Université de Montréal

Comprendre le rôle de l'innovation responsable dans la transition vers des systèmes alimentaires favorables à la santé

Étude de cas au Québec et dans l'État de São Paulo

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Thèse présentée en vue de l'obtention du grade de Philosophiae Doctor

Doctorat (Ph.D.) en santé publique, option Systèmes, organisations et politiques de santé

Juin, 2023

Université de Montréal

Département de gestion, d'évaluation et de politique de santé

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Cette thèse intitulée

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Résumé

Le système alimentaire joue un rôle fondamental dans la santé, non seulement de façon directe, par les liens entre l'alimentation et la santé, mais aussi de façon indirecte, puisque la production, la transformation, la distribution et la consommation des aliments ont des effets sur les plans économique, environnemental et social qui, ultimement, influencent la santé. Par conséquent, les liens entre la nourriture et la santé sont depuis longtemps d'intérêt pour la santé publique. Néanmoins, une approche systémique de l'alimentation semble encore en émergence dans la recherche en santé publique. Dans cette thèse, nous intégrons la recherche en santé publique à la recherche sur les systèmes alimentaires pour mieux comprendre la transition vers des systèmes alimentaires basés sur des principes de l'innovation responsable, c'est-à-dire, plus durables et résilients, justes et équitables pour les travailleurs et bénéfiques pour la santé de la population. Afin de mieux comprendre ce phénomène, nous avons analysé la transition dans le contexte d'une économie établie et dans celui d'une économie émergente : la province de Québec (Canada) et l'État de São Paulo (Brésil). Plus spécifiquement, trois objectifs ont été cernés par le devis d'une étude de cas multiple qui combine des données primaires et secondaires.

Le premier objectif consistait à caractériser les systèmes alimentaires dans la province de Québec et l'État de São Paulo. Afin d'atteindre ce but, nous avons mené une analyse secondaire de données socio-économiques sur le système alimentaire de ces deux endroits. Cette caractérisation a mis en évidence la manière dont ces systèmes alimentaires sont abordés par les autorités publiques sur leur propre territoire, c.-à-d. une activité économique. Cette perspective purement économique contraste avec une orientation vers le bien commun, nécessaire pour mettre de l'avant le rôle des systèmes alimentaires face aux grands défis sociétaux, comme la sécurité alimentaire et le changement climatique.

Le deuxième objectif a permis de clarifier comment les contraintes et les opportunités contextuelles affectent l'émergence de l'innovation responsable dans le système alimentaire. Pour atteindre ce but, nous avons analysé des données issues de 34 entrevues semi-structurées menées dans 30 organisations, soit 15 dans la province de Québec et 15 dans l'État de São Paulo. Les analyses clarifient la façon dont les différentes dimensions contextuelles façonnées par le

système alimentaire dominant freinent l'émergence d'organisations et de pratiques responsables. D'autre part, les résultats font ressortir que les dimensions contextuelles peuvent être modifiées de façon délibérée afin de soutenir l'émergence de l'innovation responsable dans le système alimentaire.

Le troisième objectif de la thèse comprenait l'analyse des organisations et des pratiques qui soutiennent la transition des systèmes alimentaires. La base de données pour atteindre cet objectif était constitué de 34 entrevues semi-structurés, de notes de terrain et de documents publics. Étant donné que la littérature sur l'innovation responsable dans le système alimentaire est encore en émergence, nous avons élaboré une définition provisoire du concept de l'Innovation responsable dans les systèmes alimentaires (IRSA) pour soutenir l'étude. Les résultats clarifient la façon dont les organisations et les pratiques axées sur l'IRSA transforment la production alimentaire en intégrant des pratiques de production qui visent à avoir un impact social et environnemental positif. Elles transforment la distribution alimentaire par des pratiques de commercialisation transparentes qui rapprochent les producteurs et les consommateurs et par des principes de responsabilité qui modifient la demande aux plans individuel et institutionnel. Enfin, elles contribuent à la transition en résistant aux dynamiques du système alimentaire dominant et en cherchant à aligner les acteurs vers un objectif commun.

