate the effects of information traceability, health claims and verification of health claims on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids.

[92]This cluster hadthe highest mean importance rating (3.91 on a scale of 5).

ABSTRACT

This research aims at investigating the effects of information traceability, health claims and verification of health claims on consumers' behavioral intentions (intention to purchase, intention to recommend and intention to serve) toward foods enriched with omega-3 fatty acids. The experimental design is a mixed between-within-subjects analysis of variance. The between-subjects factors examined are traceability with two treatments (completely traceable- not traceable) and health claims with three treatments (functional claim, disease risk reduction claim and disease prevention claim). The first within-subjects factor is verification of health claims with two levels (Health Canada, a federal government agency and Heart and Stroke Foundation, a third party organization). The second within-subjects factor is about food product categories (meat products, eggs, cereal products, dairy products and processed fruits or vegetables products). Thereby, six versions of a questionnaire were administered to six groups of participants (n = 463), one version per group (varying between 72 and 83 respondents) in Montreal and Ottawa. Results show support for the effect of traceability and verification of health claims on consumers' behavioral intentions. Moreover, a significant two-way interaction between health claims and verification of health claims was obtained for intention to recommend the omega-3 fatty acids enriched foods to others. A significant three-way interaction between traceability, health claims and verification of health claims was also obtained for intention to recommend to others foods enriched with omega-3 fatty acids. Results of this study contribute to a deeper understanding of the simultaneous effects of traceability, health claims and verification of health claims on consumers' behavioral intentions of health enhancing foods, a phenomenon still largely unexplored. Results also have implications in both marketing strategy and public policy. For marketers, findings show how information cues such as traceability, health claims and verification of health claims influence consumers' behavioral intentions of omega-3 fatty acids enriched foods and hence help them elaborating effective communication strategies. For policy makers, findings of this study might be of particular interest for elaborating effective regulatory framework for functional foods industry.

KEY WORDS : Traceability, health claims, verification of health claims, intention to purchase, intention to recommend, intention to serve, omega-3 fatty acids, a mixed between-within subjects analysis of variance.

RÉSUMÉ

L'objectif de cette recherche consiste à examiner les effets de la traçabilité, des allégations santé et de la vérification des allégations santé sur les intentions de comportement des consommateurs (intention d'achat, intention de recommandation et intention de servir aux autres) à l'égard des aliments enrichis d'acides gras oméga-3. Le design expérimental consiste en une analyse de variance mixte de type inter et intra-sujets. Les facteurs inter-sujets sont la traçabilité avec deux traitements (complètement traçable-pas traçable) et les allégations santé avec trois traitements (allégation fonctionnelle, allégation de réduction de risque de maladie et allégation de prévention de maladie). Le premier facteur intra-sujets concerne la vérification des allégations santé avec deux niveaux (Santé Canada, une agence gouvernementale fédérale et la Fondation des maladies du cœur, une organisation à but non lucratif). Le deuxième facteur intra-sujet porte sur les catégories de produits enrichis d'acides gras oméga-3 avec cinq traitements (viandes, œufs, produits céréaliers, produits laitiers et fruits ou légumes transformés). Ainsi, six versions d'un questionnaire ont été administrées à six groupes de participants (n = 463), une version par groupe (variant entre 72 et 83 répondants) à Montréal et à Ottawa. Les résultats montrent que la traçabilité et la vérification des allégations santé ont des effets significatifs sur les intentions de comportement du consommateur. De plus, des effets d'interaction significatifs double et triple ont été également trouvés entre les allégations santé et la vérification des allégations santé, d'une part et entre la traçabilité, les allégations santé et la vérification des allégations santé, d'autre part. Les résultats de cette étude contribuent à approfondir la compréhension des effets simultanés de la traçabilité, des allégations santé et de la vérification des allégations santé sur les intentions de comportement des consommateurs à l'égard des aliments santé, un phénomène encore largement inexploré. De plus, les résultats de cette étude présentent des implications au niveau managérial et au niveau des politiques publiques. Pour les gestionnaires en marketing, les résultats de cette étude peuvent les aider à mieux comprendre comment les indices d'informations tels que la traçabilité, les allégations santé et la vérification des allégations santé influencent les intentions de comportement des consommateurs à l'égard des aliments enrichis d'acides gras oméga-3 et ainsi les aider à élaborer des stratégies de communication efficaces. Pour les responsables de la réglementation, les résultats de cette étude pourraient être d'un intérêt particulier dans l'élaboration de cadres réglementaires efficaces pour l'industrie des aliments fonctionnels

MOTS-CLÉS : Traçabilité, allégation santé, vérification des allégations santé, intention d'acheter, intention de recommander, intention de servir, acides gras oméga-3, analyse de variance mixte de type inter et intra-sujets.

4.1 Introduction

Despite the healthy image and the scientific evidence of functional foods benefits, consumers are uncertain about the functionality, health impact and safety of these products (Hobbs, 2002; Moorsel, Cranfield and Sparling, 2007; Siedlok, Smart and Gupta, 2010; Verbeke, 2005a). In fact, foods in general have intangible characteristics called credence attributes (such safety, nutritional and health benefits, etc.) that cannot be adequately assessed before or even after purchase (Lobb and Mazzocchi, 2007; Moser, Raffaelli and Thilmany-McFadden, 2011; Verbeke, 2005b; Zou and Hobbs, 2006). As a result, before making purchase decisions, uncertainty emerges in consumers' mind (Hobbs, 2004; Singh and Sirdeshmukh, 2000; Zou 2011), increases risk perception and may negatively affect purchase intentions. In such situation, consumers will try to gather additional information to decrease perceived uncertainty (Kim and Benbasat, 2003) and restore their confidence (Golan et al., 2004; Hobbs, 2004, van Rijswijk and Frewer, 2012) by using extrinsic quality cues such as brand names or information on labels[93] (Bredahl, 2004; Verbeke, 2005; Zeithaml, 1988). According to Verbeke (2005b), considering how many food items are low involvement[94] products, it is likely consumers use labelling information such

[93]Refers to all information on food packaging including health claims, nutritional information, ingredient lists, etc. (EdComs, 2007).

[94] According to Zaichkowsky (1985, p. 342), involvement is «*a person's perceived relevance of the object based on inherent needs, values, and interests*». A person can be involved with advertisements (Krugman, 1977), with products (Howard and Sheth 1969; Hupfer and Gardner 1971), or with purchase decisions (Clarke and Belk 1978). As stated by Howard and Sheth (1969), involvement with products leads to greater perception of attribute differences, perception of greater product importance, and greater commitment to brand choice. In consumer behavior, involvement is viewed by theorists in terms of a two-fold dichotomy: low involvement and high involvement (Engel and Blackwell, 1982). For low involvement-product, the purchase decision is less significant than high involvement-product (Ahmed et al., 2004).

as nutritional value or contents, traceability[95], production methods, origin and health claims as heuristics to help judge of a product's quality and safety.

Several studies have argued that information on labels help consumers make informed choices (Garretson and Burton, 2000; Hailu et al., 2009; Hoefkens and Verbeke, 2013; Kozup, Creyer and Burton, 2003; Roe, Levy and Derby, 1999; Wansink, 2003). Information on food labels has a direct potential impact on consumers' decision making (Verbeke and Ward, 2006). It transforms credence attributes of food products into search attributes[96] (Bernués, Olaizola and Corcoran, 2003; Caswell and Mojduszka, 1996; Caswell and Padberg, 1992; Drichoutis, Lazaridis and Nayga, 2006) and therefore influences consumers' perception, attitude, beliefs and behavior (Behrens, Villanueva and Da Silva, 2007; Grunert, 2005; Steenkamp and van Trijp, 1996; Stranieri et al., 2010).

However, irrelevant and/or information overload on product labels can engender misunderstanding, ignorance, boredom and impatience for consumers (Salaün and Flores, 2001; Verbeke, 2005b). In a situation of a large amount of information, consumers can decide to remain rationally ignorant since the time and effort allocated for information processing exceeds the expected marginal benefit (McCluskey and Swinnen, 2004) and therefore use only a limited part of the available information on product labels (Verbeke and Ward, 2006). Given the limited space on labels, the limited human cognitive capacity and the potential for information overload, it is

---

[95] *«Traceability is the ability to follow an item or group of items – animals, food products or ingredients – from one point in the supply chain to another. Tags, tattoos, and logbooks are all elements of traceability that have been used for years by both industry and government. Traceability systems are based on three basic elements: animal/product identification; premises identification; and animal/product movement»* (Health Canada, 2013). This information is available online at: http://www5.agr.gc.ca/eng/industry-markets-and-trade/traceability/?id=1382971713721)

[96] Contrary to credence attributes, search attributes are attributes that can be evaluated before purchase (Caswell, and Mojduszka, 1996).

important for marketers and regulatory agencies to help consumers in their decision-making. In fact, adequate labelling of functional foods is necessary for market definition and growth (Basu, Thomas and Acharya, 2007).

Regarding labelling information affecting consumers' valuation of food, past studies focused on traceability (Chen and Huang, 2013; Chen, Zhao, and Liu, 2014; Choe et al., 2009; Hobbs et al. 2005; Loureiro and Umberger, 2007; Stranieri, Baldi and Banterle, 2010; Ubilava and Foster, 2009), health claims (Hoefkens and Verbeke, 2013; Saba et al., 2010; Sabbe et al., 2009; Van Trijp and Van der Lans, 2007; Van Kleef, van Trijp and Luning, 2005; Verbeke, Scholderer and Lähteenmäki, 2009), and verification of health claims (Cox, Evans and Evans, 2008; 2011; Hailu et al., 2009; Zou, 2011).

Traceability «*[...] refers to the information trail that follows the physical trail of food from farm to table, and can affect every member of the supply chain - including the end consumer*» (Newman et al., 2014, p.6). Food safety crises, major outbreaks of foodborne illnesses and product recalls have affected, in recent years, consumers' confidence about food quality and safety (Hobbs, 2004; Johnson, 2011; Verbeke, 2005b). Introduced by governments and food manufacturers, traceability systems become a major instrument for ensuring food safety and delivering quality assurances (Hobbs et al., 2005) and therefore enables consumers a better product choice (Verbeke and Ward, 2006).

Health claims are defined as information statements printed on food labels, placed in-front-of the product to describe their expected health outcomes, specific health related functions or role in a healthy lifestyle (Lähteenmäki, 2013). In functional foods

studies, nutrition claim[97], functional[98] and disease risk reduction[99] health claims were mostly incorporated to investigate their effects on consumers' purchase behavior (e.g. Hoefkens and Verbeke, 2013; Saba et al., 2010; Sabbe et al., 2009; Van Trijp and Van der Lans, 2007; van Kleef, van Trijp and Luning, 2005; Verbeke, Scholderer and Lähteenmäki, 2009).The disease prevention[100] health claim, considered the most difficult health claim to substantiate (Malla, Hobbs and Sogah, 2013), has received little attention in the literature. Except for Zou (2011), the disease prevention health claim has never been considered in past studies. All these health claims are different in terms of regulatory mechanisms and standards of evidence. In Canada, functional and disease risk reduction health claims are exempted by Food and Drug Regulation and can be used on food products. However, disease prevention health claims are not exempted from drug claim and cannot be used on food labels (AAFC, 2012). Concerning the standard of evidence, disease risk reduction and disease prevention health claims require the highest standard of evidence, while for functional health claim, a lower standard of evidence is sufficient. Despite these regulatory differences, consumers do not categorize health claims in the same way as regulators do. In fact,

---

[97]Nutrition or nutrient claim describes the amount of a nutrient in a food. Example: *A good source of iron, source of fiber, high in vitamin A, Sodium free or trans fat free* (Health Canada, 2010).

[98]Relate to the effects that a food has on the normal functions of the body. It is based on the role that the food or the food constituent plays when consumed at levels consistent with normal dietary patterns. For example, "[Naming the food or food constituent] promotes regularity or laxation" (Canadian Food Inspection Agency, 2014). This information is available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=7#s13c7

[99] Is a statement that links a food to a reduced risk of developing a diet-related disease or condition in the context of the total diet. For example, "[Naming the food or food constituent] may reduce the risk of cardiovascular disease". (Canadian Food Inspection Agency, 2014).This information is available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14

[100]Refers to the treatment or mitigation of a disease or health-related condition, or about restoring, correcting or modifying body functions. For example, "[Naming the food or food constituent] lowers blood cholesterol". (Canadian Food Inspection Agency, 2014). This information is available online at: http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/health-claims/eng/1392834838383/1392834887794?chap=14#s47c14

consumers often do not know about these differences and do not even always understand differences between health claims categories (Edcoms, 2007).

Unlike health claims, the verification of health claims has received little attention, especially in Canada (Hailu et al., 2009; Zou, 2011). However, the role of verification of health claims in consumers' acceptance of food has been acknowledged in some studies (Hailu et al., 2009; Innes and Hobbs, 2011). Verification of health claims, as quality signal, is important to establish the credibility of health claims (Hailu et al., 2009; Ronteltap et al., 2007). In fact, although consumers perceive health claims as potentially useful, they are at the same time often unable to understand some of them (EdComs, 2007). Moreover, consumers are skeptical and confused about the real benefits referred to specific health claims (Pothoulaki and Chryssochoidis, 2009). Thus, a potential market failure arises due to information asymmetry between buyers and sellers. To reduce information asymmetry and avoid market failure, credible quality signals are necessary (Caswell and Mojduszka, 1996).

It is important to note that health claims are regulated by government while the verification of health claims accuracy can be carried out both by private certifiers (retailers, manufacturers), third-party certifiers (Fulponi 2006; Hatanaka, Bain and Busch, 2005; Henson and Reardon 2005) or public certifiers. Nevertheless, effects of endorsement by regulatory agencies are limited in empirical studies (EdComs, 2007; Zou, 2011).

Even if previous studies have examined traceability, health claims and verification of health claims, the nexus of these types of labelling information has remained unexplored. Given the importance of these information cues, their simultaneous effects should bring in additional evidence about consumers' valuations of functional foods. Indeed, according to Verbeke and Ward (2006) consumers can weigh up

information on food labels and/or specific information cues on labels against other characteristics or attributes during the stage of product evaluation in their decision making process.

The aim of this article is to investigate the effects of traceability (completely traceable, not traceable), health claims (functional health claim: «*Good for your heart*», disease risk reduction health claim «*Reduces the risks of heart disease and cancer*» and disease prevention health claim «*Helps to prevent coronary heart disease and cancer*») and verification of health claims accuracy (carried by *Health* Canada, a federal government agency and Heart and Stroke Foundation, a non-profit organization) on consumers' behavioral intentions toward omega-3 fatty acids enriched foods. In particular, this study addresses the following research questions:

1) What is the influence of traceability (completely traceable, not traceable) on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

2) Do health claims (functional health claim, disease risk reduction health claim or disease prevention health claim) differ in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

3) What is the impact of verification of health claim accuracy carried by a government agency (Health Canada) versus a non-profit third party organization (Heart and Stroke Foundation) on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

4) Does traceability interacts with verification of health claims? How differences in product traceability (completely traceable, not traceable) coupled with the party that verified the accuracy of health claim type (a government agency, Health Canada- or a third party organization, Heart and Stroke

Foundation) influence consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

5) Do health claims vary with the verification of health claims? How differences in health claims (functional; disease risk reduction and disease prevention), in conjunction with the party that verified the accuracy of health claim type (a government agency, Health Canada or a third party organization, Heart and Stroke Foundation) influence consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

6) Does traceability interacts simultaneously with health claims and verification of health claims? How differences in product traceability (completely traceable-not traceable) in conjunction with health claims (functional-disease risk reduction and disease prevention) and the party that verified the accuracy of health claim type (a government agency, Health Canada or a third party organization, Heart and Stroke Foundation) affect consumers' behavioral intentions toward foods enriched with omega-3 fatty acids?

A mixed between-within subjects analysis[101] of variance is used as a research method in this study to investigate the effects of traceability, health claims and verification of health claims on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids.

This study has additional contributions. First, while traceability has been widely examined for conventional foods (e.g. Chen and Huang, 2013; Chen, Zhao, and Liu, 2014; Choe et al, 2009; Hobbs et al. 2005; Loureiro and Umberger, 2007; Stranieri,

[101]Also known as split-plot ANOVA, this method is a combination of two different types of one-way ANOVA into one study: a between-subjects ANOVA and a within-subjects ANOVA (Stevens, 2009).

Baldi and Banterle, 2010; Ubilava and Foster, 2009) it has never been examined in the context of functional foods. Second, previous studies most commonly have focused on a specific behavioral intention such as intention to purchase or willingness to buy (Lähteenmäki, 2013). Other behavioral intentions such as intentions to recommend and intentions to serve are important variables in the context of food consumption. Thus, this research incorporates intentions to purchase, intentions to recommend and intentions to serve foods enriched with omega-3 fatty acids as dependent variables. Finally, previous studies have mainly focused on specific food as carriers for functional ingredient such as fruit juice, yoghurt, spread, bread, margarine, soup, etc. (Hoefkens and Verbeke, 2013; Van Kleef, van Trijp and Luning, 2005; Verbeke Scolderer and Lähteenmäki, 2013). None has considered food products categories in general. Following «*Eating Well with Canada's Food Guide*» (Health Canada, 2011), this study considers five food products categories enriched with omega-3 fatty acids, namely: meat products, eggs, cereal products, dairy products and processed fruits or vegetables.

The remainder of this article is structured as follows. Section 4.2 provides the theoretical underpinnings that justify the developed hypotheses of this research. Section 4.3 describes the research methods employed, with details about research design, sample, procedure and dependent variables' measures. Empirical findings are presented in section 4.4. The results are discussed in section 4.5. Finally, the paper concludes in section 4.6 with theoretical contributions, both managerial and public policy implications, limitations and avenues for future research.

4.2 Hypotheses development

In this section are presented hypotheses related to the effects of independent factors (traceability, health claims and verification of health claims) on consumers' behavioral intentions (intention to purchase, intention to recommend and intention to serve) toward omega-3 fatty acids enriched foods. First, hypotheses related to main effect of traceability (hypothesis 1), the role of health claims (hypothesis 2) and the impact of verification of health claims (hypothesis 3) on consumers' behavioral intentions are proposed. Second, hypotheses related to interaction effects of health claims and verification of health claims (hypothesis 4), traceability and verification of health claims (hypothesis 5) and traceability, health claims and verification of health claims (hypothesis 6) are respectively presented.

4.2.1 Main effects of independent variables

a) Traceability

Following food safety crises about food quality and safety (Hobbs, 2004; Verbeke, 2005b), it has been argued that traceability systems help restore consumers' confidence (Gellynck and Verbeke, 2001; Hobbs, 2004; Liao, Chang and Chang, 2011; van Rijswijk et al., 2008). In fact, food traceability systems represent a means to disseminate information provision to consumers (Bosona and Gebresenbet, 2013; Menozzi et al., 2013; Hobbs, 2004; Van Rijswij and Frewer, 2011), and hence, constitute a major instrument for addressing food safety issues (Van Rijswijk et al., 2008; Verbeke, 2005b).

The aim of information traceability is to reduce information asymmetry arising from food safety and food quality attributes (van Rijswijk and Frewer, 2008; Hobbs, 2004).

It can reduce possible consumers' anxiety about food safety as it provides some sort of quality assurance (Golan et al., 2004; Hobbs et al., 2005; McCarthy and Henson, 2005; Van Rijswijk et al., 2008; Van Wezemael et al., 2010) and therefore, enables a better product choice for consumers (Verbeke and Ward, 2006). It has been shown that traceability strengthens consumers' purchase intentions (Chen and Huang, 2013; Chen, Zhao, and Liu, 2014;Choe et al, 2009; Hobbs et al. 2005; Loureiro and Umberger, 2007;Stranieri, Baldi and Banterle, 2010; Ubilava and Foster, 2009). These findings lead to formulate, the following hypothesis:

H1: Traceability has a positive impact on consumers' behavioral intentions:

- H1a: Consumers are more likely to purchase completely traceable than non traceable omega-3 fatty acids enriched foods.
- H1b: Consumers are more likely to recommend to others completely traceable than non traceable omega-3 fatty acids enriched foods.
- H1c: Consumers are more likely to serve to others to whom they care for completely traceable than non traceable omega-3 fatty acids enriched foods.

b) Health claims

Given the growing interest of consumers and public in general for health related issues (Cardillo et al., 2011; Fernqvist and Ekelund, 2014), health claims have been widely studied (Fernqvist and Ekelund, 2014). Given health benefits of food products are credence attributes, health claims have become a typical mean to convey these attributes to consumers (Hoefkens and Verbeke, 2013; Sabbe et al, 2009). In fact, in the absence of health claims, health benefits remain unknown to potential consumers (Van Trijp and van der Lans, 2007; Williams, 2005; Lord, Eastlack and Stanton, 1987). Consequently, health claims help consumers make better-informed and possibly healthier food choices (Baglione, 2012; Drichoutis et al., 2008; Williams and Ghosh, 2008). Previous studies used nutrition claim, functional and disease risk

reduction health claims to investigate whether consumers' behavioral intentions differ significantly (Grunert et al, 2009; Hoefkens and Verbeke, 2013; Saba et al., 2010; Sabbe et al., 2009; Van Trijp and Van der Lans, 2007; Van Kleef, van Trijp and Luning, 2005; Verbeke, Scholderer and Lähteenmäki, 2009). For instance, Hoefkens and Verbeke (2013); Verbeke, Scholderer and Lähteenmäki (2009) focused on nutrition, functional and disease risk reduction health claims. Grunert et al (2009); Saba et al. (2010), Van Kleef, van Trijp and Luning (2005) were interested in functional and disease risk reduction health claims. Sabbe et al. (2009) emphasized nutrition claim. Van Trijp and Van der Lans (2007) studied nutrition and disease risk reduction health claims.

However, these previous studies have found mixed results. While Hoefkens and Verbeke (2013), Sabba et al. (2010)[102], Verbeke, Scholderer and Lähteenmäki (2009) argued, on the one hand, consumers are more likely to buy functional food with a nutrition claim or a functional health claim than with a disease risk reduction claim, Van Kleef, van Trijp and Luning (2005), Sabba et al. (2010)[103], and Grunert et al. (2009) have demonstrated, on the other hand, consumers were more likely to buy functional foods labeled with a risk reduction than those labeled with a functional health claim. Moreover, Grunert et al. (2009), van Kleef, van Trijp and Luning (2005) found that positive claims (i.e., functional health claims) did not have any major impact on consumer response. Considering these inconsistencies in research results, hypothesis 2 (H2) is proposed without specifying any expected particular difference between health claims types (functional, disease risk reduction and disease prevention) in affecting consumers' behavioral intentions:

[102] This was found only for consumers in the United Kingdom.

[103] This finding was obtained for consumers in Finland and Germany.