En conclusion, cette thèse montre que l'intégration entre la recherche sur les systèmes alimentaires et la recherche en santé publique permet de s'attaquer aux causes profondes des enjeux de sécurité alimentaire. L'approche de l'innovation responsable mobilisée dans la thèse peut contribuer à la création d'innovations qui auront le potentiel de promouvoir la transition des systèmes alimentaires. Les connaissances générées dans cette thèse sont susceptibles d'informer la mise en place de politiques publiques et de pratiques à l'interface de la santé publique, des systèmes alimentaires et de la protection de l'environnement. Ce type d'intégration est primordial pour soutenir la consolidation des systèmes alimentaires plus favorables à la santé.

Mots-clés : Changement climatique; Étude de cas; Innovation responsable; Système alimentaire; Sécurité alimentaire; Système alimentaire alternatif; Système alimentaire durable; Transition des systèmes alimentaires; Transition durable.

Abstract

The food system plays a fundamental role in health, not only directly, through the links between food and health, but also indirectly, as the production, processing, distribution, and consumption of food have economic, environmental, and social effects that ultimately affect health. Therefore, the links between food and health have long been of interest to public health. Nevertheless, a systems approach to food seems to be still emerging in public health research. In this thesis, we integrate public health research with food systems research to better understand the transition to food systems based on principles of responsible innovation, i.e., more sustainable, resilient, fair, equitable to workers, and beneficial to population health. In order to better understand this phenomenon, we analyzed the transition in the context of an established economy and an emerging economy: the province of Québec (Canada) and the state of São Paulo (Brazil). More specifically, three objectives were pursued through the design of a multiple case study that combines primary and secondary data.

The first objective consisted of characterizing the food systems in the province of Québec and the state of São Paulo. To achieve this goal, we conducted a secondary analysis of socio-economic data on the food system of the province of Québec and the state of São Paulo. The characterization of these two food systems highlighted the way they are approached by public authorities in their own territory: an economic activity. This purely economic perspective contrasts with an orientation towards the common good, which is necessary to put forward the role of food systems in the face of major societal challenges, such as food security and climate change.

The second objective clarified how contextual constraints and opportunities affect the emergence of responsible innovation in the food system. To achieve this goal, we analyzed data from 34 semi-structured interviews conducted in 30 organizations, 15 in the province of Québec and 15 in the state of São Paulo. The analyses clarified how different contextual dimensions shaped by the dominant food system hindered the emergence of responsible organizations and practices. On the other hand, the results showed that the contextual dimensions can be deliberately modified to support the emergence of responsible innovation in the food system.

The third objective involved the analysis of organizations and practices that support food systems transition. The database consisted of 34 semi-structured interviews, fieldnotes, and public documents. Given that the literature on responsible innovation in food systems is still emerging, we developed a draft definition of the concept of Responsible Innovation in Food Systems (RIFS) to support the study. The findings clarified how RIFS-oriented organizations and practices transformed food production by incorporating production practices that aim to have a positive social and environmental impact. They transformed food distribution through transparent commercialization practices that bring producers and consumers closer together and through responsibility principles that change demand at the individual and institutional levels. Finally, they contributed to the transition by resisting the dynamics of the dominant food system and seeking to align actors toward a common goal.

In conclusion, this thesis showed that the integration between food systems research and public health research can contribute to addressing the deep causes of food security issues. The responsible innovation approach mobilized in this thesis can foster the development of innovations that promote food systems transition. Thus, the knowledge generated in this thesis can inform the development of policies and practice at the interface of public health, food systems and environmental protection. This type of integration is critical to support the consolidation of healthier food systems.

Keywords: Alternative food systems; Climate change; Case study; Food system; Food systems transition; Food security; Responsible innovation; Sustainable food system; Sustainable transition.