H2: Health claims (functional, disease risk reduction and disease prevention) differ significantly in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty acids

c) Verification of health claims

Verification of health claims plays an important role in consumers' acceptance of both functional foods (Hailu et al., 2009) and agri-foods (Innes and Hobbs, 2011). It supports effective development of marketing strategies, especially when the functional ingredient is novel and associated health effects are unknown (Hailu et al., 2009). In fact, given health benefits from functional foods are credence attributes that cannot be experienced by consumers, verification of health claims by credible organizations can help reduce consumers' uncertainty and reinforce the credibility of health claims (Ronteltap et al., 2007).

Despite their importance for consumer acceptance, trustworthiness of functional foods, verification of health claims accuracy by different organizations have been less investigated (Niva and Mäkelä, 2007). According to Hailu et al. (2009), fewer studies have examined the link between verification of health claims by different organizations and consumer acceptance of functional foods (Cox, Evans and Lease, 2008, 2011; Hailu et al., 2009). These studies have found that consumers' acceptance of functional foods is higher when these products mention on their labels that the verification of functional health claim and disease risk reduction health claim was carried by government (Cox, Evans and Lease, 2008, 2011; Hailu et al., 2009). Moreover, similar findings were also obtained in studies about public acceptance of new food technologies (Cardello, Schutzb and Lesherc, 2007; Mohr et al., 2007). All, these research results lead to the following hypothesis:

H3: Verification of health claims (functional, disease risk reduction and disease prevention) accuracy by Health Canada (a government agency) has greater effect on consumers' behavioral intentions than verification of these health claims types accuracy by Heart and Stroke Foundation (a third party organization).

- H3a: Consumers are more likely to purchase foods enriched with omega-3 fatty acids indicating on their labels that 'Health Canada' verified the health claim type (functional, disease risk reduction or disease prevention) as being accurate than to buy those indicating that 'Heart and Stroke Foundation' verified the accuracy for such health claims.
- H3b: Consumers are more likely to recommend to others foods enriched with omega-3 fatty acids indicating on their labels 'Health Canada' verified the health claim (functional, disease risk reduction or disease prevention) than to recommend those indicating that 'Heart and Stroke Foundation' verified the accuracy for such health claims.
- H3c: Consumers are more likely to serve to others foods enriched with omega-3 fatty acids indicating on their labels 'Health Canada' verified the health claim (functional, disease risk reduction or disease prevention) than to serve to others those indicating that 'Heart and Stroke Foundation' verified the accuracy for such health claims.

4.2.2 Interaction effects between independent variables

a) Interaction between health claims (functional, disease risk reduction and disease prevention) and verification of such health claim types by a government and a third party organization

According to Ford, Smith and Swasy (1988), even after using a product, health claims cannot be verified by consumers due to lack of technical expertise or practical possibilities. Lätheennmäki (2013) asserted that nutrition and health claims are just

one piece of information that consumers may use to evaluate a product's potential benefit. Moreover, Verbeke and Ward (2006) assumed that during the stage of product evaluation, consumers can weigh up labelling information and/or specific information cues on labels against other characteristics or attributes.

Furthermore, it has been argued that verification of health claims, in general, plays an important role in consumers' acceptance of functional foods (Hailu et al., 2009) and also agri-foods (Innes and Hobbs, 2011). According to Hailu et al. (2009) and Ronteltap et al. (2007), the verification of health claims, as a quality signal, is important to establish the credibility of health claims. Therefore, a potential interaction between a health claim and verification of a health claim can be expected. However, despite previous studies (Cox, Evans and Lease, 2008, 2011; Hailu et al., 2009) have found that consumers' acceptance of functional foods is higher when it is mentioned on food products' labels that the health claim has being verified accurately by a government agency. Mixed results were found regarding health claim differences in affecting consumers' behavioral intentions (Hoefkens and Verbeke, 2013; Sabba et al., 2010; Verbeke, Scholderer and Lähteenmäki, 2009 and Van Kleef, van Trijp and Luning, 2005)

Following these arguments and considering these research results inconsistencies, hypothesis 4 (H4) is proposed without specifying any expected particular difference between health claims types (functional, disease risk reduction and disease prevention) and the verification of health claim accuracy in affecting consumers' behavioral intentions:

H4: The differences between health claim types (functional, disease risk reduction or disease prevention) vary in conjunction with the verification of health claim accuracy carried by a government agency (Health Canada) vs. by a third party organization

(Heart and Stroke Foundation) in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty acids.

- H4a: The differences between health claim types (functional, disease risk reduction or disease prevention) vary in conjunction with a verification of health claim accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation) in affecting consumers' purchase intentions of omega-3fatty acids enriched foods.
- H4b: The differences between health claim types (functional, disease risk reduction or disease prevention) vary in conjunction with a verification of health claim accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation) in affecting consumers' intentions to recommend omega-3 fatty acids enriched foods.
- H4c: The differences between health claims types (functional, disease risk reduction or disease prevention) vary in conjunction with verification of a health claim accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation) in affecting consumers' intentions to serve omega-3 fatty acids enriched foods.

b) Interaction between: (1) traceability and verification of health claims (by a government vs. by a third party organization) and (2) traceability, health claims (functional, disease risk reduction and disease prevention) and verification of health claims (by a government vs. by a third party organization)

Verbeke and Ward (2006) and Hobbs et al. (2005) have demonstrated that consumers are not interested in traceability information per se. Hence, consumer interest for and understanding of traceability cannot be taken for granted (Hobbs, 2005; Verbeke et al., 2006). Traceability is more difficult for consumers to understand than other information cues, such as country of origin or quality certifications (Grunert, 2005; Van Rijswijk et al., 2008; Verbeke and Ward, 2006). Consequently, traceability as

such has little marketing potential and thus is of limited value to consumers unless accompanied by trustworthy quality verification (Hobbs et al., 2005; Verbeke, 2005b; Verbeke and Ward, 2006). Moreover, Van Rijswijk and Frewer (2008) argued that traceability may be a powerful tool to help establishing the authenticity of food and to check the veracity of food claims made by producers. In general, it has been stated that credence attributes necessitate traceability systems to check the integrity of information claims on labels (Galan et al., 2004; Tronstad et al., 2005).

Furthermore, Drichoutis, Lazaridis and Nayga (2006) and Stranieri, Baldi and Banterle (2010) have stated that traceability and sources of information, amongst others, are important determinants of the consumers use of nutrition information. Moreover, Dickinson and Bailey (2002) have argued that food safety, traceability, and health information are valuable information for consumers. First, it has been shown that traceability strengthens consumers' purchase intentions (Chen and Huang, 2013; Chen, Zhao and Liu, 2014; Choe et al, 2009; Hobbs et al. 2005; Loureiro and Umberger, 2007; Stranieri, Baldi and Banterle, 2010; Ubilava and Foster, 2009). Second, Cox, Evans and Lease (2008, 2011). Second, Hailu et al. (2009) have found that the verification of a health claim accuracy by a government entity increases consumers' acceptance of functional foods. Finally, mixed results have been found regarding health claim types in affecting behavioral intentions toward functional foods (Hoefkens and Verbeke, 2013; Sabba et al., 2010; Verbeke, Scholderer and Lähteenmäki, 2009 and Van Kleef, van Trijp and Luning, 2005).

These research outputs lead to suggest that interactions between: (1) traceability and verification of health claims and (2) traceability, health claims and verification of health claims are worthy of being examined, as formulated in hypotheses H5 and H6.

H5: The impact of traceability on consumers' behavioral intentions toward omega-3 fatty acids enriched foods varies in conjunction with verification of health claims.

- H5a: Consumers are more likely to purchase completely traceable than non traceable omega-3 fatty acids enriched foods which health claim accuracy is verified by a government agency (Health Canada) than by a third party organization (Heart and Stroke Foundation).
- H5b: Consumers are more likely to recommend to others completely traceable than non traceable omega-3 fatty acids enriched foods omega-3 fatty which health claim accuracy is verified by a government agency (Health Canada) than by a third party organization (Heart and Stroke Foundation).
- H5c: Consumers are more likely to serve to others completely traceable than non traceable omega-3 fatty acids enriched foods which health claim accuracy is verified by a government agency (Health Canada) than by a third party organization (Heart and Stroke Foundation).

For hypothesis 6 (H6), given research inconsistencies regarding health claim, this hypothesis is proposed without specifying any expected particular difference between traceability, health claims types (functional, disease risk reduction and disease prevention) and verification of health claim accuracy in affecting consumers' behavioral intentions:

H6: The impact of traceability on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids varies with health claims (functional, disease risk reduction or disease prevention) and verification of health claims.

- H6a: The impact of traceability on consumers' intentions to purchase foods enriched with omega-3 fatty acids varies with health claims (functional, disease risk reduction or disease prevention) and verification of health claim type accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation).

- H6b: The impact of traceability on consumers' intentions to recommend to others foods enriched with omega-3 fatty acids varies with health claims (functional, disease risk reduction or disease prevention) and verification of health claim type accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation).
- H6c: The impact of traceability on consumers' intentions to serve to others foods enriched with omega-3 fatty acids varies with health claims (functional, disease risk reduction or disease prevention) and verification of health claim type accuracy carried by a government agency (Health Canada) vs. by a third party organization (Heart and Stroke Foundation).

4.3 Research method

4.3.1 Research design

The hypotheses were tested by means of a mixed between-within subjects analysis of variance design. This method was employed to assess the impact of traceability (traceable, not traceable), health claims (a functional health claim, a disease risk reduction health claim and a disease prevention health claim), verification of health claim accuracy (a government or a third party organization) and food product categories (meat products, eggs, cereal products, dairy products and processed fruits or vegetables products) on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. Traceability and health claims are two between-subjects factors, while verification of health claim accuracy and food product categories are two within-subjects factors. Thereby a two-between two-within subjects analysis of variance was conducted.

As detailed in Table 4.1, the experiment was repeated for five product categories enriched with omega-3 fatty acids, namely: meat products, eggs, cereal products, dairy products and processed fruits or vegetables products. This, required six variants of the questionnaires to incorporate the between subjects health claims and traceability manipulations for each of the five selected product categories. Thus, each respondent completed a questionnaire assessing one health claim type (functional or disease risk reduction or disease prevention), one level of traceability (completely traceable or not traceable) for each of the five categories of food products (meat, eggs, cereal products, dairy products and processed fruits or vegetables products) and two treatments of verification of health claims accuracy (Health Canada - a federal government agency - or Heart and Stroke Foundation- a third party non-profit organization).

Table 4.1 Experimental design of the study

				Verification of health claim (« *Within* »)									
				Government					**Third party organization**				
			Products (« *Within* »)	Meat	Eggs	Cereal	Dairy product	Processed fruit or vegeta-bles	Meat	Eggs	Cereal	Dairy product	Processed Fruit or Vegeta-bles
Traceability (« *Between* »)	Traceable	**Health Claim (« *Between* »)**	Functional	**Condition 1 (n= 81)**									
			Disease risk reduction	**Condition 2 (n= 73)**									
			Disease prevention	**Condition 3 (n= 83)**									
	Not traceable		Functional	**Condition 4 (n= 74)**									
			Disease risk reduction	**Condition 5 (n= 80)**									
			Disease prevention	**Condition 6 (n= 72)**									

4.3.2 Sample and procedure

A pretest of the questionnaire was conducted during the Spring 2013 with a sample of 30 students in Montreal, Canada who were similar in terms of demographic profile to the final sample. The pretest was useful to assess the understanding of questions and consistencies between questionnaires.

After the pretest, a total of 810 questionnaires were distributed to undergraduate students in Montreal and Ottawa (Canada) during the Summer and Fall 2013. In total 500 questionnaires were returned. Only 463 questionnaires were usable for statistical analysis. In this sample, 47% of respondents are male, 99% are less than 25 years old, 98% are single and 30% have an annual income of $25 000 or less.

Each of the 463 respondents randomly received one of the six variants of questionnaires (C1to C6, see Appendix 4.1a and 4.1b). The number of respondents in each of the six between-subject conditions of the experiment was varying between 72 and 83 (Table 4.1).

The six questionnaire variants were structured in the same manner, consisting of three sections. The first section provided definitions of terms for omega-3 fatty acids and its uses, health claims and traceability. The second section included a set of instructions about how to answer the questionnaire and the ten product profiles. Finally, the third section consisted of sociodemographic questions (Appendix 4.1).

It is important to note that the level of measurement and sample size requirements were satisfied (Appendix 4.2- descriptive statistics). In fact according to Tabachnick and Fidell (2013), the minimum sample size for the total number of subjects is 10 +

number of levels in the within-subjects factor and the minimum number in each cell is 5. All these requirements are satisfied. The total numbers of subjects were 452, 457 and 434 respectively for intentions to purchase, intentions to recommend and intentions to serve (these are greater than 10 + the number of levels in the repeated factors (5 for food product categories and 2 for verification of health claims accuracy)). In addition, the smallest cells in the analysis had 68, 71 and 66 cases, respectively, for intentions to purchase, intentions to recommend and intentions to serve. Therefore the requirement of five or more subjects per cell is satisfied.

4.3.3 Measures

a) Dependent variables

The dependent variables used in this study were behavioral intentions, namely: intentions to purchase, intentions to recommend and intentions to serve. Each behavioral intention was measured with one item on a seven-point semantic differential scale. The measure of the intentions to purchase was achieved by obtaining one's intention to buy by evaluating the following statement on a seven-point scale: «*I am unlikely/likely to purchase this product*». Intentions to recommend was measured by evaluating the following statement: «*It is unlikely/likely that I would recommend this product to others*». Finally, the measure of intentions to serve was obtained by evaluating the following statement on the same type of scale: «*It is unlikely/likely that I would serve this product to people I care for*».

b) Independent variables

Traceability. Two levels of traceability were incorporated in the experimental design of this study, namely: completely traceable and not traceable foods enriched with

omega-3 fatty acids. Therefore, if omega-3 fatty acids enriched food is completely traceable, a government agency or an individual could trace its production at every step and identify all parties involved in its processing and distribution, from the farm to the kitchen table. On the other hand, if omega-3 fatty acids enriched food is not traceable, a government agency or an individual could not trace it from the farm to the kitchen table.

Health claims. Three types of health claims related to foods enriched with omega-3 fatty acids were investigated in this study: (1) a functional claim: «*Good for your heart*», (2) a disease risk reduction health claim: «*Reduces the risks of heart disease and cancer*» and (3) a disease prevention health claim: «*Helps to prevent coronary heart disease and cancer*».

Verification of health claims. Two parties for the verification of health claims' accuracy were included in the design of this study. The first one is Health Canada (a federal government agency) and the second one is Heart and Stroke Foundation (a non-profit organization or third-party organization).

Food product categories. The food product categories used in this study were selected accordingly to «Eating Well with Canada's Food Guide»[87] and two previous studies on functional foods (Kotilainen et al., 2006; Menrad, 2003). Health Canada distinguishes between four food product groups, namely: (1) meat and alternatives, (2) milk and alternatives, (3) grain products and (4) vegetables and fruits. Kotilainen et al. (2006) and Menrad (2003) argued that functional foods have been developed in

[87]Health Canada (2011). Available online at: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php

all food categories (dairy, confectionery, bakery, soft drinks, etc.). The categories of foods enriched with omega-3 fatty acids chosen in this study were (1) meat products (e.g. beef, chicken, pork, etc), (2) eggs, (3) cereal products (e.g. sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous), (3) dairy products (milk, kefir, yogurt, cheese, etc.) and (5) processed fruits or vegetables (fruit juice, vegetable juice, etc.).

4.4 Results

4.4.1 Main effects

This section presents results related to how independent variables, namely: traceability, health claims and verification of health claims affect consumers' behavioral intentions (intentions to purchase, intentions to recommend and intentions to serve) toward foods enriched with omega-3 fatty acids.

It should be noted that the effect of food product categories (meat product, eggs, cereal products, dairy products and processed fruits or vegetables products) on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids was not developed as a hypothesis; as it is a demonstration for the experimental design of this study rather than a theoretical proposition. This effect, presented at the end of this section, is aimed at extending findings' discussion of this article.

a) Traceability

The results show that traceability has three significant main effects on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. First, as

depicted in Tables 4.2 and 4.3, traceability has a significant effect on consumers' purchase intentions of foods enriched with omega-3 fatty acids. Subjects were more likely to purchase completely traceable than non traceable food products enriched with omega-3 fatty acids (M: completely traceable = 4.965, not traceable = 4.609, Type III Sum of Squares = 142.764, $F(1, 446) = 9.882$, $p = 0.002 < 0.01$). Thus, H1a is supported. Second, the effect of traceability on consumers' intentions to recommend to others, foods enriched with omega-3 fatty acids, is also significant (Tables 4.2 and 4.3). Consumers are more likely to recommend these products to others when they are completely traceable than when they are not (M: completely traceable = 4.908, not traceable = 4.536, Type III Sum of Squares = 157.196, $F (1, 451) = 9.918$, $p = 0.002 < 0.01$). Thus, H1b is supported. Finally, traceability has a significant main effect on consumers' intentions to serve to individuals they care for, foods enriched with omega-3 fatty acids. As illustrated in Tables 4.2 and 4.3, consumers are more likely to serve completely traceable than non traceable foods enriched with omega-3 fatty acids (M: completely traceable = 5.070, not traceable = 4.576, Type III Sum of Squares = 263.944, $F(1, 428) = 17.384$, $p = 0.000 < 0.01$). Thus, H3c is supported.

Table 4.2 Effects of traceability and health claims on behavioral intentions: Between-Subjects ANOVA

	DV: Intentions to purchase			
	df	**Type III Sum of Squares**	**F**	**p**
Source of variation:				
Traceability	1	142.764	9.882	0.002
Health Claim	2	23.104	0.800	0.450
Error	446	6443.126		
	DV: Intentions to recommend			
Source of variation:				
Traceability	1	157.196	9.918	0.002
Health Claim	2	50.908	1.606	0.202
Error	451	7148.391		
	DV: Intentions to serve			
Source of variation:				
Traceability	1	263.944	17.384	0.000
Health Claim	2	17.704	0.583	0.559
Error	428	6498.218		

Abbreviation: DV = Dependent variable, df = degrees of freedom, F = Fisher's test

Table 4.3 Effects on dependent variables: Marginal Means and Standard Deviations

DV: Intentions to purchase	**M**	**SD**
Traceability		
-Completely traceable	4.965	0.082
-Not traceable	4.609	0.078
Health claims		
-Functional: «*Good for your Heart*»	4.742	0.097
-Disease risk reduction: «*Reduces the risks of heart diseases*»	4.730	0.100
-Disease prevention: «*Helps to prevent coronary heart disease and cancer*»	4.888	0.098
Verification of health claims		
-A government agency: Health Canada	4.930	0.059
- A third-party organization: Heart and Stroke Foundation	4.644	0.064
Food product categories		
-Meat(beef, chicken, pork, etc.)	4.763	0.070
-Eggs	4.890	0.070
-Cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.)	4.870	0.070
-Dairy products (milk, kefir, yogurt, cheese, etc.)	4.870	0.075
-Processed fruits or vegetables (fruit juice, vegetable juice, etc.)	4.563	0.083
DV: Intentions to recommend	**M**	**SD**
Traceability		
-Completely traceable	4.908	0.083
-Not traceable	4.536	0.084
Health claims		
-Functional: «*Good for your Heart*»	4.633	0.101
-Disease risk reduction: «*Reduces the risks of heart diseases*»	4.663	0.104
-Disease prevention: «*Helps to prevent coronary heart disease and cancer*»	4.870	0.102
Verification of health claims		
- A government agency: Health Canada	4.837	0.060
-A third-party organization: Heart and Stroke Foundation	4.607	0.069

Abbreviations: DV = Dependent variable, M = Mean, SD = Standard deviation

Table 4.3 Effects on dependent variables: Marginal Means and Standard Deviations (…Continued)

DV: Intentions to recommend	**M**	**SD**
Food product categories		
-Meat	4.693	0.088
-Eggs	4.795	0.070
-Cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.)	4.750	0.072
-Dairy products (milk, kefir, yogurt, cheese, etc.)	4.816	0.072
-Processed fruits or vegetables (fruit juice, vegetable juice, etc.)	4.556	0.080
DV: Intention to serve	**M**	**SD**
Traceability	5.070	0.083
- Completely traceable		
-Not traceable	4.576	0.085
Health Claims		
-Functional: «*Good for your Heart*»	4.778	0.102
-Disease risk reduction: «*Reduces the risks of heart diseases*»	4.778	0.104
-Disease prevention: «*Helps to prevent coronary heart disease and cancer*»	4.913	0.102
Verification of health claims		
-A government agency: Health Canada	5.009	0.061
-A third-party organization: Heart and Stroke Foundation	4.637	0.068
Food product categories		
-Meat (beef, chicken, pork, etc.)	4.417	0.070
-Eggs	4.900	0.071
-Cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.)	4.884	0.071
-Dairy products (milk, kefir, yogurt, cheese, etc.)	4.894	0.073
-Processed fruits or vegetables (fruit juice, vegetable juice, etc.)	4.620	0.083

Abbreviations: DV = Dependent variable, M = Mean, SD = Standard deviation

b) Health claims

Hypothesis H2 suggest that there are significant differences between health claims (functional health claim, disease risk reduction health claim and disease prevention health claim) in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. As shown in Table 4.2, there are no significant differences between health claims. The reported p-values for all the dependent variables (intentions to purchase, intentions to recommend and intentions to serve) are superior to 0.05 and thus hypothesis H2 is not supported. For consumers, whether foods enriched with omega-3 fatty acids are labeled with a functional health claim (*'Good for your heart'*), a disease risk reduction health claim (*'Reduces the risk of heart disease and cancer'*) or a disease prevention health claim (*'Helps to prevent coronary heart disease and cancer'*), their behavioral intentions toward these products (intentions to purchase, intentions to recommend and intentions to serve others) do not vary significantly.

c) Verification of health claims

Results indicate that verification of health claims' (VHC) accuracy have significant main effects on consumers' intentions to purchase as well as intentions to recommend and intentions to serve to others foods enriched with omega-3 fatty acids. First of all, consumers are more likely to purchase foods enriched with omega-3 fatty acids that state on their labels that 'Health Canada' (a government agency) verified the accuracy of health claim type than those indicating on their labels that 'Heart and Stroke Foundation' (a third party organization) verified the health claim type as being accurate (M: Health Canada VHC = 4.930, Heart and Stroke Foundation VHC = 4.644, Type III Sum of Squares = 91.772, $F(1, 446) = 37.847$, $p = 0.00 < 0.01$) (Tables 4.3 and 4.4). Thus, H3a is supported. Moreover, consumers are more likely to

recommend to others foods enriched with omega-3 fatty acids that mention on their labels that 'Health Canada' (a government agency) verified the accuracy of health claim type than those specifying on their labels that 'Heart and Stroke Foundation' (a third party organization) verified the accuracy of health claim(M: Health Canada VHC = 4.837, Heart and Stroke Foundation VHC = 4.607, Type III Sum of Squares = 60.284, $F(1, 451) = 20.045$, $p = 0.00 < 0.01$) (Tables 4.3 and 4.4). Thereby, H3b is supported. Finally, consumers are more likely to serve to others foods enriched with omega-3 fatty acids which indicate on their labels that the accuracy of health claim type has been verified by 'Health Canada' (a government agency) than those indicating on their labels that 'Heart and Stroke Foundation' (a third party organization) verified the health claim type as being accurate (M: Health Canada VHC = 5.009, Heart and Stroke Foundation VHC = 4.637, Type III Sum of Squares = 149.515, $F(1, 428) = 56.640$, $p = 0.00 < 0.01$). This finding supports H3c.

Table 4.4 Within-Subjects ANOVA

Source of variation	**DV: Intentions to purchase**			
	df	**Type III Sum of Squares**	**F**	**p**
VHC	1	91.772	37.846	0.000
Food product categories	4	64.468	6.422	0.000
HC x VHC	2	7.088	1.462	0.233
T x VHC	1	0.365	0.150	0.698
T x HC x VHC	2	5.709	1.177	0.309
Error df	446			
Source of variation	**DV: Intentions to Recommend**			
VHC	1	60.284	20.045	0.000
Food product categories	4	39.468	3.638	0.009
HC x VHC	2	15.497	2.577	0.077
T x VHC	1	0.012	0.004	0.950
T x HC x VHC	2	14.919	2.480	0.085
Error df	451			
Source of variation	**DV: Intentions to serve**			
VHC	1	149.515	56.640	0.000
Food product categories	4	48.525	5.717	0.000
HC x VHC	2	2.082	0.394	0.674
T x VHC	2	2.871	1.087	0.298
T x HC x VHC	2	3.302	0.625	0.535
Error df	428			

Abbreviations: VHC= verification of health claims; HC = health claims; T= traceability; df = degrees of freedom; F = Fisher's test

d) Main effect of food product categories

As shown in Table 4.4, food product categories enriched with omega-3 fatty acids have significant main effects on consumers' behavioral intentions. All the p-values for intentions to purchase (p= 0.000), intentions to recommend (p= 0.009) and intentions to serve (p= 0.000) are inferior to 0.01.

As depicted in Figure 4.1 and Appendix 5.4a, consumers are more likely to buy eggs (M= 4.890), followed by cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.) (M= 4.870) and dairy products (milk, kefir, yogurt, cheese, etc) (M= 4.847) enriched with omega-3 fatty acids. Enriched meat products with omega-3 fatty acids (beef, chicken, pork, etc) come in the fourth position (M= 4.763). Finally, the lowest score of consumers' intentions to buy is for processed fruits or vegetables (fruit juice, vegetable juice, etc.) enriched with omega-3 fatty acids (M= 4.565).

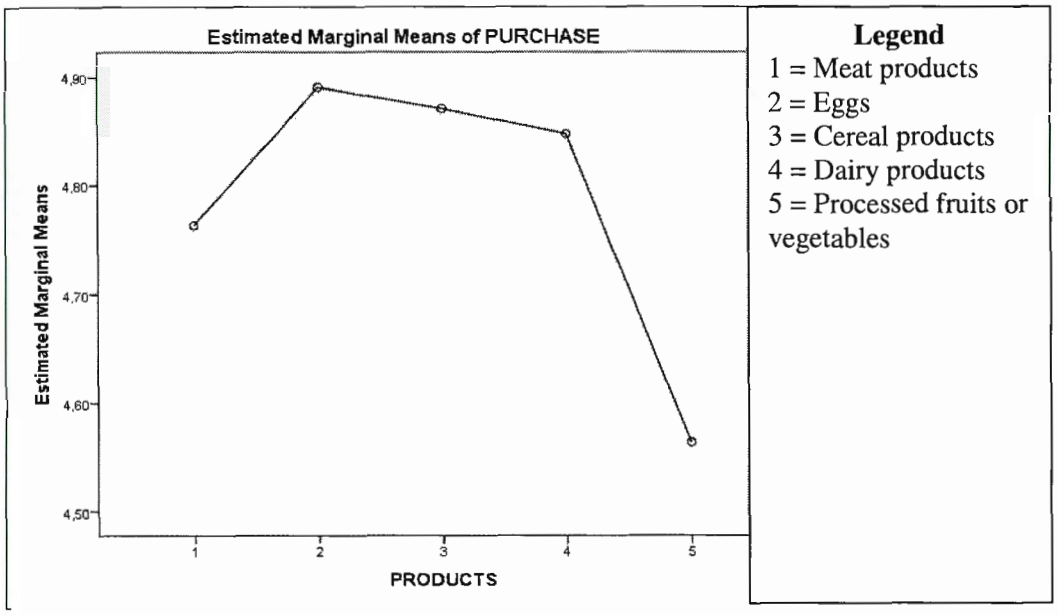


Figure 4.1 Effect of food product categories enriched with omega-3 fatty acids on consumers' purchase intentions

Besides, consumers are more likely to recommend to others enriched dairy products (milk, kefir, yogurt, cheese, etc) (M= 4.816), followed very closely by enriched eggs (M= 4.795), and successively by enriched cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.) (M= 4.750) and enriched meat products (beef, chicken, pork, etc.) (M= 4.693) with omega-3 fatty acids (Figure 4.2 and Appendix 4.4b). However, consumers are less likely to recommend to others processed fruits or vegetables (fruit juice, vegetable juice, etc.) enriched with omega-3 fatty acids (M= 4.556).

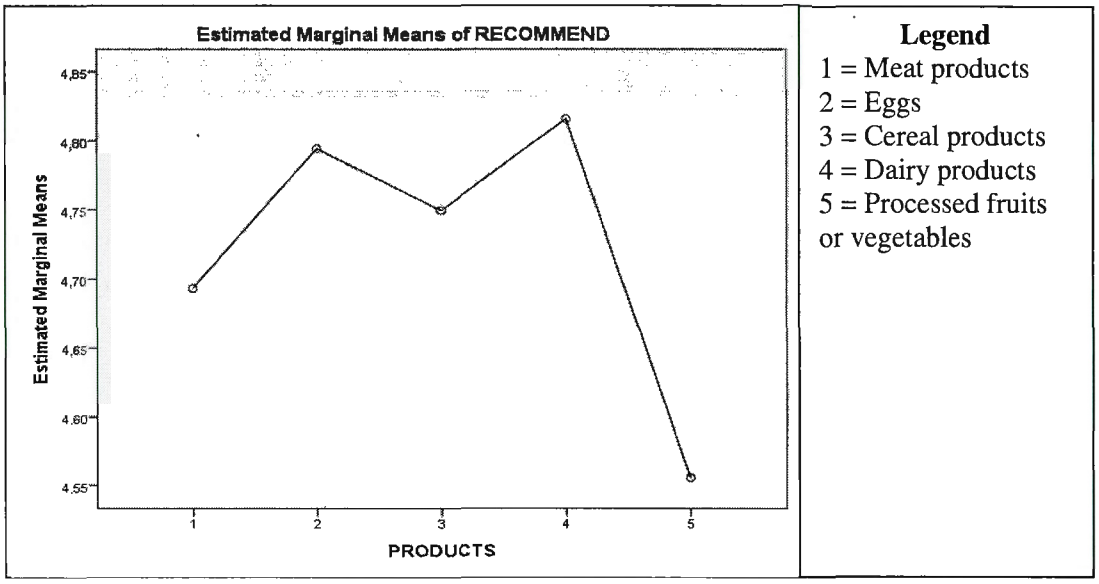


Figure 4.2 Effect of food product categories enriched with omega-3 fatty acids on consumers' intentions to recommend

Finally, for consumers' intentions to serve to other people they care for, foods enriched with omega-3 fatty acids (Figure 4.3 and Appendix 4.4c), the highest score is for eggs (M= 4.900). In the second, third and fourth positions are respectively dairy products (milk, kefir, yogurt, cheese, etc) (M= 4.894), cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.) (M= 4.884) and meat products (beef, chicken, pork, etc.) (M= 4.817). The lowest score of consumers' intentions to serve is again for processed fruits or vegetables (fruit juice, vegetable juice, etc.) enriched with omega-3 fatty acids (M= 4.620).

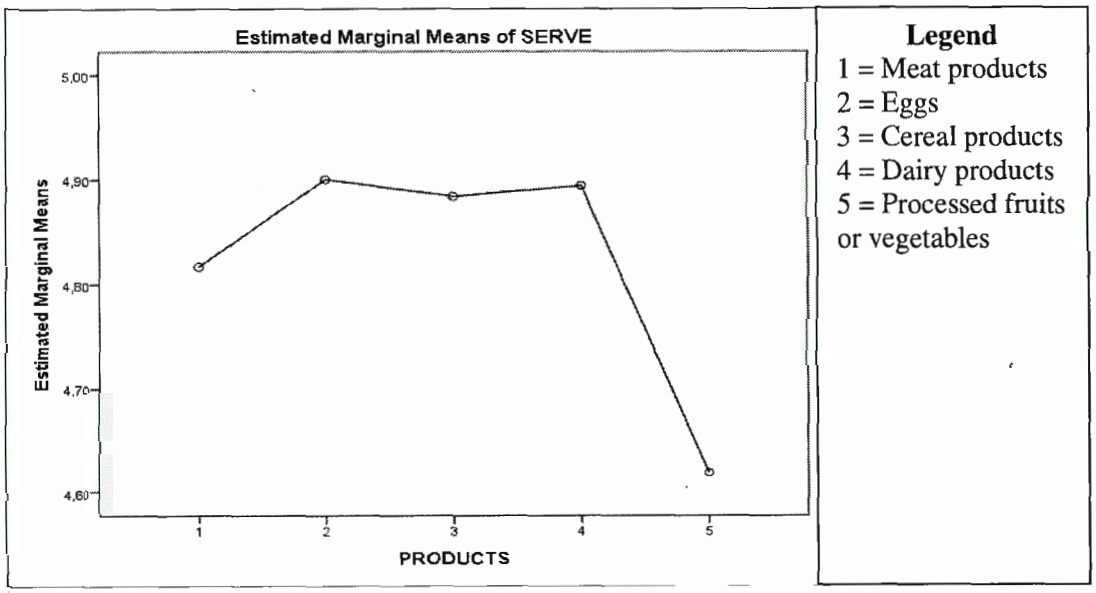


Figure 4.3 Effect of food product categories enriched with omega-3 fatty acids on consumers' intentions to serve

The Bonferroni comparison test (Appendices 5.4a, 5.4b and 5.4c) reveals that for all behavioral intentions (intentions to purchase, intentions, to recommend and intentions to serve), there are only significant differences between the following foods enriched with omega-3 fatty acids:

- Eggs and processed fruits or vegetables ($p < 0.05$),
- Cereal products and processed fruits or vegetables ($p < 0.05$),
- Dairy products and processed fruits or vegetables ($p < 0.05$).

In summary, consumers seem to accept the enrichment of eggs, cereal products, dairy products and to a lesser extent meat products with omega-3 fatty acids. However, they seem reluctant to buy, recommend or serve to others processed fruits or vegetables (fruit juice, vegetable juice, etc) enriched with omega-3 fatty acids.

4.4.2 Interaction effects

a) Health claims by verification of health claims

The hypothesis 4 (H4) proposed that the differences between health claims (functional health claim, disease risk reduction health claim or disease prevention health claim) vary in conjunction with the party that verified the accuracy of health claim type (a government agency-Health Canada- or a third party organization- Heart and Stroke Foundation-) in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. For purchase intentions of omega-3 fatty acids-enriched foods, this interaction is statistically not significant, Type III Sum of Squares = 7.088, F (2,446) =1.462, $p = 0.233 > 0.05$) (Table 4.4). Hence H4a is not supported. Concerning intentions to recommend to others omega-3 fatty acids-enriched foods, the interaction between health claims and verification of health claims is significant, Type III Sum of Squares = 15.497, F (2,451) = 2.577, $p = 0.077 < 0.1$) (Table 4.4). Thus, this interaction supports H4b.

A Bonferroni three-group comparison test (Appendix 4.4b) confirms that the source of interaction is found in differences between the verification of health claims treatments (Health Canada and Heart and Stroke Foundation) for both functional health claim (*'Good for your heart'*) and disease risk reduction health claim (*'Reduces the risk of heart disease and cancer'*) (left-hand-side of figure 4.4, $p < 0.05$), but not for the disease prevention health claims (*'Helps to prevent coronary heart disease and cancer'*) (right-hand-side of figure 4.4, $p > 0.05$). In other words, when foods enriched with omega-3 fatty acids are labeled with a functional health claim (*'Good for your heart'*) or a disease risk reduction health claim (*'Reduces the risks of heart disease and cancer'*) and at the same time state on labels that this health claim type has been verified as being accurate by Health Canada (a federal

government agency), consumers are more likely to recommend to others these food products than those specifying on their labels that Heart and Stroke Foundation has verified the accuracy of this health claim type. However, there is no significant difference on consumers' intentions to recommend these food products to others ($p > 0.05$) whether foods enriched with omega-3 fatty acids are labeled with a disease prevention health claim (*'Helps to prevent coronary heart disease and cancer'*) and mentioning that this health claim type has been verified accurate by Health Canada (a federal government agency) or by Heart and Stroke Foundation (a third party organization). (See Appendix 4.4b, for pairwise comparisons, Bonferroni test).

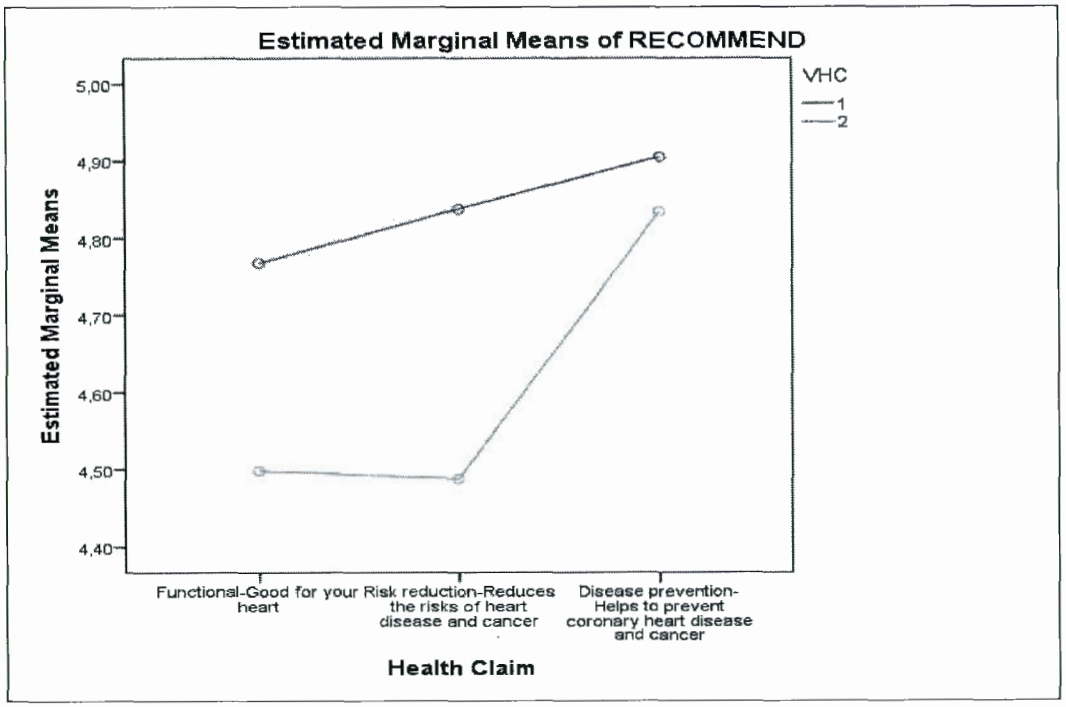


Figure 4.4 Effects of health claim and verification of health claim on consumers' intentions to recommend to others enriched foods with omega-3 fatty acids

Finally, consumers' intentions to serve to others foods enriched with omega-3 fatty acids, do not differ between health claims treatments (types) and verification of health claims treatments (Health Canada and Heart and Stroke Foundation) (Type III Sum of Squares = 2.082, F (2,428) = 0.394, p= 0.674 > 0.05) (Table 4.4). H4c is not supported.

b) Traceability by verification of health claims

As illustrated in Table 4.4, the interaction between traceability and verification of health claims on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids is not significant. Consumers' behavioral intentions of omega-3 fatty acids-enriched foods do not differ across both traceability treatments (completely traceable- not traceable) and organization that verified the health claim type as being accurate (a government agency-Health Canada- or a third party organization -Heart and Stroke Foundation). First, for intentions to purchase, H5a is not supported (Type III Sum of Squares = 0.365, F (2, 446) = 0.150, p = 0.698 > 0.05). Second, for intentions to recommend, H5b is also not supported (Type III Sum of Squares = 0.012, F (2, 451) = 0.004, p = 0.950 > 0.05). Finally, for intentions to serve (Type III Sum of Squares = 2.871, F (2, 428) = 1.087, p = 0.298 > 0.05), hypothesis 5c (H5c) is not supported.

In summary, differences in product traceability (completely traceable –not traceable) coupled with the party that verified the accuracy of health claim type (a government agency-Health Canada- or a third party organization-Heart and Stroke Foundation) do not significantly differ in affecting consumers' behavioral intentions of foods enriched with omega-3 fatty acids.

c) Traceability by health claims by verification of health claims

Hypothesis 6 (H6) proposed that there is a triple interaction between traceability, health claims and verification of health claims on consumers' behavioral intentions. The results in Table 4.4 show that the three-way interaction of traceability, health claims and verification of health claims is only significant for intentions to recommend (Type III Sum of Squares = 14.919, $F(2, 451) = 2.480$, $p = 0.085 < 0.1$). Hence, hypothesis 6b (H6b) is supported. Nevertheless, for intentions to purchase (Type III Sum of Squares = 5.709, $F(2, 451) = 1.177$, $p = 0.309 > 0.05$) and for intentions to serve to others foods enriched with omega-3 fatty acids (Type III Sum of Squares = 3.302, $F(2, 428) = 0.625$, $p = 0.535 > 0.05$). H6a and H6c are not supported.

As illustrated in Figure 4.5 and according to Bonferroni comparison test (See Appendix 4.4b- pairwise comparison, Bonferroni test), the difference between verification of health claim accuracy by Health Canada (VHC 1) and verification of health claim by Heart and Stroke Foundation (VHC 2) is significant between traceability treatments (completely traceable -not traceable) only for the functional health claim ('*Good for your heart*') ($p = 0.072 < 0.10$) and not for the disease risk reduction health claim ('*Reduces the risk of heart disease and cancer*') ($p = 0.388 > 0.05$) nor for the disease prevention health claim ('*Helps to prevent coronary heart disease and cancer*') ($p = 0.374 > 0.05$). In other words, when foods enriched with omega-3 fatty acids are completely traceable, labeled with a functional health claim ('Good for your heart') and at the same time stating on labels that this health claim has been verified as being accurate by Health Canada (a federal government agency), consumers are more likely to recommend to others these foods than those which are not traceable, labeled with a functional health claim ('*Good for your heart*') and

indicating on labels that this health claim has been verified accurate by Heart and Stroke Foundation (a third party organization).

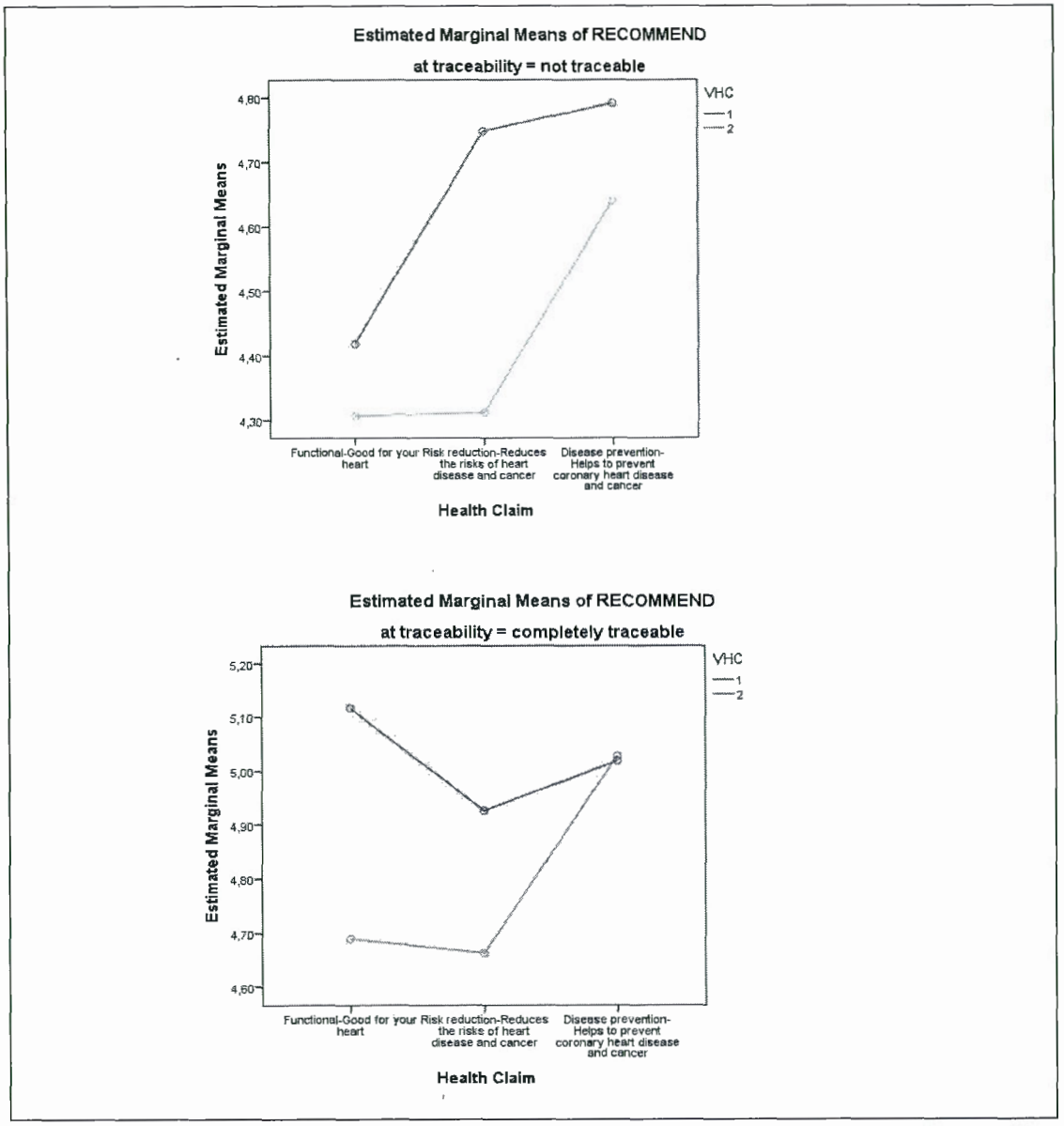


Figure 4.5 Effects of traceability, health claims, and verification of health claims on consumers' intentions to recommend to others foods enriched with omega-3 fatty acids

4.5 Discussion

This study reports on the effects of traceability, health claims and verification of health claims on consumers' intentions to purchase, intentions to recommend and intentions to serve omega-3 fatty acids-enriched foods. The discussion summarizes key findings of the mixed between-within analysis of variance used to test the main effects as well as the interaction effects. of traceability, health claims and verification of health claims. Findings related to main effects are firstly discussed, followed by those related to interaction effects.