Resumo

O sistema alimentar desempenha um papel fundamental na saúde, não apenas diretamente, através da relação entre os alimentos e a saúde, mas também indiretamente, uma vez que a produção, processamento, distribuição e consumo de alimentos tem efeitos econômicos, ambientais e sociais que, em última instância, influenciam a saúde. Dessa forma, os vínculos entre a alimentação e a saúde são de interesse para a saúde pública há muito tempo. No entanto, uma abordagem sistêmica sobre o papel da alimentação na saúde parece estar ainda em emergência nas pesquisas em saúde pública. Nesta tese, integramos a pesquisa em saúde pública à pesquisa em sistemas alimentares para compreender a transição para sistemas alimentares baseados em princípios de inovação responsável, ou seja, mais sustentáveis e resilientes, justos e equitativos para os trabalhadores e benéficos para a saúde da população. A fim de ampliar a compreensão deste fenômeno, analisamos a transição no contexto de uma economia estabelecida e uma economia emergente: a província de Québec (Canadá) e o estado de São Paulo (Brasil). Nesse sentido, buscamos alcançar três objetivos específicos por meio de um estudo de caso múltiplo que combina dados primários e secundários.

O primeiro objetivo consistia em caracterizar os sistemas alimentares da província de Québec e do estado de São Paulo. Para atingir este objetivo, foi feita uma análise secundária dos dados socioeconômicos do sistema alimentar da província de Québec e do estado de São Paulo. A caracterização destes dois sistemas alimentares destacou a forma como estes são abordados pelas autoridades públicas em seu próprio território: uma atividade econômica. Esta perspectiva puramente econômica contrasta com uma orientação para o bem comum, necessária para destacar o papel dos sistemas alimentares frente aos grandes desafios da sociedade, como a segurança alimentar e as mudanças climáticas.

No segundo objetivo buscamos esclarecer as restrições e oportunidades contextuais que afetam o surgimento de inovações responsáveis no sistema alimentar. Para isso, foram analisados dados de 34 entrevistas semiestruturadas realizadas em 30 organizações, 15 na província de Québec e 15 no estado de São Paulo. As análises esclareceram de maneira empírica que as dimensões contextuais moldadas pelo sistema alimentar dominante dificultam o surgimento de

organizações e práticas responsáveis. Por outro lado, os resultados sugerem que as dimensões contextuais podem ser deliberadamente modificadas para apoiar o surgimento de uma inovação responsável no sistema alimentar.

O terceiro objetivo da tese envolveu a análise das organizações e práticas que apoiam a transição dos sistemas alimentares. Os dados utilizados para alcançar este objetivo consistiram em 34 entrevistas semiestruturadas, notas de campo e documentos públicos. Considerando que a literatura sobre inovação responsável em sistemas alimentares ainda está emergindo, desenvolvemos uma definição provisória do conceito de Inovação Responsável em Sistemas Alimentares (IRSA) para apoiar o estudo. Os resultados mostraram como as organizações e práticas orientadas para a IRSA transformam a produção de alimentos através da integração de práticas de produção que visam ter um impacto social e ambiental positivo. Elas transformam a distribuição de alimentos através de práticas de comercialização transparentes que conectam produtores e consumidores, e através de princípios de responsabilidade que transformam a demanda em nível individual e institucional. Finalmente, elas contribuem para a transição resistindo às dinâmicas do sistema alimentar dominante e procurando alinhar diferentes atores em direção a um objetivo em comum.

Em conclusão, esta tese mostrou que a integração da pesquisa em sistemas alimentares à pesquisa em saúde pública permite abordar as causas profundas das questões de segurança alimentar. A abordagem de inovação responsável mobilizada nesta tese pode contribuir para o desenvolvimento de inovações que tenham o potencial de promover a transição dos sistemas alimentares. Por fim, os conhecimentos desenvolvidos nesta tese podem informar políticas e práticas na interface entre saúde pública, sistemas alimentares e proteção ambiental. Este tipo de integração é fundamental para apoiar o fortalecimento de sistemas alimentares mais favoráveis à saúde.

Palavras-chave: Estudo de caso; Inovação responsável; Mudanças climáticas; Segurança alimentar; Sistemas alimentares alternativos; Sistema alimentar; Sistema alimentar sustentável; Transição de sistemas alimentares; Transição sustentável.

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AEJS	Aspects éthiques, juridiques et sociaux (AEJS)
ASC	Agriculture soutenue par la communauté
AFS	Alternative food system
CERSES	Comité d'éthique de la recherche en sciences et en santé
CERSJ	Comité d'éthique de la recherche du Centre hospitalier universitaire Sainte-Justine
CPA	Conseil des politiques alimentaires
CReSP	Centre de recherche en santé publique
ESPUM	École de santé publique de l'Université de Montréal
FAECUM	Fédération des associations étudiantes du campus de l'Université de Montréal
FAO	Organisation des Nations Unies pour l'alimentation et l'agriculture (Food and Agriculture Organization)
FRQSC	Fonds de recherche du Québec - société et culture
FRQS	Fonds de recherche du Québec - santé
GDP	Gross Domestic Product
IRSC	Instituts de recherche en santé du Canada
IRS	Innovation responsable en santé
IRSA	Innovation responsable dans le système alimentaire
MAPA	Ministère brésilien de l'Agriculture, de l'élevage et de l'approvisionnement
ODD	Objectifs de développement durable
OMS	Organisation mondiale de la santé
RIFS	Responsible Innovation in Food Systems
RRI	Responsible Research and Innovation
SAA	Système alimentaire alternatif
SAM	Système alimentaire montréalais
STI	Science, Technologie et Innovation
STRN	Sustainability Transitions Research Network
WESP	World Economic Situation and Prospects

À Elena

Remerciements

L'obtention de ce doctorat est sans aucun doute l'une des étapes les plus importantes de ma vie. Pendant toutes ces années, je me suis consacrée du mieux que j'ai pu pour apprendre davantage sur les systèmes alimentaires. Ce chemin était rempli de personnes et de ressources qui ont rendu ce parcours possible.

Tout d'abord, je remercie profondément chacune des 34 personnes qui ont participé aux entrevues de cette recherche. Vous avez répondu à mes nombreuses questions et m'avez beaucoup appris sur le système alimentaire de la province du Québec et de l'État de São Paulo. J'espère avoir bien utilisé les informations que vous avez généreusement partagées avec moi.

Merci à Fernando, qui a décidé de m'accompagner dans un nouveau pays et m'a ainsi donné les encouragements dont j'avais besoin pour démarrer ce parcours si incroyable et si effrayant. Merci d'avoir été là pendant toutes ces années, de m'avoir réconfortée quand j'en avais besoin et d'avoir célébré les victoires avec moi.

Je remercie énormément ma directrice de thèse, Professeure Pascale Lehoux. Tu m'as donné la liberté d'étudier ce que je voulais et de grandir au sein d'une équipe merveilleuse, sous ta direction impeccable. Tes orientations m'ont permis de voir dans la pratique la façon dont la recherche peut (et doit) transformer le monde. Ta capacité d'écoute m'a appris sur comment bien mener une entrevue. Ta perspicacité m'a appris à voir au-delà de ce qui se trouve devant moi. Tu es une source d'inspiration en tant que professeure, chercheuse et superviseure. Par ailleurs, tu m'as donné le soutien intellectuel, financier et psychologique pendant toutes ces années avec une générosité et une patience qui sont rares. Merci d'avoir toujours été là pour moi et de ne m'avoir jamais laisser tomber. Je souhaite à tous les étudiant.e.s d'avoir une directrice comme toi, parce que cela fait toute la différence.

Je tiens à remercier toutes les personnes qui ont fait partie de l'équipe In Fieri pendant mon doctorat. Lysanne, merci de ton appui et de tes contributions toujours pertinentes lors de mes présentations dans les rencontres In Fieri. Surtout, merci d'avoir fait la révision linguistique de mes articles, toujours avec beaucoup d'enthousiasme et d'excellentes phrases motivationnelles (« *if you are going through hell just keep going*! »).

Robson, merci pour les pauses café remplies de discussions intéressantes qui contribuaient à la fois à résoudre des défis de la thèse ou simplement pour rigoler avec mon cher ami. Merci aussi de tes suggestions perspicaces lors de mes présentations dans les rencontres In Fieri.