4.5.1 Discussion of main effects

First, the results demonstrate that traceability has main effects on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. Consumers are more likely to purchase, to recommend and to serve to others completely traceable than non traceable omega-3 fatty acids enriched foods. This finding is consistent with previous studies which found that traceability strengthens consumers' purchase intentions of conventional food such as fast food (Chen and Huang, 2013), agri-food products (Chen, Zhao, and Liu, 2014; Choe et al, 2009) meat products (beef, pork) (Hobbs et al. 2005; Loureiro and Umberger, 2007; Ubilava and Foster, 2009). In fact, traceability seems to be a good mean of information (Bosona and Gebresenbet, 2013; Hobbs, 2004; Menozzi et al., 2013; Van Rijswij and Frewer, 2011). It serves as a form of quality assurance (Golan et al., 2004; Hobbs et al., 2005; McCarthy and Henson, 2005; Van Rijswijk et al., 2008; Van Wezemael et al., 2010) and enables a better product choice for consumer (Verbeke and Ward, 2006).

Second, this study reports no significant differences between health claims in affecting consumers' behavioral intentions toward foods enriched with omega-3 fatty

acids. Whether foods enriched with omega-3 fatty acids are labeled with a functional health claim (*'Good for your heart'*), a disease risk reduction health claim (*'Reduces the risk of heart disease and cancer'*) or even with a disease prevention health claim (*'Helps to prevent coronary heart disease and cancer'*), consumers' intentions to purchase, intentions to recommend and intentions to serve these food products to others do not vary significantly. A possible explanation may be that consumers may purchase from habit, experience and past behavior, do not seek to read labels and/or that they do not understand the information that they read on labels (Pothoulaki and Chryssochoidis, 2009). According to some authors, this is because of the complexity of health claims (Verbeke et al., 2009) and the presence of too much information on food packaging (EdComs, 2007).

Furthermore, this finding is contradictory with some previous studies which argued that functional and disease risk reduction health claims differ in affecting consumers' purchase intentions of functional foods (Hoefkens and Verbeke, 2013; Saba et al., 2010; Sabbe et al., 2009; Van Trijp and Van der Lans, 2007; van Kleef, van Trijp and Luning, 2005; Verbeke, Scholderer and Lähteenmäki, 2009)[104]. However, this finding is in accordance with what Lähteenmäki (2013) noticed that there are relatively few consistent findings about consumers' responses to functional foods' health claims.

Third, verification of health claim accuracy has a significant effect on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. Consumers are more likely to purchase, to recommend and to serve to others these foods when it is mentioned on their labels that 'Health Canada' (a government agency) verified the health claim type than to purchase, recommend or serve those indicating on their labels that 'Heart and Stroke Foundation' (a third party organization) verified the

[104] It is important to note that these studies focused on health claims without reference to the source of health claim verification.

health claim type accuracy. This finding is in line with previous studies that found that consumers' acceptance of functional foods is higher when these products mention on their labels that the verification of health claims comes from a reliable source outside the food industry such as government (Cox, Evans and Lease, 2008, 2011; Hailu et al., 2009). Using conjoint analysis to investigate consumers' preferences over functional foods attributes[105], these previous studies incorporated functional and disease risk reduction health claims. According to Malla et al. (2013), given the growing number of functional food products and health claims, consumers are confused. Verification of health claims, as quality signal, is important to establish the trustworthiness of health claims (Hailu et al., 2009; Ronteltap et al., 2007).

It is important to note that, Heart and Stroke Foundation (HSF) has recently announced the abolition of its Health Check program from food products labels and restaurants' menus (HSF, 2014)[106]. According to some dietitians, the program was outdated. The criteria used were mostly related to heart health and less to fiber, salt and sugar (Allard, 2014). Moreover, consumers were not very interested by this logo (HSF, 2014). Again, the finding of this study seems to provide a practical rationale for the decision by Heart and Stroke Foundation to withdraw its logo.

Finally, results of this paper indicate that consumers do not have the same behavioral intentions (intentions to purchase, intentions to recommend and intentions to serve) toward different food product categories enriched with omega-3 fatty acids. Consumers have more favorable intentions to buy, to recommend and to serve to others eggs, cereal products (sliced bread, pita tortilla, bagel, breakfast cereals, pasta, couscous, etc.), dairy products (milk, kefir, yogurt, cheese, etc.) and at a less extent

[105]Base product, health claims, verification of health claims and price.

[106]Heart and Stroke Foundation (2014). This information is available online at: http://www.healthcheck.org/story/health-check-exit

meat products (beef, chicken, pork, etc.) enriched with omega-3 fatty acids. This finding is consistent with some previous studies. For instance Zou (2011) found that consumers have positive responses toward omega-3 enriched milk and Verbeke, Scolderer and Lähteenmäki (2009) found that consumers have quite positive valuations of omega-3 fatty acids enriched spread. According to Verbeke, Scolderer and Lähteenmäki (2009) and Verbeke et al. (2005) these favorable intentions may result from the association with omega-3 that has built a quite strong reputation. However, for processed fruits or vegetables (fruit juice, vegetable juice, etc.) enriched with omega-3 fatty acids, consumers have the lowest intentions to buy, to recommend and to serve to others. In other words, consumers seem to consider artificial the enrichment of processed fruits or vegetables with omega-3 fatty acids. For instance, consumers consider that fruits juices have already a healthy image (Bech-Larsen and Grunert, 2003). Consequently, the combination of a healthy image product (fruit juice) and a less natural type of enrichment (omega-3 fatty acids opposed to fiber) is perceived less natural and apparently results in lower consumers' behavioral intentions (Verbeke, Scolderer and Lähteenmäki, 2009).

4.5.2 Discussion of interaction effects

Regarding the interaction effects, this research reports a significant interaction between health claims and verification of health claims only for consumers' intentions to recommend to others foods enriched with omega-3 fatty acids. In addition, significant three-way interaction effects of traceability, health claims and verification of health claims was also found on consumers' intentions to recommend to others foods enriched with omega-3 fatty acids. These interactions are discussed hereafter.

This research finds that the impact of a given health claim (a functional health claim, a disease risk reduction health claim or a disease prevention health claim) on consumers' intentions to recommend foods enriched with omega-3 fatty acids varies in conjunction with the organization that verified the accuracy of health claim type (a government agency, Health Canada or a third party organization, Heart and Stroke Foundation). Indeed, when foods enriched with omega-3 fatty acids are labeled with a functional health claim ('*Good for your heart*') or a disease risk reduction health claim ('*Reduces the risks of heart disease and cancer*') and at the same time specified on labels that this health claim type has been verified accurate by Health Canada (a federal government agency), consumers are more likely to recommend to others these food products than to recommend those labeled with a functional health claim or a disease risk reduction health claim which has been verified accurate by Heart and Stroke Foundation (a third party organization).

Besides, results demonstrate there is a significant triple interaction of traceability, health claims and verification of health claims on consumers' intentions to recommend to others omega-3 fatty acids enriched foods. Confirmed by a Bonferroni test, the difference between verification of health claim accuracy by Health Canada (VHC 1) and verification of health claim by Heart and Stroke Foundation (VHC 2) is significant between traceability treatments (completely traceable -not traceable) only for the functional health claim ('*Good for your heart*') and not for the disease risk reduction health claim ('*Reduces the risk of heart disease and cancer'*) nor for the disease prevention health claim ('*Helps to prevent coronary heart disease and cancer'*). Consumers have significantly higher intentions to recommend to others completely traceable omega-3 fatty acids enriched foods labeled with a given functional health claim ('*Good for your heart'*) and at the same time mentioning that the accuracy of this health claim has been verified by Health Canada (a government agency).

An explanation of both the two-way[107]and there-way[108]interactions can be provided by the elaboration likelihood model of Petty and Cacioppo (1986) and Chaiken, Liberman and Eagly (1989). Since foods are low involvement products, consumers will not follow a systematic decision making processing (Verbeke, 2005b). They will rather use heuristics without much further cognitive elaboration or deep thought (Leathwood et al., 2007; Verbeke, 2005). Moreover, memory is organized as an associative network of information (Solomon, 1996). Thereby, pieces of information that are perceived to be related can be linked to each other and grouped together under general categories (Leathwood et al., 2007). In this study, source that can be trusted (Health Canada), and traceability are examples of heuristics that are used by consumers in conjunction with health claims to elicit their intentions to recommend omega-3 fatty acids fatty acids enriched foods to others. Given that, health benefits are credence attributes that cannot be instantly experienced, consumers will use during their purchase decision process verification of health claims, as a quality signal, and traceability as a quality and safety product assurance. In fact, verification of health claims has been considered critical in establishing the trustworthiness of functional foods' health claims (Hailu et al., 2009).

4.6 Conclusion and future research

The main objective of this research was to investigate the effects of traceability, health claims and verification of health claims on consumer's behavioral intentions toward foods enriched with omega-3 fatty acids. A mixed between-within subjects analysis of variance was used to achieve this objective. A questionnaire with 6 variants was administrated to 463 subjects.

[107] Interaction between health claims and verification of health claims.

[108]Interaction between traceability, health claims and verification of health claims.

This research is the first study to examine simultaneously the effects of traceability, health claims and verification of health claims on consumers' behavioral intentions toward functional foods. Previous studies highlighted the importance of these labels information cues in consumers' food choice without investigating the interaction effects between them. One of the contributions of this study is addressing this gap in the literature. In addition, this research focused on several behavioral intentions (intention to purchase, intention to recommend and intention to serve) as dependent variables whereas previous studies most commonly used intention to purchase as dependent behavioral variable (Lähteenmäki, 2013). Moreover, previous studies usually emphasized on specific functional food products such as calcium enriched fruit juice (Hoefkens and Verbeke, 2013; Verbeke, Scholderer and Lätheenmäki, 2013), omega-3 enriched spread and fiber enriched cereal (Verbeke, Scholderer and Lätheenmäki, 2013) and bread, bar of chocolate, chewing gum, margarine, ice-cream, soup, tea, etc. (Van Kleef et al., 2005). In contrast, this study is interested in consumers' behavioral intentions toward five omega-3 fatty acids enriched foods categories, namely: meat products, eggs, cereal products, dairy products and processed fruits or vegetables. Another contribution of this study is to investigate the effects of different types of health claims at the same time. Specifically, this study examines a functional health claim, a disease risk reduction health claim and a disease prevention health claim. Finally, this study enriches the knowledge about the verification of health claims for functional foods. In fact, there is limited research in this area, especially in Canada (Hailu et al., 2009; Zou, 2011). Thereby, this study examined the health claims verification accuracy carried by different organizations: Health Canada (a government organization) and Heart and Stroke Foundation (a third party or non-profit organization).

In this section a summary of the major research findings is first presented. Second, implications for functional food industry and public policy are highlighted. Finally, this section concludes with limitations and future research.

a) Summary of major research findings

The results indicate that consumers are more likely to purchase, to recommend and to rather serve completely traceable than non traceable enriched foods with omega-3 fatty acids. Given the credence nature of functional foods, traceability, as a labelling information cue, seems to help consumers during their decision making process. Whereas previous studies demonstrated the influence of traceability on consumers' purchase intentions of conventional foods (Chen and Huang, 2013; Chen, Zhao, and Liu, 2014; Choe et al, 2009; Hobbs et al. 2005; Loureiro and Umberger, 2007; Ubilava and Foster, 2009), this study is the first to demonstrate this same effect in the context of functional foods.

Regarding health claims, this study reports that there is no difference between the three types of health claims (functional, disease risk reduction or disease prevention) in affecting consumers' behavioral intentions. Whether the health claim on foods enriched with omega-3 fatty acids is a functional health claim (*Good for your heart*), a disease risk reduction health claim (*Reduces the risks of heart disease and cancer*') or a disease prevention health claim (*Helps to prevent coronary heart disease and cancer*'), consumers' behavioral intentions (intentions to purchase, intentions to recommend, and intentions serve to others these foods) do not vary significantly.

For verification of health claims, results show that consumers are more likely to purchase, to recommend and to serve to others foods enriched with omega-3 fatty acids stating on their labels that 'Health Canada' (a government agency) verified the

accuracy of health claim type than those indicating on their labels that 'Heart and Stroke Foundation' (a third party organization) verified the health claim type as being accurate.

With regard to food products categories enriched with omega-3 fatty acids, consumers are more likely to purchase, to recommend and to serve to others eggs, cereal products, dairy products and, at a less extent, meat products. However, for processed fruits or vegetables (fruit juice, vegetable juice, etc.) enriched with omega-3 fatty acids, consumers seem reticent to buy, recommend or serve them to others.

Finally, findings report on significant interactions effects of (1) health claims (functional, disease risk reduction and disease prevention) and verification of health claim type accuracy (carried by a government agency vs. a third party organization) and (2) traceability, health claims (functional, disease risk reduction and disease prevention) and verification of health claim type accuracy (carried by a government agency vs. a third party organization) for consumers' intentions to recommend to others foods enriched with omega-3 fatty acids.

b) Implications for functional foods industry and policy makers

Findings of this study might be of particular interest to functional food industry as well as to policy makers.

For functional foods firms, findings of this research provide a better understanding of the main and interaction effects of traceability, health claims and verification of health claims on consumers' behavioral intentions toward omega-3 fatty acids-enriched foods. For traceability, results show that consumers are more likely to

purchase, to recommend and to serve to others completely traceable than non traceable foods enriched with omega-3 fatty acids. Consequently, with this type of information, both functional foods manufacturers and retailers could benefit from a potential increase in sales. Therefore, functional foods' producers should collaborate with government to provide consumers with truthful information about their products' safety and quality through an effective traceability system. Regarding health claims, results demonstrate that whether foods enriched with omega-3 fatty acids are labeled with a functional health claim (*'Good for your heart'*), a disease risk reduction health claim (*'Reduces the risk of heart disease and cancer'*) or a disease prevention health claim (*'Helps to prevent coronary heart disease and cancer'*), consumers' behavioral intentions (intentions to purchase, intentions to recommend and intentions to serve to others) do not vary significantly. However, results show that the differences between health claim types vary in conjunction with verification of health claims in affecting consumers' intentions to recommend to others foods enriched with omega-3 fatty acids. Especially, functional and disease risk reduction health claims when combined with verification carried by a credible government agency (Health Canada), consumers are more likely to recommend to others omega-3 fatty acids enriched foods. Functional foods' manufacturers should collaborate with policy makers in order to authorize functional and disease risk reduction health claims.

For policy makers, results of this study suggest that traceability and verification of health claims accuracy by a government agency (Health Canada) have effects on consumers' intentions to purchase, to recommend and to serve omega-3 fatty acids enriched foods. Therefore, government regulatory agencies should establish both effective traceability system and verification of health claims accuracy programs for functional foods. In fact, since traceability is a quality and a safety assurance (Grunert, 2005), it is critical for public policy makers to provide a mean to check the

authenticity of the information and thus build trust between sellers and consumers (Choe et al., 2009). Concerning, the verification of health claims, it is important for the government regulatory agency to set programs that allow functional food industry stating on their products' labels that the health claim type has been verified accurate by a government agency as long as functional foods manufacturers comply to health claims regulations.

c) Limitations and future research

Some limitations of this study must be acknowledged. First, this study focused only on some specific labels cues such as traceability, health claims and verification of health claims to investigate their impact on consumers' behavioral intentions toward foods enriched with omega-3 fatty acids. However, during their decision-making process, consumers may use other attributes or extrinsic cues such as price and brand names which can affect their food decision making (Bredahl, 2004). Moreover, Fernqvist and Ekelund (2014) argued that in a real situation, many products present more than one type of credence together with many other extrinsic and intrinsic quality cues. Future research can include other label cues such as nutritional information or production method technology (e.g. nanotechnology, genetic engineering). Second, the sample of this study is limited to students. Future studies are recommended to investigate respondents with diverse socio demographic profiles. For instance, gender and age affect consumer reactions to functional foods and health claims (Ares and Gambaro, 2007; Verbeke, 2005b). Third, like most consumer research, this study, used self-reported data. According to Fisher (1993) studies using self reported data may suffer from social desirability bias. Therefore, future studies should use more experimentation and observation with real product settings and shopping environments. Finally, this study did not incorporate in the experimental design covariates such as personality traits which are of great interest because they

are at the heart of consumer attitude formation and behavioral intentions (Dabholkar and Bagozzi, 2002). Future research should use, for example, health consciousness as a personality trait. In fact, previous studies found that health consciousness predicts consumers' attitude, intention and purchase of functional foods (Landström et al., 2007; Naylor, Droms and Haws, 2009).

REFERENCES

Allard, M. (2014). Mort de Visez Santé. La presse, August 9, 2014. Available online at: http://www.lapresse.ca/vivre/sante/nutrition/201408/08/01-4790367-mort-de-visezsante.php?utm_categorieinterne=trafficdrivers&utm_contenuinterne=cyberpresse_B9_vivre_259_accueil_POS1 (Accessed August, 2014).

Ahmed, Z. U, Johnson, J. P, Yang, X., Fatt, C. K, Teng, S. H. & Boon, L. C. (2004). Does country of origin matter for low-involvement products? *International Marketing Review*, 21(1), 102-120.

Ares, G. & Gambaro, A. (2007). Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite*, 49(1), 148–158.

Baglione, S., Tucci, L. A. & Stanton, J. L. (2012). Self-reported nutritional knowledge and the acceptance of health related food benefit claims. *British Food Journal*, 114(4), 453-468.

Basu, S. K., Thomas, J. E. & Acharya, S. N. (2007). Prospects for growth in global nutraceutical and functional food markets: A Canadian perspective. *Australian Journal of Basic and Applied Sciences*, 1(4), 637-649.

Bech-Larsen, T. & Grunert, K. G. (2003). The perceived healthiness of functional foods. A conjoint study of Danish, Finnish and American consumers' perception of functionalfoods. *Appetite*, 40 (1), 9–14.

Behrens, J. H., Villanueva, N. D. & Da Silva, M. A. (2007). Effect of nutrition and health claims on the acceptability of soya milk beverages. *International Journal of Food Science & Technology*, 42(1), 50-56.

Bernués, A., Olaizola, A. & Corcoran, K. (2003). Labelling information demanded by European consumers and relationships with purchasing motives, quality and safety of meat. *Meat Science*, 65(3), 1095-1106.

Bosona, T. & Gebresenbet, G. (2013). Food traceability as an integral part of logistics management in food and agricultural supply chain. *Food Control*, 33(1), 32-48.

Bredahl, L. (2004). Cue utilization and quality perception with regard to branded beef. *Food Quality and Preference*, 15(1), 65-75.

Cardello, A. V., Schutzb, H. G. & Lesherc, L. L. (2007). Consumer perceptions of foods processed by innovative and emerging technologies: A conjoint analytic study. *Innovative Food Science & Emerging Technologies*, 8(1), 73-83.

Carillo, E., Varela, P., Salvador, A. & Fiszman, S. (2011). Main factors underlying consumers' food choice: A first step for the understanding of attitudes toward ''healthy eating''. *Journal of Sensory Studies*, 26(2), 85-95.

Caswell, J. A. & Padberg, D. I. (1992). Toward a more comprehensive theory of food labels. *American Journal of Agricultural Economics*, 74(2), 460–468.

Caswell, J. A. & Mojduszka, E. M. (1996). Using informational labelling to influence the market for quality in food products. *American Journal of Agricultural Economics*, 78(5), 1248-1253.

Chaiken S, Liberman, A. & Eagly, A. H. (1989). *Heuristic and Systematic Processing within and Beyond the Information Processing Context.* In Unintended Thought, p. 212–252 [JS Uleman and JA Bargh, editors]. New York: Guildford Press.

Chen, M. F. &, Chien-Hsien Huang, C. H. (2013). The impacts of the food traceability system and consumer involvement on consumers' purchase intentions toward fast foods. *Food Control*, 33(2), 313-319.

Chen, J., Zhao, Z. & Liu, F. (2014). Factors that influence consumers' willingness to buy traceable agricultural foods in China: Based on the empirical analysis from 1573 consumers. *Pakistan Journal of Statistics*, 30(1), 101-112.

Choe, Y. C., Park, J., Chung, M. & Moon, J. (2009). Effect of the food traceability system for building trust: Price premium and buying behavior. *Information Systems Frontiers*, 1(2), 167-179.

Clarke, K. & Russell W. Belk, R. W. (1978). *The Effects of Product Involvement and Task Definition On Anticipated Consumer Effort*, in *Advances In Consumer Research,* Vol. 5, ed. H. Keith Hunt, Ann Arbor, MI: Association for Consumer Research, 313-318.

Cox, D. N., Evans, G. & Lease, H. J. (2008). Australian consumers' preferences for conventional and novel sources of long chain omega-3 fatty acids: A conjoint study. *Food Quality and Preference*, 19(3), 306-314.

Cox, D. N., Evans, G. & Lease, H. J. (2011). The influence of product attributes, consumer attitudes and characteristics on the acceptance of: (1) Novel bread and milk, and dietary supplements and (2) fish and novel meats as dietary vehicles of long chain omega 3 fatty acids. *Food Quality and Preference*, 22(2), 205-212.

Dabholkar, P. A. & Bagozzi, R. P. (2002). An attitudinal model of technology-based self-service: Moderating effects of consumer traits and situational factors. *Journal of the Academy of Marketing Science*, 30(3), 184-201.

Drichoutis, A. C., Lazaridis, P. & Nayga, R. M. (2006). Consumers' use of nutritional labels: A review of research studies and issues. *Academy of Marketing Science Review*, 10(9), 1-22.

Drichoutis, A. C., Lazaridis, P., Nayga, R. M., Kapsokefalou, M. & Chryssochoidus, G. (2008). A theoretical and empirical investigation of nutritional label use. *European Journal of Health Economics*, 9(3), 293-304.

EdComs. *Review and Analysis of current literature on consumer understanding of nutritionand health claims made on food*. COI Communications (Food Standards Agency, London, 2007). Available online at: http://www.foodlabellingreview.gov.au/internet/foodlabelling/submissions.nsf/lookupSubmissionAttachments/1ATAN-85Y6T620100531140503BTDC/$FILE/627g.pdf (Accessed August, 2014).

Engel, J. F. & Blackwell, R. D. (1982). *Consumer Behavior*, Dryden Press: New York.

Fernqvist, F. & Ekelund, L. (2014). Credence and the effect on consumer liking of food–A review. *Food Quality and Preference*, 32 (Part C), 340-353.

Fisher, R. J. (1993). Social desirability bias and the validity of indirect questioning. *Journal of Consumer Research,* 20(2), 303-315.

Fulponi, L. (2006). Private voluntary standards in the food system: The perspective of major retailersin OECD countries. *Food Policy,* 31(1), 1-13.

Ford, G. T., Smith, D. B. & Swasy, J. L. (1988). An empirical test of the search, experience and credence attributes framework. *Advances in Consumer Research*, 15(1), 239-244.

Garretson, J. A. & Burton, S. (2000). Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust. *Journal of Public Policy & Marketing*, 19(2), 213-227.

Grunert, K. G., Lähteenmäki, L., Boztug, Y., Martinsdóttir, E., Ueland, Ø., Åström, A. & Lampila, P. (2009). Perception of health claims among Nordic consumers. *Journal of Consumer Policy*, 32(3), 269-287.

Grunert, K. G. (2005). Food quality and safety: consumer perception and demand. *European Review of Agricultural Economics*, 32(3), 369-391.

Grunert, K. G., Bech-Larsen, T. & Bredahl, L. (2000). Three issues in consumer quality perception and acceptance of dairy products. *International Dairy Journal*, 10(8), 575-584.

Gellynck, X. & Verbeke, W. (2001). Consumer perception of traceability in the meat chain. *Agrarwirtschaft*, 50(6), 368-373.

Golan, E., Krissoff, B., Kuchler, F., Calvin, L., Nelson, K. & Price, G. (2004). *Traceability in the US food supply: Economic theory and industry studies*. ERS. Agr.Econ. Report No. (AER-830), US Department of Agriculture, Washington, DC, March, 56p. Available on line at: http://www.ers.usda.gov/publications/aer-agricultural-economic-report/aer830.aspx#.U6MkTfl5OSo (Accessed June, 2014).

Hailu, G. A., Boecker, A., Henson, S. & Cranfield, J. (2009). Consumer valuation of functional foods and nutraceuticals in Canada. A conjoint study using probiotics. *Appetite,* 52(2), 257-265.

Hatanaka, M., Bain, C. & Busch, L. (2005). Third party certification in the global agrifood system. *Food Policy,* 30(3), 354-69.

Health Canada. (2010). *Food and nutrition*. Available online at:http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/claims-reclam/index-eng.php (Accessed May, 2014)

Health Canada. (2011). *Eating well with Canada's food guide*. Available online at: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php (Accessed December, 2012).

Heart and Stroke Foundation (2014). *Health Check exit*. Media release, 06-18-2014. Available online at: http://www.healthcheck.org/story/health-check-exit (Accessed, July, 2014).

Henson, S., & Reardon, T. (2005). Private agri-food standards: Implications for food policy and the agri-food system. *Food Policy,* 30(3), 241-53.

Hobbs, J. E. (2002). Evolving supply chains in the nutraceuticals and functional foods industry. *Canadian Journal of Agricultural Economics*, 50(4), 559-568.

Hobbs, J. E. (2004). Information asymmetry and the role of traceability systems. *Agribusiness*, 20(4), 397-415.

Hobbs, J. E., Bailey, D., Dickinson, D. L. & Haghiri, M. (2005). Traceability in the Canadian red meat sector: Do consumers care? *Canadian Journal of Agricultural Economics*, 53(1), 47-65.

Hoefkens, C. & Verbeke, W. (2013). Consumers' health-related motive orientations and reactions to claims about dietary calcium. *Nutrients*, 5(1), 82-96.

Howard, J. A. & Sheth, J. N. (1969). *The Theory of Buyer Behavior*. New York: John Wiley.

Hupfer, N. & Gardner, D. (1971). *Differential Involvement with Products and Issues: An Exploratory Study*, in *Proceedings: Association for Consumer Research*, ed. David M. Gardner, College Park, MD: Association for Consumer Research, 262-269.

Innes, B. G. & Hobbs, J. E. (2011). Does it matter who verifies production-derived quality? *Canadian Journal of Agricultural Economics*, 59(1), 87-107.

Johnson, R. (2011). *Food safety on the farm. Congressional research service.* Available online at: http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL34612.pdf (Accessed August, 2014)

Kim, D. & Benbasat, I. (2003). Trust-related arguments in internet stores: A framework for evaluation. *Journal of Electronic Commerce Research*, 4(2), 49-64.

Kotilainen, L., Rajalahti, R., Ragasa, C. & Pehu, E. (2006). *Health enhancing foods. World Bank.* Available online at: http://siteresources.worldbank.org/INTARD/Resources/Health_Enhacing_Foods_ARD_DP_30_final.pdf (Accessed January, 2013).

Kozup, J. C., Creyer, E. H. & Burton, S. (2003). Making healthful food choices: The influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing*, 67(2), 19-34.

Krugman, H. E. (1977). Memory without recall, exposure without perception. *Journal of Advertising Research*, 17(4), 7-12.

Landström, E., Koivisto Hursti, U. K., Becker, W. & Magnusson, M. (2007). Use of functional foods among Swedish consumers is related to health-consciousness and perceived effect. *British Journal of Nutrition*, 98(5), 1058-1069.

Lähteenmäki, L. (2013). Claiming health in food products. *Food Quality and Preference*, 27(2), 196–201.

Leathwood, P. D., Richardson, D. P., Sträter, P., Todd, P. M. & van Trijp, H. C. M. (2007). Consumer understanding of nutrition and health claims: Sources of evidence. *British Journal of Nutrition*, 98(3), 474-484.

Liao, P. A., Chang, H. H. & Chang, C. Y. (2011). Why is the food traceability system unsuccessful in Taiwan? Empirical evidence from a national survey of fruit and vegetable farmers. *Food Policy*, 36(5), 686-693.

Lobb, A. E. & Mazzocchi, M. (2007). Quality farm food in Europe: A possible alternative to the industrialised food market and to current agri-environmental policies: Lessons from France. *Acta Agriculturae Scandinavica C – Food Economics*, 4(1), 3-12.

Lord, J. B., Eastlack, J. O. & Stanton, J. L. (1987). Health claims in food advertising: Is there a bandwagon effect? *Journal of Advertising Research*, 27(2), 9-15.

Loureiro, M. L. & Umberger, W. J. (2007). A choice experiment model for beef: What US consumer responses tell us about relative preferences for food safety, country-of-origin labelling and traceability. *Food Policy*, 32(4), 496–514.

Lyly, M., Roininen, K., Honkapää , K., Poutanen, K. & Lähteenmäki, L. (2007). Factors influencing consumers' willingness to use beverages and ready-to-eat frozen soups containing oat b-glucan in Finland, France and Sweden. *Food Quality and Preference*, 18(2), 242-255.

Malla, S., Hobbs, J. E. & Sogah, E.K. (2013). *Functional foods and natural health products regulations in Canada and around the world: Nutrition labels and health claims*. Canadian Agricultural Innovation and Regulation Network. Available online at: http://www.ag-innovation.usask.ca (Accessed April, 2014).

McCarthy, M. & Henson, S. (2005). Perceived risk and risk reduction strategies in the choice of beef by Irish consumers. *Food Quality and Preference*, 16(5), 435-445.

McCluskey, J. J. & Swinnen, J. F. M. (2004). Political economy of the media and consumer perceptions of biotechnology. *American Journal of Agricultural Economics*, 86(5), 1230-1237.

Menozzi, D., Halawany-Darson, R., Mora, C. & Giraud, G. (2013). Motives towards traceable food choice: A comparison between French and Italian consumers. *Food Control*. Available online at: http://dx.doi.org/10.1016/j.foodcont.2013.09.006 (Accessed June, 2014).

Menrad, K. (2003). Market and marketing of functional food in Europe. *Journal of Food Engineering*, 56(2), 181-188.

Mohr, P., Harrison, A., Wilson, C., Baghurst, K. & Syrette, J. (2007). Attitudes, values and socio-demographic characteristics that predict acceptance of genetic engineering and applications of new technology in Australia. *Biotechnology Journal*, 2(9), 1169-1178.

Moser, R., Raffaelli, R. & Thilmany-McFadden, D. (2011). Consumer preferences for fruit and vegetables with credence-based attributes: A review. *International Food and Agribusiness Management Review*, 14(2), 121-141.

Moorsel, D. V, Cranfield, J. A. & Sparling, D. (2007). Factors affecting biotechnology innovation in Canada: Analysis of the 2001 biotechnology use and development survey. *International Journal of Biotechnology*, 9(1), 39-59.

Naylor, R. W., Droms, C. M. & Haws, K. L. (2009). Eating with a purpose: consumer response to functional food health claims in conflicting versus complementary information environments. *Journal of Public Policy & Marketing*, 28(2), 221-233.

Newman, C. L., Turri, A. M., Howlett, E. & Stokes, A. (2014). Twenty years of country-of-origin food labelling research: A review of the literature and implications for food marketing systems. *Journal of Macromarketing*, 1-15. Available online at: http://jmk.sagepub.com/content/early/2014/03/24/0276146714529306 (Accessed June, 2014).

O'Connor, E., Cowan, C., Williams, G., O'Connell, J. & Boland, M. P. (2006). Irish consumer acceptance of a hypothetical second-generation GM yogurt product. *Food Quality & Preference*, 17(5), 400-411.

Petty, R. E. & Cacioppo, J. T. (1986). *The elaboration likelihood model of persuasion.* In *Advances in Experimental Social Psychology*, vol. 19, 123–205 [L Berkowitz, editor]. New York: Academic Press.

Pothoulaki, M. & Chryssochoidis, G. (2009). Health claims: Consumers' matters. *Journal of Functional Foods*, 1(2), 222-228.

Roe, B., Levy, A. S. & Derby, B. M. (1999). The Impact of health claims on consumer search and product evaluation outcomes: Results from FDA experimental data. *Journal of Public Policy & Marketing*, 18(1), 89-105.

Ronteltap, A., Van Trijp, J. C. M., Renes, R. J. & Frewer, L. J. (2007). Consumer acceptance of technology-based food innovations: Lessons for the future of nutrigenomics. *Appetite*, 49(1), 1-17.

Saba, A., Vassallo, M., Shepherd, R., Lampila, P., Arvola, A., Dean, M. & Lähteenmäki, L. (2010). Country-wise differences in perception of health-related messages in cereal-based food products. *Food Quality and Preference*, 21(4), 385-393.

Sabbe, S., Verbeke, W. & Van Damme, P. (2009). Perceived motives, barriers and role of labelling information on tropical fruit consumption. Exploratory findings. *Journal of Food Products Marketing*, 15(2), 119–138.

Salnikova, E. & Stanton, J. L. (2012). A comparison of front-of-pack nutrition claims between the US and EU. *British Food Journal*, 116(2), 2014, 337-352.

Salaün, Y. & Flores, K. (2001). Information quality: Meeting the needs of the consumer. *International Journal of Information Management*, 21(1), 21–37.

Siedlok, F., Smart, P. & Gupta, A. (2010). Convergence and reorientation via open innovation: The emergence of nutraceuticals. *Technology Analysis & Strategic Management*, 22(5), 571-592.

Siegrist, M., Cousin, M. E., Kastenholz, H. & Wiek, A. (2007). Public acceptance of nanotechnology foods and food packaging: The influence of affect and trust. *Appetite*, 49(2), 459-466.

Singh, J. & Sirdeshmukh, D. (2000). Agency and trust mechanisms in consumer satisfaction and loyalty judgments. *Journal of the Academy of Marketing Science*, 28(1), 150-167.

Solomon, M. R. (1996). *Consumer Behavior: Buying, Having, and Being*. Englewood Cliffs, NJ: Prentice Hall Inc, 3rd edition.

Stranieri, S., Baldi, L. & Banterle, A. (2010). Do nutrition claims matter to consumers? An Empirical analysis considering european requirements. *Journal of Agricultural Economics*, 61(1), 15-33.

Steenkamp, J. B. E. M. & van Trijp, H. C. M. (1996). Quality guidance: A consumer based approach to food quality improvement using partial least squares. *European Review of Agricultural Economics*, 23(2), 195–215.

Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences.* New York, NY: Routledge.

Tabachnick, B. G. & Fidell, L. S. (2013). *Using Multivariate Statistics.* Boston: Pearson, International ed., 6th ed.

Tronstad, R., Lobo, R., Umberger, W., Nakamoto, S. T., Curtis, K. R., Lev, L., Bailey, D., Ward, R. & Bastian, C. (2005). *Certification and labelling considerations for agricultural producers. Western Extension Marketing Committee Report.* University of Arizona, (College of Agricultural and Life Sciences), Tucson, Arizona. Available online at: http://cals.arizona.edu/arec/wemc/certification&labelling/certificationbookprint.pdf (Accessed June, 2014).

Ubilava, D. & Foster, K. (2009). Quality certification vs. product traceability: Consumer preferences for informational attributes of pork in Georgia. *Food Policy*, 34(3), 305–310.

Van Kleef, E., van Trijp, H. C. M. & Luning, P. (2005). Functional foods: Health claim-food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite*, 44(3), 299–308.

Van Rijswijk, W., Frewer, L. J., Menozzi, D. & Faioli, G. (2008). Consumer perceptions of traceability: A cross-national comparison of the associated benefits. *Food Quality and Preference*, 19(5), 452–464.

Van Rijswijk, W. & Frewer, L. J. (2008). Consumer perceptions of food quality and safety and their relation to traceability. *British Food Journal*, 110(10), 1034-1046.

Van Rijswijk, W. & Frewer, L. J. (2012). Consumer needs and requirements for food and ingredient traceability information. *International Journal of Consumer Studies*, 36(3), 282-290.

Van Trijp, H. & Van der Lans, I. A. (2007). Consumer perceptions of nutrition and health claims. *Appetite*, 48(3), 305-324.

Van Wezemael, L., Verbeke, W., Kügler, J. O., de Barcellos, M. D. & Grunert, K. G. (2010). European consumers and beef safety: Perceptions, expectations and uncertainty reduction strategies. *Food Control*, 21(6), 835-844.

Verbeke, W. (2005a). Consumer acceptance of functional foods: Socio-demographic, cognitive and attitudinal determinants. *Food Quality and Preference,* 16(1), 45–57.

Verbeke, W. (2005b). Agriculture and the food industry in the information age. *European Review of Agricultural Economics*, 32(3), 347-68.

Verbeke, W., Sioen, I., Pieniak, Z., Van Camp, J. & De Henauw, S. (2005). Consumer perception versus scientific evidence about health benefits and safety risks from fish consumption. *Public Health Nutrition*, 8(4), 422-429.

Verbeke, W. & Ward, R. W. (2006). Consumer interest in information cues denoting quality, traceability and origin: An application of ordered probit models to beef labels. *Food Quality and Preference*, 17(6), 453-67.

Verbeke, W., Scholderer, J. & Lähteenmäki, L. (2009). Consumer appeal of nutrition and health claims in three existing product concepts. *Appetite*, 52(3), 684-692.

Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? *Journal of Consumer Affairs*, 37(2), 305-316.

Williams, P. (2005). Consumer understanding and use of health claims for foods. *Nutrition Reviews*, 63(7), 256-264.

Williams, P. & Ghosh, D. (2008). Health claims and functional foods. *Nutrition & Dietetics,* 65(3), S89-S93.

Zaichkowsky, J. L. (1985). Measuring the involvement construct. *Journal of Consumer Research*, 12(3), 341-352.

Zeithaml, V. A. (1988). Consumer perceptions of price, quality and value: A means-end model and synthesis of evidence. *The Journal of Marketing*, 52(3), 2-22.

Zou, N. H., & Hobbs, J. E. (2006). *Modelling functional food choice and health care impacts: A literature review* (No. 91556). University of Alberta, Department of Resource Economics and Environmental Sociology. Available online at: http://www.consumerdemand.re.ualberta.ca/Publications/CMD%2006-02.pdf (Accessed January, 2014).

APPENDICES

Appendix 5.1.a First version of the questionnaire (Condition 1: C1)

Dear Participant,

We are researchers at Université du Québec à Montréal (UQAM) and HEC-Montréal who are conducting a study on the perceptions of foods which are enriched with *omega-3* Fatty Acids. The findings of this study will be published and will provide the scientific community, public policy organizations, as well as the food industry with a better understanding of how consumers perceive and feel about such foods.

In the following pages, you will find a questionnaire which you are kindly invited to complete. There are no right or wrong answers. Your task is to simply provide responses that best reflect your impressions of various foods. The completion of this questionnaire should take approximately thirty minutes of your time. In order to respond easily and accurately, we ask that you follow precisely the procedures and instructions provided for each section of this questionnaire.

Please note that all the collected information will remain strictly confidential and completely anonymous. The collected responses will in fact only be used for statistical purposes and there is no way for the researchers, or anyone else for that matter, to associate a respondent to the questionnaire he or she has completed.

Your participation is voluntary. You are completely free to participate or not in this research and you may stop your participation at any time. Please note that providing responses to this questionnaire will be considered as consent on your part to participate in this study. Also note that given the strict confidentiality measures which are taken, your participation in this study should not cause you any prejudice whatsoever nor should it benefit you directly in any way.

This study has been approved by the Comité d'éthique de la recherche/Research Ethics Committee of Université de Québec à Montréal (UQAM). It therefore complies with ethical standards in research involving human subjects. For any questions pertaining to ethical issues with respect to this research project, please feel free to contact a member of the UQAM Research Ethics Committee by telephone at (514) 987-3000 (Ext. 7753).

If you have any questions about this questionnaire or our study, please feel free to contact one of the researchers whose name and contact information appear below. Finally, we would thank you very much for your participation and hope you will enjoy completing this questionnaire and contributing to the advancement of knowledge in this area of research.

PART I

Instructions:

In the following pages, you will be asked to evaluate various descriptions or profiles of food products. Before you begin, it is important that you read and understand the following notions because they will help you to assess each food product profile.

A. Description of 'omega-3' Fatty Acids and their Uses

Omega-3 Fatty Acids are considered to be 'good' fats' (*polyunsaturated* fats) and are commonly found in marine (i.e., fish and seafood) and plant (e.g.flax and canola) sources. Scientific evidence indicates that *omega-3* Fatty Acids have a positive impact on health. Despite these robust research findings, there is still an apparent lack in the intake of omega-3 Fatty Acids by Canadian consumers.

Omega-3 Fatty Acids can be added to various foods. For instance, they can be incorporated into eggs by feeding chickens with flax, a grain rich in omega-3 Fatty Acids. Alternatively, it can be given to livestock in the form of feed grains enriched in omega-3 Fatty Acids. In turn, the resulting meat will be rich in omega-3 Fatty Acids and thus provide benefits to the consumer.

Another way to increase this intake could involve adding plant or fish oils to various processed food products without altering their original taste. In fact, with current technologies such as *microencapsulation*, the enrichment of processed foods with omega-3 oils has NO impact on the taste of the food whatsoever. Examples of such foods include yogourts, breads, milk, cheeses, tofu, soy beverages, cereals, pasta, fruit juices and many other readily available processed foods.

B. Definition of 'Health Claim'

A health claim is any representation in labelling or advertising that states, suggests, or implies that a relationship exists between good health and the consumption of a food, or an ingredient in the food. Food companies can make certain health claims by linking food consumption to the prevention of certain illnesses. For instance,

commonly found claims in the marketplace suggest that "sodium intake is related to high blood pressure"; that "calcium may reduce the risk of osteoporosis"; that "saturated fat intake is related to heart disease"; and that "fruits and vegetables may help reduce the risk of cancer." Government agencies and various foundations can verify and regulate health claims.

C. Definition of 'Traceability'

Traceability is the ability to track an item or group of items – animals, plants, processed food products or ingredients – from one point in the supply chain to another. An effective traceability system would be based for instance on the ability to trace a food product from its initial production location (ex: a farm in Canada or elsewhere) to the consumer's kitchen table in Canada. It would therefore allow one to trace the food through all stages of the food production process and the identification of all intermediaries involved in the distribution of the food to consumers.

Therefore, if a food product is completely traceable, a government agency or an individual could trace its production at every step and identify all parties involved in its processing and distribution, from the farm to the kitchen table. On the other hand, if a food is not traceable, a government agency or an individual could not trace it from the farm to the kitchen table.

Traceability is very important in crisis situations involving tainted foods because it may greatly enhance the ability to contain and stop the flow of 'high risk' products in the distribution chain to consumers. Here are some examples where food traceability would be highly desirable:
Ex1: Identification of a farm from which originated an animal which was infected with a particular disease which can be transmitted to consumers.
Ex2: Identification of the producer of a vegetable grown in soil contaminated by pollutants.
Ex3: Identification of the packing plant where tainted meat was processed.
Ex4: Identification of the producer of a cereal which was farmed by using prohibited and harmful pesticides or herbicides.

PART II

Instructions: In the following pages, you will be asked to evaluate ten (10) descriptions or profiles of food products. As you know, there are many food groups. For the purposes of this study, we essentially arrived at ten (10) categories of foods which seem to make sense to most consumers and which can involve enrichment with omega-3 Fatty Acids. When thinking about these food categories, think only of **foods enriched with omega-3 Fatty Acids.**

Please read carefully all the characteristics that are presented in the description of each profile and then answer the statements following this description by circling the numbers that best describe your impressions. There are no right or wrong answers. It is your impressions that matters.

Also note that you are asked to evaluate each of the following product profiles independently of the other profiles you have read. Just focus on the information provided in a particular profile and provide responses for that profile. Then, go on to the next one, and so forth …

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: aHeart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

PART III

SOCIODEMOGRAPHIC VARIABLES

1. Are you the main food grocery shopper in your household?

Yes ☐
No ☐

2. How frequently do you personally do the grocery shopping for your household?

Weekly (once or several times a week) ☐
A few times a month ☐
Once a month ☐
Less than once a month ☐
Never ☐

3. How much do you approximately spend monthly on food?

Less than 200$ ☐
200-250$ ☐
251-300$ ☐
301- 350$ ☐
351-400$ ☐
More than 400$ ☐

4. Do you think that your food choice is _____ in preventing chronic diseases?

Very important ☐
Somewhat important ☐
Not very important ☐
Not at all important ☐

5. Before purchasing a new food product, do you _____ read the label?

Always ☐
Often ☐
Sometimes ☐
Never ☐

6. Do you consider that you are _____ informed about foods enriched with omega-3 fatty acid?

Very informed	☐
Somewhat informed	☐
Not very informed	☐
Not at all informed	☐

7. Are you _____ worried about having chronic diseases?

Not at all	☐
Somewhat	☐
Very	☐

8. What is your gender?

Male	☐
Female	☐

9. What is your marital status?

Single, never married	☐	Married	☐	Common-law partner	☐		
Separated	☐	Divorced	☐	Widowed	☐		

10. How many children do you have? _____

11. How many children currently live with you?_____

12. What was the total annual income, before taxes, of your household in 2012?

$25 000 or less	☐	Between 25 001 to $50 000	☐
Between $50 001 to $75 000	☐	$75 001 to $100 000	☐
$ 100 000 and over	☐		

13. How many years of schooling have you completed?

Primary school	☐	High school	☐	College or Cégep	☐		
University-undergraduate	☐	University-graduate	☐				

14. To which age group do you belong?

Less than 25 years old	☐	25 to 34 years old	☐	35 to 44 years old	☐		
45 to 54 years old	☐	55 to 64 years old	☐	65 years old and more	☐		

15. With which ethnic group do you identify?_____

16. What is your nationality?_____

THANK YOU FOR YOUR COLLABORATION!

Appendix 4.2b Modified parts of the five other versions of the questionnaire (C2, C3, C4, C5 and C6)

Second version of the questionnaire (Condition 2: C2)

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: aHeart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Third version of the questionnaire (Condition 3: C3)

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: aHeart and Stroke Foundation, a non-governmental organization.**
- **This product is completely traceable, from the farm to the kitchen table.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Fourth version of the questionnaire (Condition 4: C4)

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Good for your heart».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Fifth version of the questionnaire (Condition 5: C5)

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Reduces the risks of heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Sixth version of the questionnaire (Condition 6: C6)

Product profile 1:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 2:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 3:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 4:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 5:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: Health Canada, a federal government agency.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 6:

- **A meat product enriched with omega-3 fatty acids (ex: beef, chicken, pork, etc).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 7:

- **Eggs enriched with omega-3 fatty acids.**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 8:

- **A cereal product enriched with omega-3 fatty acids (sliced bread, pita, tortilla, bagel, breakfast cereals, pasta, couscous, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 9:

- **A dairy product enriched with omega-3 fatty acids (ex: milk, kefir, yogurt, cheese, etc.)**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Product profile 10:

- **A processed fruit or vegetable product enriched with omega-3 fatty acids (ex: fruit juice, vegetable juice, etc.).**
- **The following health claim appears on the packaging: «Helps to prevent coronary heart disease and cancer».**
- **The health claim has been verified as being accurate by: a Heart and Stroke Foundation, a non-governmental organization.**
- **This product is not traceable.**

Please use the following scales to evaluate this product by circling one answer on each row

I am unlikely to purchase this product	1 2 3 4 5 6 7	I am likely to purchase this product
It is unlikely that I would recommend this product to others	1 2 3 4 5 6 7	It is likely that I would recommend this product to others
It is unlikely that I would serve this product to people I care for	1 2 3 4 5 6 7	It is likely that I would serve this product to people I care for

Appendix 4.3Descriptive statistics

	Traceability	Health claim	Mean	SD	N
P1	**Not traceable**	**F**	4,2800	1,65676	75
		DRR	4,6623	1,55268	77
		DP	4,7042	1,51558	71
		Total	4,5471	1,58150	223
	Completely traceable	**F**	4,8902	1,67041	82
		DRR	4,7971	1,75382	69
		DP	4,9036	1,52711	83
		Total	4,8675	1,64028	234
	Total	**F**	4,5987	1,68652	157
		DRR	4,7260	1,64640	146
		DP	4,8117	1,52010	154
		Total	4,7112	1,61807	457
P2	**Not traceable**	**F**	4,4400	1,64596	75
		DRR	4,7532	1,87894	77
		DP	5,1127	1,51704	71
		Total	4,7623	1,70638	223
	Completely traceable	**F**	5,1829	1,67868	82
		DRR	5,0000	1,69775	69
		DP	5,0964	1,64994	83
		Total	5,0983	1,66862	234
	Total	**F**	4,8280	1,69909	157
		DRR	4,8699	1,79372	146
		DP	5,1039	1,58493	154
		Total	4,9344	1,69366	457
P3	**Not traceable**	**F**	4,3733	1,78411	75
		DRR	4,9091	1,67160	77
		DP	4,5775	1,80208	71
		Total	4,6233	1,75832	223
	Completely traceable	**F**	5,3537	1,38218	82
		DRR	4,9420	1,93941	69
		DP	5,1084	1,79438	83
		Total	5,1453	1,70968	234
	Total	**F**	4,8854	1,65626	157
		DRR	4,9247	1,79688	146
		DP	4,8636	1,81161	154
		Total	4,8906	1,75127	457

Appendix 4.2 Descriptive statistics (…Continued)

	Traceability	Health claim	Mean	SD	N
P4	**Not traceable**	**F**	4,6000	2,00000	75
		DRR	4,7532	1,82926	77
		DP	4,7746	1,64922	71
		Total	4,7085	1,82827	223
	Completely traceable	**F**	5,2683	1,47446	82
		DRR	5,1594	1,82808	69
		DP	5,3012	1,65820	83
		Total	5,2479	1,64385	234
	Total	**F**	4,9490	1,77156	157
		DRR	4,9452	1,83371	146
		DP	5,0584	1,66955	154
		Total	4,9847	1,75525	457
P5	**Not traceable**	**F**	4,4000	1,83067	75
		DRR	4,6623	1,98422	77
		DP	4,7887	1,85869	71
		Total	4,6143	1,89218	223
	Completely traceable	**F**	4,8902	1,95635	82
		DRR	4,7391	2,06264	69
		DP	4,6867	1,85399	83
		Total	4,7735	1,94671	234
	Total	**F**	4,6561	1,90718	157
		DRR	4,6986	2,01501	146
		DP	4,7338	1,85078	154
		Total	4,6958	1,91984	457
P6	**Not traceable**	**F**	4,3733	1,63388	75
		DRR	4,2727	1,82552	77
		DP	4,6620	1,58514	71
		Total	4,4305	1,68816	223
	Completely traceable	**F**	4,3902	1,76912	82
		DRR	4,7101	1,95615	69
		DP	5,6747	5,81862	83
		Total	4,9402	3,79923	234
	Total	**F**	4,3822	1,70043	157
		DRR	4,4795	1,89453	146
		DP	5,2078	4,42169	154
		Total	4,6915	2,97117	457

Appendix 4.2 Descriptive statistics (…Continued)

	Traceability	Health claim	Mean	SD	N
P7	**Not traceable**	**F**	4,4667	1,71112	75
		DRR	4,2987	1,78491	77
		DP	4,8028	1,54568	71
		Total	4,5157	1,69219	223
	Completely traceable	**F**	4,8293	1,63907	82
		DRR	4,5652	1,81884	69
		DP	4,9880	1,67837	83
		Total	4,8077	1,70878	234
	Total	**F**	4,6561	1,67834	157
		DRR	4,4247	1,79975	146
		DP	4,9026	1,61597	154
		Total	4,6652	1,70511	457
P8	**Not traceable**	**F**	4,3733	1,76124	75
		DRR	4,4935	1,73678	77
		DP	4,2958	1,65956	71
		Total	4,3901	1,71514	223
	Completely traceable	**F**	4,7927	1,49681	82
		DRR	4,7536	1,88185	69
		DP	5,0241	1,67460	83
		Total	4,8632	1,67745	234
	Total	**F**	4,5924	1,63674	157
		DRR	4,6164	1,80520	146
		DP	4,6883	1,70167	154
		Total	4,6324	1,71055	457
P9	**Not traceable**	**F**	4,2267	1,72872	75
		DRR	4,3636	1,77637	77
		DP	4,7746	1,51372	71
		Total	4,4484	1,68880	223
	Completely traceable	**F**	4,8171	1,44126	82
		DRR	4,8986	1,72478	69
		DP	4,8554	1,75397	83
		Total	4,8547	1,63526	234
	Total	**F**	4,5350	1,60739	157
		DRR	4,6164	1,76659	146
		DP	4,8182	1,64279	154
		Total	4,6565	1,67218	457

Appendix 4.2 Descriptive statistics (…Continued)

	Traceability	Health claim	Mean	SD	N
P10	**Not traceable**	**F**	4,0933	1,91843	75
		DRR	4,1299	1,89425	77
		DP	4,6620	1,91194	71
		Total	4,2870	1,91677	223
	Completely traceable	**F**	4,6220	1,76831	82
		DRR	4,3913	1,94949	69
		DP	4,6024	1,77338	83
		Total	4,5470	1,82023	234
	Total	**F**	4,3694	1,85461	157
		DRR	4,2534	1,91837	146
		DP	4,6299	1,83271	154
		Total	4,4201	1,87044	457

Appendix 4.3 Between-Subjects ANOVA

DV: Intention to purchase

Tests of Between-Subjects Effects

Measure: PURCHASE
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	103024,348	1	103024,348	7131,454	,000	,941	7131,454	1,000
healclaim	23,104	2	11,552	,800	,450	,004	1,599	,187
tracab	142,764	1	142,764	9,882	,002	,022	9,882	,880
healclaim * tracab	29,078	2	14,539	1,006	,366	,004	2,013	,225
Error	6443,126	446	14,446					

Computed using alpha = ,05

DV: Intention to recommend

Tests of Between-Subjects Effects

Measure: RECOMMEND
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	101422,917	1	101422,917	6398,885	,000	,934	6398,885	1,000
healclaim	50,908	2	25,454	1,606	,202	,007	3,212	,340
tracab	157,196	1	157,196	9,918	,002	,022	9,918	,882
healclaim * tracab	16,821	2	8,410	,531	,589	,002	1,061	,138
Error	7148,391	451	15,850					

Computed using alpha = ,05

DV: Intention to serve

Tests of Between-Subjects Effects

Measure: SERVE
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	100529,472	1	100529,472	6621,294	,000	,939	6621,294	1,000
healclaim	17,704	2	8,852	,583	,559	,003	1,166	,147
tracab	263,944	1	263,944	17,384	,000	,039	17,384	,986
healclaim * tracab	34,008	2	17,004	1,120	,327	,005	2,240	,247
Error	6498,218	428	15,183					

Computed using alpha = ,05

Appendix 4.4aIntention to purchase marginal means and standard deviation

1. Grand Mean

Measure: PURCHASE

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
4,787	,057	4,675	4,898

Estimates

Measure: PURCHASE

traceability	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
not traceable	4,609	,082	4,448	4,769
completely traceable	4,965	,078	4,811	5,119

Estimates

Measure: PURCHASE

Health Claim	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Functional-Good for your heart	4,742	,097	4,552	4,932
Risk reduction-Reduces the risks of heart disease and cancer	4,730	,100	4,535	4,926
Disease prevention-Helps to prevent coronary heart disease and cancer	4,888	,098	4,695	5,081

Estimates

Measure: PURCHASE

VHC	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4,930	,059	4,814	5,045
2	4,644	,064	4,519	4,769

Appendix 4.4aIntention to purchase marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: PURCHASE

PRODUCTS	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4,763	,070	4,626	4,900
2	4,890	,070	4,752	5,028
3	4,870	,070	4,733	5,008
4	4,847	,075	4,700	4,994
5	4,563	,083	4,400	4,727

Pairwise Comparisons

Measure: PURCHASE

(I) PRODUCTS	(J) PRODUCTS	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-,127	,061	,383	-,299	,045
	3	-,107	,077	1,000	-,325	,110
	4	-,084	,068	1,000	-,276	,108
	5	,200	,086	,206	-,043	,442
2	1	,127	,061	,383	-,045	,299
	3	,019	,074	1,000	-,190	,228
	4	,043	,071	1,000	-,158	,244
	5	,326*	,085	,001	,088	,565
3	1	,107	,077	1,000	-,110	,325
	2	-,019	,074	1,000	-,228	,190
	4	,023	,070	1,000	-,174	,220
	5	,307*	,073	,000	,102	,512
4	1	,084	,068	1,000	-,108	,276
	2	-,043	,071	1,000	-,244	,158
	3	-,023	,070	1,000	-,220	,174
	5	,284*	,079	,004	,060	,507
5	1	-,200	,086	,206	-,442	,043
	2	-,326*	,085	,001	-,565	-,088
	3	-,307*	,073	,000	-,512	-,102
	4	-,284*	,079	,004	-,507	-,060

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix 4.4aIntention to purchase marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: PURCHASE

Health Claim	VHC	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Functional-Good for your heart	1	4,902	,100	4,705	5,099
	2	4,581	,109	4,368	4,795
Risk reduction-Reduces the risks of heart disease and cancer	1	4,911	,103	4,708	5,113
	2	4,550	,112	4,330	4,770
Disease prevention-Helps to prevent coronary heart disease and cancer	1	4,976	,102	4,776	5,176
	2	4,800	,110	4,583	5,017

Pairwise Comparisons

Measure: PURCHASE

Health Claim	(I) VHC	(J) VHC	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Functional-Good for your heart	1	2	,321*	,079	,000	,165	,477
	2	1	-,321*	,079	,000	-,477	-,165
Risk reduction-Reduces the risks of heart disease and cancer	1	2	,361*	,082	,000	,201	,521
	2	1	-,361*	,082	,000	-,521	-,201
Disease prevention-Helps to prevent coronary heart disease and cancer	1	2	,175*	,081	,030	,017	,334
	2	1	-,175*	,081	,030	-,334	-,017

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix 4.4bIntention to recommend marginal means, standard deviation and Bonferroni comparison test

1. Grand Mean

Measure: RECOMMEND

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
4,722	,059	4,606	4,838

Estimates

Measure: RECOMMEND

traceability	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
not traceable	4,536	,084	4,370	4,702
completely traceable	4,908	,083	4,745	5,070

Pairwise Comparisons

Measure: RECOMMEND

(I) traceability	(J) traceability	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
not traceable	completely traceable	-,372*	,118	,002	-,604	-,140
completely traceable	not traceable	,372*	,118	,002	,140	,604

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix4.4b Intention to recommend marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: RECOMMEND

Health Claim	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Functional-Good for your heart	4,633	,101	4,436	4,831
Risk reduction-Reduces the risks of heart disease and cancer	4,663	,104	4,458	4,868
Disease prevention-Helps to prevent coronary heart disease and cancer	4,870	,102	4,670	5,070

Pairwise Comparisons

Measure: RECOMMEND

(I) Health Claim	(J) Health Claim	Mean Difference (I-J)	Std. Error	a	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Functional-Good for your heart	Risk reduction-Reduces the risks of heart disease and cancer	-,030	,145	1,000	-,378	,319
	Disease prevention-Helps to prevent coronary heart disease and cancer	-,237	,143	,297	-,580	,107
Risk reduction-Reduces the risks of heart disease and cancer	Functional-Good for your heart	,030	,145	1,000	-,319	,378
	Disease prevention-Helps to prevent coronary heart disease and cancer	-,207	,146	,469	-,557	,143
Disease prevention-Helps to prevent coronary heart disease and cancer	Functional-Good for your heart	,237	,143	,297	-,107	,580
	Risk reduction-Reduces the risks of heart disease and cancer	,207	,146	,469	-,143	,557

Based on estimated marginal means

Adjustment for multiple comparisons: Bonferroni.

Appendix4.4b Intention to recommend marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: RECOMMEND

VHC	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4,837	,060	4,720	4,955
2	4,607	,069	4,472	4,742

Pairwise Comparisons

Measure: RECOMMEND

(I) VHC	(J) VHC	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	,230*	,051	,000	,129	,331
2	1	-,230*	,051	,000	-,331	-,129

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix4.4b Intention to recommend marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: RECOMMEND

PRODUCTS	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4,693	,088	4,520	4,866
2	4,795	,070	4,657	4,932
3	4,750	,072	4,609	4,891
4	4,816	,072	4,675	4,957
5	4,556	,080	4,398	4,713

Pairwise Comparisons

Measure: RECOMMEND

(I) PRODUCTS	(J) PRODUCTS	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-,101	,079	1,000	-,323	,121
	3	-,056	,088	1,000	-,303	,190
	4	-,123	,087	1,000	-,367	,122
	5	,138	,095	1,000	-,129	,404
2	1	,101	,079	1,000	-,121	,323
	3	,045	,070	1,000	-,153	,243
	4	-,021	,068	1,000	-,213	,170
	5	,239*	,078	,022	,020	,458
3	1	,056	,088	1,000	-,190	,303
	2	-,045	,070	1,000	-,243	,153
	4	-,066	,064	1,000	-,246	,113
	5	,194	,070	,060	-,004	,392
4	1	,123	,087	1,000	-,122	,367
	2	,021	,068	1,000	-,170	,213
	3	,066	,064	1,000	-,113	,246
	5	,260*	,069	,002	,066	,455
5	1	-,138	,095	1,000	-,404	,129
	2	-,239*	,078	,022	-,458	-,020
	3	-,194	,070	,060	-,392	,004
	4	-,260*	,069	,002	-,455	-,066

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix4.4b Intention to recommend marginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: RECOMMEND

Health Claim	VHC	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Functional-Good for your heart	1	4,768	,102	4,568	4,968
	2	4,498	,117	4,269	4,728
Risk reduction-Reduces the risks of heart disease and cancer	1	4,838	,106	4,630	5,046
	2	4,488	,121	4,249	4,726
Disease prevention-Helps to prevent coronary heart disease and cancer	1	4,905	,103	4,703	5,108
	2	4,834	,118	4,602	5,067

Pairwise Comparisons

Measure: RECOMMEND

Health Claim	(I) VHC	(J) VHC	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Functional-Good for your heart	1	2	,269*	,088	,002	,097	,442
	2	1	-,269*	,088	,002	-,442	-,097
Risk reduction-Reduces the risks of heart disease and cancer	1	2	,350*	,091	,000	,171	,529
	2	1	-,350*	,091	,000	-,529	-,171
Disease prevention-Helps to prevent coronary heart disease and cancer	1	2	,071	,089	,422	-,103	,245
	2	1	-,071	,089	,422	-,245	,103

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix4.4b Intention to recommend marginal means, standard deviation and Bonferroni comparison test (…Continued)

NOTE: for the triple interaction Traceability x Health claim x Verified health claims a Bonferroni comparison test was handled to check if interaction between health claim and verification of health claim differ across traceability treatments.

Estimates

Dependent Variable: diffvhc

traceability	Health Claim	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
not traceable	Functional-Good for your heart	,112	,126	-,136	,360
	Risk reduction-Reduces the risks of heart disease and cancer	,442	,124	,199	,685
	Disease prevention-Helps to prevent coronary heart disease and cancer	,144	,129	-,109	,397
completely traceable	Functional-Good for your heart	,427	,121	,190	,664
	Risk reduction-Reduces the risks of heart disease and cancer	,288	,129	,034	,541
	Disease prevention-Helps to prevent coronary heart disease and cancer	-,013	,119	-,247	,222

Comparaisons appariées

Variable dépendante: diffvhc

Health Claim	(I) traceability	(J) traceability	Différence moyenne (I-J)	Erreur std.	Signification[a]	Intervalle de confiance à 95 % pour la différence[a]	
						Borne inférieure	Borne supérieure
Functional-Good for your heart	not traceable	completely traceable	-,315	,175	,072	-,658	,028
	completely traceable	not traceable	,315	,175	,072	-,028	,658
Risk reduction-Reduces the risks of heart disease and cancer	not traceable	completely traceable	,154	,179	,388	-,197	,505
	completely traceable	not traceable	-,154	,179	,388	-,505	,197
Disease prevention-Helps to prevent coronary heart disease and cancer	not traceable	completely traceable	,156	,175	,374	-,189	,501
	completely traceable	not traceable	-,156	,175	,374	-,501	,189

Basées sur les moyennes marginales estimées

a. Ajustement pour les comparaisons multiples : Bonferroni.

Appendix 4.4cIntention to servemarginal means, standard deviation and Bonferroni comparison test

1. Grand Mean

Measure: SERVE

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
4,823	,059	4,706	4,939

Estimates

Measure: SERVE

traceability	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
not traceable	4,576	,085	4,409	4,742
completely traceable	5,070	,083	4,907	5,233

Pairwise Comparisons

Measure: SERVE

(I) traceability	(J) traceability	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
not traceable	completely traceable	-,494*	,119	,000	-,727	-,261
completely traceable	not traceable	,494*	,119	,000	,261	,727

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix 4.4c Intention to serve marginal means, standard deviation and Bonferroni comparison test (...Continued)

Estimates

Measure: SERVE

Health Claim	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Functional-Good for your heart	4,778	,102	4,577	4,979
Risk reduction-Reduces the risks of heart disease and cancer	4,778	,104	4,573	4,983
Disease prevention-Helps to prevent coronary heart disease and cancer	4,913	,102	4,713	5,112

Pairwise Comparisons

Measure: SERVE

(I) Health Claim	(J) Health Claim	Mean Difference (I-J)	Std. Error	a	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Functional-Good for your heart	Risk reduction-Reduces the risks of heart disease and cancer	,000	,146	1,000	-,351	,351
	Disease prevention-Helps to prevent coronary heart disease and cancer	-,135	,144	1,000	-,481	,211
Risk reduction-Reduces the risks of heart disease and cancer	Functional-Good for your heart	,000	,146	1,000	-,351	,351
	Disease prevention-Helps to prevent coronary heart disease and cancer	-,135	,146	1,000	-,485	,215
Disease prevention-Helps to prevent coronary heart disease and cancer	Functional-Good for your heart	,135	,144	1,000	-,211	,481
	Risk reduction-Reduces the risks of heart disease and cancer	,135	,146	1,000	-,215	,485

Based on estimated marginal means

Adjustment for multiple comparisons: Bonferroni.

Appendix 4.4c Intention to servemarginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: SERVE

VHC	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	5,009	,061	4,890	5,128
2	4,637	,068	4,504	4,770

Pairwise Comparisons

Measure: SERVE

(I) VHC	(J) VHC	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	,372*	,049	,000	,275	,469
2	1	-,372*	,049	,000	-,469	-,275

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix4.4c Intention to servemarginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: SERVE

PRODUCTS	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4,817	,070	4,679	4,955
2	4,900	,071	4,760	5,040
3	4,884	,071	4,744	5,023
4	4,894	,073	4,750	5,038
5	4,620	,083	4,456	4,783

Pairwise Comparisons

Measure: SERVE

(I) PRODUCTS	(J) PRODUCTS	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-,083	,057	1,000	-,243	,076
	3	-,067	,067	1,000	-,257	,123
	4	-,077	,068	1,000	-,268	,114
	5	,197	,079	,125	-,025	,419
2	1	,083	,057	1,000	-,076	,243
	3	,016	,069	1,000	-,177	,210
	4	,006	,068	1,000	-,186	,198
	5	,281*	,081	,005	,053	,508
3	1	,067	,067	1,000	-,123	,257
	2	-,016	,069	1,000	-,210	,177
	4	-,010	,067	1,000	-,199	,179
	5	,264*	,071	,002	,064	,464
4	1	,077	,068	1,000	-,114	,268
	2	-,006	,068	1,000	-,198	,186
	3	,010	,067	1,000	-,179	,199
	5	,275*	,072	,002	,070	,479
5	1	-,197	,079	,125	-,419	,025
	2	-,281*	,081	,005	-,508	-,053
	3	-,264*	,071	,002	-,464	-,064
	4	-,275*	,072	,002	-,479	-,070

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix 4.4c Intention to servemarginal means, standard deviation and Bonferroni comparison test (…Continued)

Estimates

Measure: SERVE

Health Claim	VHC	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Functional-Good for your heart	1	4,960	,104	4,755	5,165
	2	4,596	,117	4,366	4,825
Risk reduction-Reduces the risks of heart disease and cancer	1	4,993	,107	4,783	5,202
	2	4,563	,119	4,329	4,797
Disease prevention-Helps to prevent coronary heart disease and cancer	1	5,074	,104	4,870	5,278
	2	4,752	,116	4,524	4,980

Pairwise Comparisons

Measure: SERVE

Health Claim	(I) VHC	(J) VHC	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Functional-Good for your heart	1	2	,364*	,085	,000	,197	,532
	2	1	-,364*	,085	,000	-,532	-,197
Risk reduction-Reduces the risks of heart disease and cancer	1	2	,429*	,087	,000	,259	,600
	2	1	-,429*	,087	,000	-,600	-,259
Disease prevention-Helps to prevent coronary heart disease and cancer	1	2	,322*	,085	,000	,156	,489
	2	1	-,322*	,085	,000	-,489	-,156

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Appendix 4.5aWithin-Subjects ANOVA-DV: Intention to purchase-

Tests of Within-Subjects Effects

Measure: PURCHASE

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
VHC	Sphericity Assumed	91,772	1	91,772	37,846	,000	,078	37,846	1,000
	Greenhouse-Geisser	91,772	1,000	91,772	37,846	,000	,078	37,846	1,000
	Huynh-Feldt	91,772	1,000	91,772	37,846	,000	,078	37,846	1,000
	Lower-bound	91,772	1,000	91,772	37,846	,000	,078	37,846	1,000
VHC * healclaim	Sphericity Assumed	7,088	2	3,544	1,462	,233	,007	2,923	,312
	Greenhouse-Geisser	7,088	2,000	3,544	1,462	,233	,007	2,923	,312
	Huynh-Feldt	7,088	2,000	3,544	1,462	,233	,007	2,923	,312
	Lower-bound	7,088	2,000	3,544	1,462	,233	,007	2,923	,312
VHC * tracab	Sphericity Assumed	,365	1	,365	,150	,698	,000	,150	,067
	Greenhouse-Geisser	,365	1,000	,365	,150	,698	,000	,150	,067
	Huynh-Feldt	,365	1,000	,365	,150	,698	,000	,150	,067
	Lower-bound	,365	1,000	,365	,150	,698	,000	,150	,067
VHC * healclaim * tracab	Sphericity Assumed	5,709	2	2,854	1,177	,309	,005	2,354	,258
	Greenhouse-Geisser	5,709	2,000	2,854	1,177	,309	,005	2,354	,258
	Huynh-Feldt	5,709	2,000	2,854	1,177	,309	,005	2,354	,258
	Lower-bound	5,709	2,000	2,854	1,177	,309	,005	2,354	,258
Error(VHC)	Sphericity Assumed	1081,493	446	2,425					
	Greenhouse-Geisser	1081,493	446,000	2,425					
	Huynh-Feldt	1081,493	446,000	2,425					
	Lower-bound	1081,493	446,000	2,425					
PRODUCTS	Sphericity Assumed	64,468	4	16,117	6,422	,000	,014	25,686	,991
	Greenhouse-Geisser	64,468	3,549	18,166	6,422	,000	,014	22,789	,984
	Huynh-Feldt	64,468	3,621	17,804	6,422	,000	,014	23,252	,986
	Lower-bound	64,468	1,000	64,468	6,422	,012	,014	6,422	,715
PRODUCTS * healclaim	Sphericity Assumed	10,810	8	1,351	,538	,828	,002	4,307	,254
	Greenhouse-Geisser	10,810	7,098	1,523	,538	,808	,002	3,821	,239
	Huynh-Feldt	10,810	7,242	1,493	,538	,812	,002	3,899	,241
	Lower-bound	10,810	2,000	5,405	,538	,584	,002	1,077	,139
PRODUCTS * tracab	Sphericity Assumed	12,861	4	3,215	1,281	,275	,003	5,124	,405
	Greenhouse-Geisser	12,861	3,549	3,624	1,281	,277	,003	4,546	,378
	Huynh-Feldt	12,861	3,621	3,552	1,281	,277	,003	4,639	,382
	Lower-bound	12,861	1,000	12,861	1,281	,258	,003	1,281	,204
PRODUCTS * healclaim * tracab	Sphericity Assumed	27,474	8	3,434	1,368	,206	,006	10,946	,633
	Greenhouse-Geisser	27,474	7,098	3,871	1,368	,214	,006	9,712	,594
	Huynh-Feldt	27,474	7,242	3,794	1,368	,212	,006	9,909	,600
	Lower-bound	27,474	2,000	13,737	1,368	,256	,006	2,737	,295
Error(PRODUCTS)	Sphericity Assumed	4477,603	1784	2,510					
	Greenhouse-Geisser	4477,603	1582,819	2,829					
	Huynh-Feldt	4477,603	1614,963	2,773					
	Lower-bound	4477,603	446,000	10,039					
VHC * PRODUCTS	Sphericity Assumed	1,305	4	,326	,356	,840	,001	1,424	,132
	Greenhouse-Geisser	1,305	3,819	,342	,356	,831	,001	1,360	,130
	Huynh-Feldt	1,305	3,899	,335	,356	,835	,001	1,388	,131
	Lower-bound	1,305	1,000	1,305	,356	,551	,001	,356	,092
VHC * PRODUCTS * healclaim	Sphericity Assumed	2,727	8	,341	,372	,936	,002	2,975	,180
	Greenhouse-Geisser	2,727	7,637	,357	,372	,930	,002	2,840	,176
	Huynh-Feldt	2,727	7,798	,350	,372	,933	,002	2,900	,178
	Lower-bound	2,727	2,000	1,363	,372	,690	,002	,744	,110
VHC * PRODUCTS * tracab	Sphericity Assumed	4,881	4	1,220	1,331	,256	,003	5,325	,420
	Greenhouse-Geisser	4,881	3,819	1,278	1,331	,257	,003	5,084	,409
	Huynh-Feldt	4,881	3,899	1,252	1,331	,257	,003	5,191	,413
	Lower-bound	4,881	1,000	4,881	1,331	,249	,003	1,331	,210
VHC * PRODUCTS * healclaim * tracab	Sphericity Assumed	11,355	8	1,419	1,549	,136	,007	12,389	,699
	Greenhouse-Geisser	11,355	7,637	1,487	1,549	,139	,007	11,828	,684
	Huynh-Feldt	11,355	7,798	1,456	1,549	,138	,007	12,076	,691
	Lower-bound	11,355	2,000	5,678	1,549	,214	,007	3,097	,329
Error(VHC*PRODUCTS)	Sphericity Assumed	1635,106	1784	,917					
	Greenhouse-Geisser	1635,106	1703,090	,960					
	Huynh-Feldt	1635,106	1738,890	,940					
	Lower-bound	1635,106	446,000	3,666					

Computed using alpha = ,05

Appendix 4.5bWithin-Subjects ANOVA-DV: Intention to recommend-

Tests of Within-Subjects Effects

Measure: RECOMMEND

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
VHC	Sphericity Assumed	60,284	1	60,284	20,045	,000	,043	20,045	,994
	Greenhouse-Geisser	60,284	1,000	60,284	20,045	,000	,043	20,045	,994
	Huynh-Feldt	60,284	1,000	60,284	20,045	,000	,043	20,045	,994
	Lower-bound	60,284	1,000	60,284	20,045	,000	,043	20,045	,994
VHC * healclaim	Sphericity Assumed	15,497	2	7,749	2,577	,077	,011	5,153	,514
	Greenhouse-Geisser	15,497	2,000	7,749	2,577	,077	,011	5,153	,514
	Huynh-Feldt	15,497	2,000	7,749	2,577	,077	,011	5,153	,514
	Lower-bound	15,497	2,000	7,749	2,577	,077	,011	5,153	,514
VHC * tracab	Sphericity Assumed	,012	1	,012	,004	,950	,000	,004	,050
	Greenhouse-Geisser	,012	1,000	,012	,004	,950	,000	,004	,050
	Huynh-Feldt	,012	1,000	,012	,004	,950	,000	,004	,050
	Lower-bound	,012	1,000	,012	,004	,950	,000	,004	,050
VHC * healclaim * tracab	Sphericity Assumed	14,919	2	7,460	2,480	,085	,011	4,961	,498
	Greenhouse-Geisser	14,919	2,000	7,460	2,480	,085	,011	4,961	,498
	Huynh-Feldt	14,919	2,000	7,460	2,480	,085	,011	4,961	,498
	Lower-bound	14,919	2,000	7,460	2,480	,085	,011	4,961	,498
Error(VHC)	Sphericity Assumed	1356,318	451	3,007					
	Greenhouse-Geisser	1356,318	451,000	3,007					
	Huynh-Feldt	1356,318	451,000	3,007					
	Lower-bound	1356,318	451,000	3,007					
PRODUCTS	Sphericity Assumed	39,468	4	9,867	3,638	,006	,008	14,551	,880
	Greenhouse-Geisser	39,468	3,457	11,415	3,638	,009	,008	12,578	,841
	Huynh-Feldt	39,468	3,526	11,193	3,638	,008	,008	12,827	,846
	Lower-bound	39,468	1,000	39,468	3,638	,057	,008	3,638	,477
PRODUCTS * healclaim	Sphericity Assumed	25,477	8	3,185	1,174	,311	,005	9,393	,553
	Greenhouse-Geisser	25,477	6,915	3,684	1,174	,315	,005	8,119	,509
	Huynh-Feldt	25,477	7,052	3,613	1,174	,314	,005	8,280	,515
	Lower-bound	25,477	2,000	12,738	1,174	,310	,005	2,348	,257
PRODUCTS * tracab	Sphericity Assumed	13,603	4	3,401	1,254	,286	,003	5,015	,396
	Greenhouse-Geisser	13,603	3,457	3,934	1,254	,288	,003	4,335	,365
	Huynh-Feldt	13,603	3,526	3,858	1,254	,288	,003	4,421	,369
	Lower-bound	13,603	1,000	13,603	1,254	,263	,003	1,254	,201
PRODUCTS * healclaim * tracab	Sphericity Assumed	27,873	8	3,484	1,285	,247	,006	10,276	,600
	Greenhouse-Geisser	27,873	6,915	4,031	1,285	,255	,006	8,882	,553
	Huynh-Feldt	27,873	7,052	3,952	1,285	,254	,006	9,059	,559
	Lower-bound	27,873	2,000	13,936	1,285	,278	,006	2,569	,279
Error(PRODUCTS)	Sphericity Assumed	4893,060	1804	2,712					
	Greenhouse-Geisser	4893,060	1559,322	3,138					
	Huynh-Feldt	4893,060	1590,258	3,077					
	Lower-bound	4893,060	451,000	10,849					
VHC * PRODUCTS	Sphericity Assumed	12,409	4	3,102	2,015	,090	,004	8,060	,607
	Greenhouse-Geisser	12,409	2,709	4,581	2,015	,117	,004	5,458	,492
	Huynh-Feldt	12,409	2,757	4,501	2,015	,115	,004	5,555	,497
	Lower-bound	12,409	1,000	12,409	2,015	,156	,004	2,015	,294
VHC * PRODUCTS * healclaim	Sphericity Assumed	11,496	8	1,437	,933	,488	,004	7,467	,443
	Greenhouse-Geisser	11,496	5,417	2,122	,933	,463	,004	5,056	,353
	Huynh-Feldt	11,496	5,514	2,085	,933	,465	,004	5,146	,357
	Lower-bound	11,496	2,000	5,748	,933	,394	,004	1,867	,212
VHC * PRODUCTS * tracab	Sphericity Assumed	3,422	4	,855	,556	,695	,001	2,223	,187
	Greenhouse-Geisser	3,422	2,709	1,263	,556	,627	,001	1,505	,159
	Huynh-Feldt	3,422	2,757	1,241	,556	,630	,001	1,532	,160
	Lower-bound	3,422	1,000	3,422	,556	,456	,001	,556	,115
VHC * PRODUCTS * healclaim * tracab	Sphericity Assumed	19,280	8	2,410	1,565	,130	,007	12,523	,705
	Greenhouse-Geisser	19,280	5,417	3,559	1,565	,161	,007	8,480	,576
	Huynh-Feldt	19,280	5,514	3,497	1,565	,160	,007	8,631	,582
	Lower-bound	19,280	2,000	9,640	1,565	,210	,007	3,131	,332
Error(VHC*PRODUCTS)	Sphericity Assumed	2777,400	1804	1,540					
	Greenhouse-Geisser	2777,400	1221,579	2,274					
	Huynh-Feldt	2777,400	1243,297	2,234					
	Lower-bound	2777,400	451,000	6,158					

Computed using alpha = ,05

Appendix 4.5cWithin-Subjects ANOVA-DV: Intention to serve-

Tests of Within-Subjects Effects

Measure: SERVE

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
VHC	Sphericity Assumed	149,515	1	149,515	56,640	,000	,117	56,640	1,000
	Greenhouse-Geisser	149,515	1,000	149,515	56,640	,000	,117	56,640	1,000
	Huynh-Feldt	149,515	1,000	149,515	56,640	,000	,117	56,640	1,000
	Lower-bound	149,515	1,000	149,515	56,640	,000	,117	56,640	1,000
VHC * healclaim	Sphericity Assumed	2,082	2	1,041	,394	,674	,002	,789	,114
	Greenhouse-Geisser	2,082	2,000	1,041	,394	,674	,002	,789	,114
	Huynh-Feldt	2,082	2,000	1,041	,394	,674	,002	,789	,114
	Lower-bound	2,082	2,000	1,041	,394	,674	,002	,789	,114
VHC * tracab	Sphericity Assumed	2,871	1	2,871	1,087	,298	,003	1,087	,180
	Greenhouse-Geisser	2,871	1,000	2,871	1,087	,298	,003	1,087	,180
	Huynh-Feldt	2,871	1,000	2,871	1,087	,298	,003	1,087	,180
	Lower-bound	2,871	1,000	2,871	1,087	,298	,003	1,087	,180
VHC * healclaim * tracab	Sphericity Assumed	3,302	2	1,651	,625	,535	,003	1,251	,155
	Greenhouse-Geisser	3,302	2,000	1,651	,625	,535	,003	1,251	,155
	Huynh-Feldt	3,302	2,000	1,651	,625	,535	,003	1,251	,155
	Lower-bound	3,302	2,000	1,651	,625	,535	,003	1,251	,155
Error(VHC)	Sphericity Assumed	1129,806	428	2,640					
	Greenhouse-Geisser	1129,806	428,000	2,640					
	Huynh-Feldt	1129,806	428,000	2,640					
	Lower-bound	1129,806	428,000	2,640					
PRODUCTS	Sphericity Assumed	48,525	4	12,131	5,717	,000	,013	22,868	,982
	Greenhouse-Geisser	48,525	3,626	13,384	5,717	,000	,013	20,728	,973
	Huynh-Feldt	48,525	3,703	13,104	5,717	,000	,013	21,171	,975
	Lower-bound	48,525	1,000	48,525	5,717	,017	,013	5,717	,665
PRODUCTS * healclaim	Sphericity Assumed	18,108	8	2,264	1,067	,384	,005	8,534	,505
	Greenhouse-Geisser	18,108	7,251	2,497	1,067	,383	,005	7,735	,477
	Huynh-Feldt	18,108	7,406	2,445	1,067	,383	,005	7,900	,483
	Lower-bound	18,108	2,000	9,054	1,067	,345	,005	2,133	,237
PRODUCTS * tracab	Sphericity Assumed	22,050	4	5,512	2,598	,035	,006	10,391	,733
	Greenhouse-Geisser	22,050	3,626	6,082	2,598	,040	,006	9,419	,701
	Huynh-Feldt	22,050	3,703	5,954	2,598	,039	,006	9,620	,708
	Lower-bound	22,050	1,000	22,050	2,598	,108	,006	2,598	,363
PRODUCTS * healclaim * tracab	Sphericity Assumed	25,766	8	3,221	1,518	,146	,007	12,143	,689
	Greenhouse-Geisser	25,766	7,251	3,553	1,518	,154	,007	11,006	,655
	Huynh-Feldt	25,766	7,406	3,479	1,518	,152	,007	11,241	,663
	Lower-bound	25,766	2,000	12,883	1,518	,220	,007	3,036	,323
Error(PRODUCTS)	Sphericity Assumed	3632,794	1712	2,122					
	Greenhouse-Geisser	3632,794	1551,751	2,341					
	Huynh-Feldt	3632,794	1584,930	2,292					
	Lower-bound	3632,794	428,000	8,488					
VHC * PRODUCTS	Sphericity Assumed	3,010	4	,753	,907	,459	,002	3,628	,291
	Greenhouse-Geisser	3,010	3,624	,831	,907	,451	,002	3,288	,276
	Huynh-Feldt	3,010	3,702	,813	,907	,453	,002	3,358	,279
	Lower-bound	3,010	1,000	3,010	,907	,341	,002	,907	,158
VHC * PRODUCTS * healclaim	Sphericity Assumed	6,350	8	,794	,957	,468	,004	7,654	,454
	Greenhouse-Geisser	6,350	7,249	,876	,957	,463	,004	6,935	,429
	Huynh-Feldt	6,350	7,404	,858	,957	,464	,004	7,083	,434
	Lower-bound	6,350	2,000	3,175	,957	,385	,004	1,913	,216
VHC * PRODUCTS * tracab	Sphericity Assumed	5,794	4	1,448	1,746	,137	,004	6,983	,538
	Greenhouse-Geisser	5,794	3,624	1,599	1,746	,144	,004	6,328	,509
	Huynh-Feldt	5,794	3,702	1,565	1,746	,143	,004	6,463	,515
	Lower-bound	5,794	1,000	5,794	1,746	,187	,004	1,746	,261
VHC * PRODUCTS * healclaim * tracab	Sphericity Assumed	8,369	8	1,046	1,261	,260	,006	10,087	,590
	Greenhouse-Geisser	8,369	7,249	1,155	1,261	,265	,006	9,140	,558
	Huynh-Feldt	8,369	7,404	1,130	1,261	,264	,006	9,335	,565
	Lower-bound	8,369	2,000	4,184	1,261	,284	,006	2,522	,274
Error(VHC*PRODUCTS)	Sphericity Assumed	1420,361	1712	,830					
	Greenhouse-Geisser	1420,361	1551,204	,916					
	Huynh-Feldt	1420,361	1584,366	,896					
	Lower-bound	1420,361	428,000	3,319					

Computed using alpha = ,05

CONCLUSION

Cette thèse a été principalement motivée par la volonté de contribuer à la littérature en marketing qui manifestement présente une limite théorique et méthodologique (Gummesson, Kuusela et Närvänen, 2014; Logman, 2007, 2008, 2011), d'une part, et par les besoins exprimés par les experts dans l'industrie des aliments santé quant aux décisions à prendre dans une industrie en évolution, dynamique, caractérisée par la complexité et l'incertitude, d'autre part.

Pour ce faire, le nouveau paradigme de la théorie marketing qui met l'accent sur la complexité, l'incertitude, la dynamique et les parties prenantes et par conséquent, qui fournit une vision plus systémique et holistique (Gummesson, Kuusela et Närvänen, 2014) a été adopté dans cette thèse par articles.

Dans le premier article une étude exploratoire prospective a permis de développer un cadre conceptuel partagé qui permet d'identifier et de prioriser des interventions à entreprendre visant l'amélioration de la distribution des aliments santé. En utilisant la méthode de cartographie des concepts en groupe (Kane et Trochim, 2007), qui permet d'étudier la complexité (Trochim et Cabrera, 2005), cette étude a été menée auprès de 21 participants représentant diverses parties prenantes de l'industrie des aliments santé au Québec (Canada) (fabricants d'ingrédients, fabricants et transformateurs, experts et chercheurs en développement de la technologie, en sciences de la consommation, en distribution et marketing alimentaire et représentants du gouvernement). Les résultats de cette étude intègrent des interventions contextuelles et non seulement des interventions liées au couple produit/marché. En effet, les interventions à entreprendre visant l'amélioration de la distribution des aliments santé touchent divers aspects à savoir : 1) Information et communication avec les

consommateurs; (2) Innovation contextualisée avec le marché; (3) Gestion des relations avec les détaillants; (4) Communication avec les professionnels de la santé et possibilités réglementaires; (5) Réseautage et support institutionnel et (6) Stratégies marketing. En plus de l'identification d'initiatives ayant pour but d'améliorer la distribution des aliments santé, ce cadre conceptuel a aussi permis de prioriser ces interventions selon leurs importance et leurs faisabilité.

Toutefois, malgré que ce cadre conceptuel émergeant illustre la représentation des participants, il présente quelques limites. Tout d'abord, l'élaboration de ce cadre a été limitée à la ville de Québec et à sa région. Ensuite, l'utilisation de la cartographie des concepts en groupe dans cette étude s'est limitée à générer un cadre conceptuel émergent permettant d'identifier et de prioriser des interventions visant l'amélioration de la distribution des aliments santé. Selon Rosas et Camphausen (2007), la cartographie des concepts en groupe peut également être utilisée pour développer et valider des échelles de mesures. Il serait donc intéressant d'utiliser les groupements et les énoncés qui ont été générés dans le cadre de cette étude pour élaborer et tester les qualités psychométriques d'une échelle d'amélioration de la distribution des aliments santé. Finalement, le cadre conceptuel émergeant dans cette étude ne permet pas de comprendre les relations causales entre elles dans le cadre des analyses présentées. Partant de cette dernière limite, une étude qualitative a été menée dans le deuxième article de cette thèse dans le but de fournir une compréhension de la dynamique entre ces interventions qui visent l'amélioration de la distribution des aliments santé.

Ainsi, dans l'article 2 de cette thèse, l'approche qualitative de la dynamique des systèmes (DS) a été utilisée. Suite à des entrevues individuelles non structurées avec des experts en aliments santé et à partir d'un groupe de discussion menée avec 18

participants[109], un diagramme d'influence (DI) a été construit pour analyser les relations causales entre les interventions à entreprendre visant l'amélioration de la distribution des aliments santé. L'analyse a été réalisée en employant la méthode inductive du diagramme des systèmes (inductive system diagram method) de Burchill et Fine (1993, 1997) qui jumelle les aspects de la théorie enracinée de Glasser et Strauss (1967), Glaser (1978) et Strauss (1987) et de la DS (Goodman, 1974 ; Randers, 1980). Les résultats montrent que l'amélioration de la distribution des aliments santé dépend de l'interaction entre des interventions liées à la communication, à la réglementation, au consommateur et à la science. Encore une fois, les résultats confirment et approfondissent la compréhension de l'interaction des enjeux réglementaires, commerciaux et scientifiques dans l'amélioration de la distribution des aliments santé tel que énoncé durant les entrevues individuelles non structurées avec des experts en aliments santé et lors des séances de groupe de discussion auprès des participants représentant diverses parties prenantes de l'industrie des aliments santé au Québec (Canada). Toutefois, il est important de noter que le DI de cette étude permet seulement une compréhension statique de la complexité des interrelations entre les interventions visant l'amélioration de la distribution des aliments santé. En effet, il serait pertinent de mener une étude utilisant l'approche quantitative de la DS pour élaborer des modèles de simulation (modèle niveau-taux).

Finalement, l'article 3 de la présente thèse, porte sur les intentions de comportement des consommateurs à l'égard d'une catégorie des aliments santé à savoir les aliments enrichis d'acides gars oméga-3. Se basant sur certaines interventions visant l'amélioration des aliments santé, identifiées dans l'article1, cet article s'intéresse aux effets de la traçabilité, des allégations santé et de la vérification des allégations santé sur les intentions des consommateurs d'acheter, de recommander et de servir des

[109] Fabricants d'ingrédients, fabricants et transformateurs, experts et chercheurs en développement de la technologie, sciences de la consommation, distribution et marketing alimentaire et représentants du gouvernement.

aliments enrichis d'acides gras oméga-3. Pour cela, un design expérimental a été élaboré pour tester les effets principaux et d'interaction de la traçabilité, des allégations santé et la vérification des allégations santé sur les intentions de comportement des consommateurs. Ce design consiste en une analyse de variance mixte de type inter et intra-sujets. La traçabilité (complètement traçable-pas traçable) et les allégations santé (allégation fonctionnelle, allégation de réduction de risque de maladie et allégation de prévention de maladie) constituent les deux facteurs inter-sujets (between-sujects factors). Quant aux facteurs intra-sujets (within-subjects factors), ils concernent la vérification des allégations santé (Santé Canada, une agence gouvernementale fédérale et la Fondation des maladies du cœur, une organisation non gouvernementale) et les catégories de produits enrichis d'acides gras oméga-3 (viandes, œufs, produit céréalier, produit laitier et fruits ou légumes transformés). Ainsi, un questionnaire comportant six versions a été administré à six groupes de répondants (n = 463) à Montréal et à Ottawa. Les résultats montrent que les consommateurs ont des intentions de comportement plus élevées à l'égard des aliments enrichis d'acides gras oméga-3 qui sont traçables. De plus, les consommateurs ont des intentions de comportement plus élevées à l'égard des aliments enrichis d'acides gras oméga-3 dont les allégations santé sont vérifiées par le gouvernement (Santé Canada). Par ailleurs, les consommateurs éprouvent de faibles intentions de comportement à l'égard des fruits et légumes transformés et des viandes enrichis d'acides gras oméga-3. Il ressort également que les consommateurs sont plus enclins à recommander aux autres des aliments enrichis d'acides gras oméga-3 lorsqu'ils comportent des allégations santé fonctionnelles et de réduction de risque vérifiées par le gouvernement. Finalement, les consommateurs sont plus susceptibles recommander les aliments enrichis d'acides gras oméga-3 lorsque ces derniers sont étiquetés avec une allégation santé fonctionnelle vérifiée par le gouvernement et qu'ils sont complètement traçables.

Par ailleurs, l'étude menée dans l'article 3 de cette thèse présente certaines limites. Premièrement, seulement la traçabilité, les allégations santé et la vérification des allégations santé ont été incorporés dans l'étude alors que d'autres attributs comme le prix et la marque peuvent également affecter le processus de prise de décision des consommateurs (Bredahl, 2004). Deuxièmement, cette étude s'est limitée à un échantillon d'étudiants. En effet, il serait intéressant de mener une autre étude avec un échantillon hétérogène incluant des répondants ayant divers profils sociodémographiques. Troisièmement, cette étude utilise les données auto-rapportées. Ainsi, des études futures devraient utiliser l'expérimentation dans des contextes d'achat réels. Finalement, le design expérimental de cette étude ne comporte pas de variables modératrices comme les traits de personnalité. Étant donné, leur importance dans la formation des attitudes et les intentions de comportement (Dabholkar et Bagozzi, 2002), il serait pertinent de refaire cette étude en incorporant par exemple des traits de personnalité comme le 'Health consciousness'. En effet, il a été démontré que ce trait de personnalité prédit l'attitude et les intentions d'achat des consommateurs à l'égard des aliments fonctionnels (Landström et al., 2007; Naylor, Droms et Haws, 2009).

Les contributions de cette thèse se situent aux niveaux théorique, méthodologique et pratique. Au niveau théorique, cette thèse permet d'enrichir la littérature marketing qui selon Gummesson, Kuusela et Närvänen (2014) ne tient pas compte de la complexité, de l'incertitude et de la dynamique du marché et par conséquent, est souvent dépourvue de vision systémique et holistique. De manière générale, cette thèse a contribué d'une façon significative à l'avancement des connaissances sur la distribution et le comportement du consommateur et a produit des nouvelles connaissances.

Au niveau méthodologique, la contribution de cette thèse réside dans l'utilisation de méthodes peu utilisées en marketing comme la cartographie des concepts en groupe (Bigné et al., 2002) dans l'article 1 et la DS (Richardson et Otto, 2008) dans l'article 2. Toutefois, l'application de ces méthodes dans cette thèse a prouvé qu'elles sont pertinentes car elles permettent de saisir et de tenir compte de la complexité et de l'incertitude de l'industrie des aliments santé ; donc, pouvant plus largement être associées à des objets d'études en marketing.

Au niveau managérial, cette thèse permet d'aider les gestionnaires dans leur processus de prise de décisions relativement à la distribution des aliments santé et également au niveau du comportement du consommateur à l'égard de ces produits. De plus, les résultats de cette thèse permettent aux gestionnaires d'aligner leurs actions avec une vision organisationnelle plus large et holistique incluant des variables contextuelles pertinentes et essentielles à leurs prises de décisions, et ce, tout en tenant compte de la complexité et du dynamisme de leur industrie et de l'incertitude de l'environnement de leurs entreprises.

BIBLIOGRAPHIE*

Agence Canadienne d'Inspection des Aliments (ACIA) (2014). *Allégations santé*. Disponible en ligne à: http://www.inspection.gc.ca/aliments/etiquetage/l-etiquetage-des-aliments-pour-l-industrie/allegations-sante/fra/1392834838383/1392834887794 (Accès Juin, 2014).

Agriculture et Agroalimentaire Canada (AAC) (2014). *Aliments fonctionnels et produits de santé naturels-Industrie canadienne*. Disponible en ligne à: http://www.agr.gc.ca/fra/industrie-marches-et-commerce/statistiques-et-information-sur-les-marches/par-produit-secteur/aliments-fonctionnels-et-produits-de-sante-naturels/aliments-fonctionnels-et-produits-de-sante-naturels-industrie-canadienne/?id=1170856376710#a (Accès Juillet, 2014).

Agriculture and Agri-Food Canada (AAFC) (2009). *Market Analysis Report* – Dec 2009. Disponible en ligne à: http://www.gov.mb.ca/agriculture/statistics/pdf/marketanalysis%20report functional foods-en.pdf (Accès Avril, 2014).

Ardley, B. (2011). Marketing theory and critical phenomenology: Exploring the human side of management practice. *Marketing Intelligence & Planning*, 29(7), 628-642.

Basu, S. K., Thomas, J. E. et Acharya, S. N. (2007). Prospects for growth in global nutraceutical and functional food markets: A canadian perspective. *Australian Journal of Basic and Applied Sciences*, 1(4), 637-649.

Bigné, J. E., Aldas-Manzano, J. Küster, I. et Vila, N. (2002). The concept mapping approach in marketing: An application in the travel agencies sector. *Qualitative Market Research: An International Journal*, 5(2), 87–95.

Behara, R. (1995). Systems theoretic perspectives in service management. *Advances in Services Marketing and Management*, 4, 289-312.

*Cette bibliographie porte sur le résumé, l'abstract et les annexes de la thèse ainsi que sur l'introduction, le chapitre I et la conclusion.

Blandon, J., Cranfield, J. et Henson, S. (2007). *Functional food and natural health product issues: The canadian and international context.* International Food Economy Research Group Department of Food, Agricultural and Resource Economics. Disponible en ligne à: http://www4.agr.gc.ca/resources/prod/doc/misb/fbba/nutra/pdf/u_of_guelph_functional_foods_review_final_25jan2008_en.pdf (AccèsSeptembre, 2012).

Boehlje, M., Roucan-Kane, M. et Bröring, S. (2011). Future agribusiness challenges: Strategic uncertainty, innovation and structural change. *International Food and Agribusiness Management Review*, 14(5), 53-81.

Bredahl, L. (2004). Cue utilization and quality perception with regard to branded beef. *Food Quality and Preference*, 15(1), 65-75.

Bröring, S. (2008). How systemic innovations require alterations along the entire supply chain: The case of animal-derived functional foods. *Journal on Chain and Network Science*, 8(2), 107-119.

Bröring, S. et Cloutier, L. M. (2008). Value-creation in new product development within converging value chains: An analysis in the functional foods and nutraceutical industry. *British Food Journal*, 110(1), 76-97.

Burchill, G. et Kim, D. H. (1993). *Inductive system diagrams: An empirically based theory generation technique.* Disponible en ligne à: http://dspace.mit.edu/bitstream/handle/1721.1/48217/inductivesystemd00burc.pdf (Accès Mars, 2014).

Burchill, G. et Fine, C. H. (1997). Time versus market orientation in product concept development: Empirically-based theory generation. *Management Science*, 43(4), 465-478.

Cinnamon, B. (2007). *Results from the 2007 Functional Foods and Natural Health Products Survey.* Statistics Canada. Ottawa. Disponible en ligne à: http://www.statcan.gc.ca/pub/88f0006x/88f0006x2009001-eng.pdf (Accès Septembre, 2012).

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology,* 78(1), 98–104.

Cloutier, L. M. et El Ourabi, H. (2014). *Building a sustainable distribution chain for health enhancing foods in Quebec: Managerial cognition differences amongst stakeholders.* 11th Wageningen International Conference on Chain and Network

Management for the Conference theme track: Managing Sustainability and Innovation in Chains and Networks.

Cooper, D. et Schindler, P. (2008). *Business Research Methods.* New York: McGraw-Hill/Irwin.

Cortuff, R., Couture, F., Lemieux, S., Michaud, R., Paquin, P. et Pomerleau, S. (2011). *Critères d'évaluation d'un aliment à valeur nutritive améliorée ou santé et de son caractère innovant.* Document présenté à TRANSAQ, Institut sur la Nutrition et Aliments Fonctionnels (INAF). Université Laval, 11 juin 2011.

Dabholkar, P. A. et Bagozzi, R. P. (2002). An attitudinal model of technology-based self-service: Moderating effects of consumer traits and situational factors. *Journal of the Academy of Marketing Science*, 30(3), 184-201.

DeVellis, R. F. (1991). *Scale development: Theory and applications*, Newbury Park, CA: Sage.

Food and Drug Administration (FDA) (2009). *Guidance for industry: Evidence-based review system for the scientific evaluation of health claims.* Disponible en ligne à: http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/FoodLabellingNutrition/ucm073332.htm#system (Accès Décembre, 2013).

Garg, K. L., Wood, L. G., Singh, H. et Moughan, P. J. (2006). Means of delivering recommended levels of long chain-3 polyunsaturated fatty acids in human diets. *Journal of Food Science*, 71(5), R66-R71

Gharajedaghi J. (2006). *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture.* Burlington, MA: Elsevier.

Glaser, B. G. et Strauss A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicago, IL: Aldine Publishing Company.

Glaser B. G. (1978). *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory.* Mill Valley, CA: Sociology Press.

Goodman, M. (1974). *Study notes in System Dynamics.* Cambridge, MA: MIT Press.

Gummesson, E., Kuusela, H. et Närvänen, E. (2014). Reinventing marketing strategy by recasting supplier/customer roles. *Journal of Service Management*, 25(2), 228-240.

Hailu, G., Boecker, A., Henson, S. et Cranfield, J. (2009). Consumer valuation of functional foods and nutraceuticals in Canada. A conjoint study using probiotics. *Appetite*, 52(2), 257-265.

Hanssens, D. M., Rust, R. T. et Srivastava, R. K. (2009). Marketing strategy and wall street: Nailing down marketing's impact. *Journal of Marketing*, 73(6), 115-118.

Henson, S., Cranfield, J. et Herath, D. (2010). Understanding consumer receptivity towards foods and non-prescription pills containing phytosterols as a means to offset the risk of cardiovascular disease: An application of protection motivation theory. *International Journal of Consumer Studies*, 34(1), 28-37.

Herath, D., Cranfield, J., Henson, S. et Sparling, D. (2008). Firm, market, and regulatory factors influencing innovation and commercialization in Canada's functional food and nutraceutical sector. *Agribusiness*, 24(2), 207-230.

Hobbs, J. E. (2002). Evolving supply chains in the nutraceuticals and functional foods industry. *Canadian Journal of Agricultural Economics,* 50(4), 559–568.

Hodgins, M. E. (2011). *Innovation policy in Canada's Agri-Food system: The functional food and natural health products' segment.* Unpublished Doctoral thesis, City University London. Disponible en ligne à: http://openaccess.city.ac.uk/1121/1/Hodgins,_Mary_Ellen.pdf (Accès Juilllet, 2013).

Homer, J. B. (1996). Why we iterate: Scientific modeling in theory and practice. *System Dynamics Review*, 12(1), 1-19.

Ipsos Reid (2005). Baseline Natural Health Products survey among consumers (Final Report). Health Canada. Disponible en ligne à: www.hc-sc.gc.ca/dhp-mps/pubs/natur/eng_cons_survey-eng.php (Accès Avril, 2014).

Kane, M. et Trochim, W. M. K. (2007). *Concept Mapping for Planning and Evaluat*ion. Thousand Oaks, CA: Sage.

Khamphoune, B. (2013). *Results from the 2011 Functional Foods and Natural Health Products Survey. Statistics Canada.* Ottawa. Disponible en ligne à: http://www.statcan.gc.ca/pub/18-001-x/18-001-x2013001-eng.pdf (Accès Novembre, 2013).

Labrecque, J., Doyon, M., Bellavance, F. et Kolodinsky, J. (2006). Acceptance of functional foods: A comparison of french, american, and french canadian consumers. *Canadian Journal of Agricultural Economics*, 54(4), 647-661.

Landström, E., Koivisto Hursti, U. K., Becker, W. et Magnusson, M. (2007). Use of functional foods among Swedish consumers is related to health-consciousness and perceived effect. *British Journal of Nutrition*, 98(5), 1058-1069.

Logman, M. (2007). Logical brand management in a dynamic context of growth and Innovation. *Journal of Product & Brand Management*,16(4), 257-268.

Logman, M. (2008). Contextual intelligence and flexibility: Understanding today's marketing environment. *Marketing Intelligence & Planning*, 26(5), 508-520.

Logman, M. (2011). Realism versus simplicity in strategic marketing planning: The impact of temporality. *Marketing Intelligence & Planning*, 29(7), 662-671.

Luna-Reyes, L. F. et Andersen, D. L. (2003). Collecting and analyzing qualitative data for system dynamics: Methods and models. *System Dynamics Review*, 19(4), 271-296.

Malla, S., Hobbs, J. E. et Sogah, E. K. (2013). *Functional foods and natural health products regulations in Canada and around the world: Nutrition labels and health claims*. Canadian Agricultural Innovation and Regulation Network. Disponible en ligne à: http://www.ag-innovation.usask.ca (Accès Avril, 2014).

Malla, S., Hobbs, J. E., Sogah, E. K. et Yeung, M. T. (2013). *Assessing the functional foods and natural health products industry: A comparative overview and literature review*. Canadian Agricultural Innovation and Regulation Network, 132 pp. Disponible en ligne à: http://www.ag-innovation.usask.ca (Accès Avril, 2014).

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2007). La dynamique de la distribution alimentaire d'hier à aujourd'hui. *Bioclips plus*, 10(2), 1-12. Disponible en ligne à: http://collections.banq.qc.ca/ark:/52327/bs15524 (Accès Avril, 2014).

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) (2009). Étude de la dynamique et des tendances des marchés au sein du secteur agroalimentaire. *Bioclips plus*, 12(2), 1-12. Disponible en ligne à: http://www.mapaq.gouv.qc.ca/SiteCollectionDocuments/Bioclips/BioClipsplus_Vol_12_no2.pdf (Accès Septembre, 2012).

McCole, P. (2004). Refocusing marketing to reflect practice: The changing role of marketing for business. *Marketing Intelligence & Planning*, 22(5), 531-539.

McManus, A., Merga, M. et Newton, W. (2011). Omega-3 fatty acids. What consumers need to know. *Appetite*, 57(1), 80-83.

Moorsel, D. V, Cranfield, J. A. et Sparling, D. (2007). Factors affecting biotechnology innovation in Canada: Analysis of the 2001 biotechnology use and development survey. *International Journal of Biotechnology*, 9(1), 39-59.

Naylor, R. W., Droms, C. M. et Haws, K. L. (2009). Eating with a purpose: Consumer response to functional food health claims in conflicting versus complementary information environments. *Journal of Public Policy & Marketing*, 28(2), 221-233.

Nunnally, J. (1978). *Psychometric methods*. New York: McGraw.

OSEC (2011). *The Canadian Food Retail Sector. Opportunities for Swiss companies*. Disponible en ligne à: http://www.s-ge.com/en/filefield-private/files/2344/field_blog_public_files/1272 (Accès Avril, 2014).

Palinic, R. (2005). *Results from the Functional Foods and Nutraceuticals Survey*. Statistics Canada. Ottawa. Disponible en ligne à: http://publications.gc.ca/collections/collection_2007/statcan/88F0006X/88F0006XIE2007003.pdf (Accès Novembre, 2013).

Peng, Y., West, G. E. et Wang, C. (2006). Consumer attitudes and acceptance of CLA-enriched dairy products. *Canadian Journal of Agricultural Economics*,54(4), 663-684.

Randers, J. (1980). *Elements of the System Dynamics Method*. Cambridge, MA: MIT Press.

Richardson, G. P. et Otto, P. (2008). Applications of system dynamics in marketing: Editorial. *Journal of Business Research*, 61(11), 1099-1101.

Riediger, N. D., Othman, R. A., Suh, M. et Moghadasian, M. H. (2009). A systematic review of the roles of n-3 fatty acids in health and disease. *Journal of the American Dietetic Association*, 109(4), 668–679.

Rosas, S. R. et Camphausen, L. C. (2007). The use of concept mapping for scale development and validation in evaluation. *Evaluation and program planning*, 30(2), 125-135.

Rosas, S, A. et Kane, M. (2012). Quality and rigor of the concept mapping methodology: A pooled study analysis. *Evaluation and Program Planning*, 35(2), 236-245.

Ruxton, C. H. S. et Derbyshire, E. (2009). Latest evidence on omega-3 fatty acids and health. *Nutrition and Food Science*, 39(4), 423–438.

Sankaran, J. K. (2005). *Innovation and value-chains of nutraceuticals: The case of marine natural products*. Department of Information Systems and Operations Management, University of Auckland. Disponible en ligne à: http://docs.business.auckland.ac.nz/Doc/WP-289-Innovation-and-value-chains-of-nutraceuticals-The-case-of-marine-natural-products.pdf (Accès Octobre, 2013).

Sankaran, J. K. et Mouly, V. S. (2007). Managing innovation in an emerging sector: The case of marine-based nutraceuticals. *R&D Management*, 37(4), 329-344.

Senge, P. M. (1990). *The Fifth Discipline: The Art of Practice of the Learning Organization*. New York: Doubleday Currency.

Sheth, J. N. et Sisodia, R. S. (2005). Does marketing need reform? In marketing renaissance: Opportunities and imperatives for improving marketing thought, practice, and infrastructure. *Journal of Marketing*, 69(4), 1-25.

Siedlok, F., Smart, P. et Gupta, A. (2010). Convergence and reorientation via open innovation: The emergence of nutraceuticals. *Technology Analysis & Strategic Management*, 22(5), 571-592.

Srinivasan, S. et Hanssens, D. M. (2009). Marketing and firm value: Metrics, methods, findings and future directions. *Journal of marketing research*, 46(3), 293-312.

Sterman, J. D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston, MA: Irwin/McGraw-Hill.

Sterman, J. D. (2001). System dynamics modeling. *California Management Review*, 43(4), 8-25.

Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge: Cambridge University Press.

Tebbens, J. (2002). Aliments fonctionnels et nutraceutiques : *Création d'aliments à valeur ajoutée par les entreprises canadiennes, Statistiques Canada*. Ottawa. Disponible en ligne à:

http://publications.gc.ca/Collection/Statcan/88F0006X/88F0006XIF2005016.pdf (Accès Septembre, 2012).

Trochim, W. M. (1993). *The reliability of concept mapping*. In *Annual Conference of the American Evaluation Association*, Dallas, Texas. Disponible en ligne à: http://www.socialresearchmethods.net/research/Reliable/reliable.htm (AccèsSeptembre, 2012).

Trochim, W. M. et Cabrera, D. (2005). The complexity of concept mapping for policy analysis. *Emergence: Complexity and Organization*, 7(1), 11-22.

Verhoef, P. C. et Leeflang, P. S. H. (2009). Understanding the marketing department's influence within the firm. *Journal of Marketing*, 73(2), 14-37.

West, G. E., Gendron, C., Larue, B. et Lambert, R. (2002). Consumers' valuation of functional properties of foods: Results from a Canada-wide Survey. *Canadian Journal of Agricultural Economic*, 50(4), 541-558.

West, G. E. et Larue, B. (2004). Profiling consumer trend-setters in the Canadian healthy-foods market. *Current Agriculture, Food and Resource Issues*, (5), 65-82. Disponible en ligne à: http://ageconsearch.umn.edu/bitstream/45739/2/west5-1%5b1%5d.pdf (Accès Juin, 2014).

Workman, J. P. Jr, Homburg, C. et Gruner, K. (1998). Marketing organization: An integrative framework of dimensions and determinants. *Journal of Marketing*, 62(3), 21-41.

Zou, N. et Hobbs, J. E. (2006). *Modeling functional food choice and health care impacts: A literature review*. Working paper, Research Project Number CMD-06-02, Consumer and Market Demand Agricultural Policy Research Network. Disponible en ligne à: http://consumerdemand.ualberta.ca/Portals/22/ConsumerDemanDocuments/CMD_06-02.pdf (Accès Avril, 2014).

Zou, N. (2011). *Canadian Consumers Functional Food Choices: Labelling and Reference-Dependent Effects*. Unpublished Doctoral thesis, Department of Bioresource Policy, Business and Economics, University of Saskatchewan. Disponible en ligne à: http://ecommons.usask.ca/bitstream/handle/10388/etd-06072011-194119/PhD_Thesis_Ningning_Zou.pdf?sequence=1 (Accès Janvier, 2012).