Hudson, je te remercie de m'avoir toujours soutenue. Qu'il s'agisse de l'aide lors de mon processus de sélection pour le doctorat, des innombrables cafés, des suggestions et des conseils toujours pertinents. Tu es une personne et un professionnel incroyable et je suis très reconnaissante d'avoir eu quelqu'un d'aussi intelligent, généreux et humble que toi autour de moi pendant toutes ces années.

Je tiens à témoigner toute ma reconnaissance aux personnes suivantes, pour leur aide dans la réalisation de cette thèse :

Mes parents Jair et Marta pour toute l'affection et le soutien qu'ils m'ont apportés dans cette démarche. Vous m'avez toujours encouragée à étudier.

Mes frères Bila et Beto de m'avoir toujours fait confiance et de m'encourager.

Ma tante Luciana et mon oncle Fabio. Vos encouragements et votre confiance en moi (parfois plus que moi-même) sont une source d'énergie incroyable. Merci de m'avoir conforté quand c'était nécessaire et d'avoir célébré mes victoires avec beaucoup d'enthousiasme.

Mes amis et amies qui ont rendu le doctorat plus amusant et léger grâce à leur amitié et leur générosité: Amanda, Camila, Ervane, Érica, Jaime, Laka, Lazar, Mauricio et Muriel. Merci pour les beaux moments que nous avons passés ensemble.

Mon directeur de recherche à la maîtrise et ami, Professeur Eduardo Spers. Ton appui depuis mon baccalauréat a beaucoup contribué dans ma décision de poursuivre une carrière en recherche.

Aux personnes qui m'ont aidée à transcrire les entrevues : ma mère Marta et mon amie Hayanna pour les entrevues en portugais et Anne Préfontaine pour les entrevues en français.

Josée Tessier pour la révision et la mise en forme de la thèse.

Merci à l'organisation *Thèsez-vous* pour l'espace de rédaction et les retraites toujours productives et amusantes.

Je remercie l'équipe In Fieri, les Fonds de recherche du Québec – Société et Culture (FRQSC), l'École de santé publique de l'Université de Montréal (ESPUM), le Centre de recherche en santé publique (CReSP), la Fédération des associations étudiantes du campus de l'Université de Montréal (FAECUM) pour leur soutien financier.

Finalement, merci à ma petite Elena d'être là. Tu es arrivée vers la fin de mon doctorat, mais tu as apporté une nouvelle énergie au processus. Tu as donné encore plus de sens à ce parcours et je suis très heureuse que tu sois là pour célébrer cette étape avec *mémé*.

Chapitre 1 – Introduction

En 2015, l'ambition d'atteindre l'un des 17 Objectifs de développement durable (ODD) formulés par les Nations Unies —« Faim zéro » dans le monde en 2030— a suscité l'espoir que le combat contre la faim pourrait finalement s'achever (UN, 2015). Néanmoins, la réalité s'est montrée beaucoup plus dure et l'objectif semble de plus en plus inatteignable, d'autant plus qu'il vise à « éliminer la faim, assurer la sécurité alimentaire, améliorer la nutrition et promouvoir l'agriculture durable » (UN, 2015). Aggravé par la pandémie due au SARS-CoV-2 et les conflits en Ukraine, la faim n'a pas cessé d'augmenter dans le monde. En 2022, le nombre de personnes qui souffraient de la faim s'élevait à environ 800 millions de personnes, presque 10 % de la population mondiale (FAO, IFAD, UNICEF, WFP and WHO, 2022). En effet, l'Organisation des Nations unies pour l'alimentation et l'agriculture (FAO) estime qu'en 2030, date butoir à laquelle les ODD renvoient, la prévalence de la faim dans le monde sera semblable à celle de 2015, avec 670 millions de personnes sous-alimentées. En parallèle, la consommation d'aliments ultra-transformés est en augmentation, notamment dans les économies émergentes et établies (Monteiro et al., 2019; Nardocci et al., 2019). Les avancées scientifiques sont déjà solides sur les liens entre la consommation de ces aliments et de nombreux problèmes de santé comme les maladies cardiovasculaires, le diabète et le cancer (Levy et al., 2021; Louzada et al., 2021). Ces maladies représentent un grand fardeau pour les systèmes de santé et deviennent de plus en plus dispendieuses à traiter. Non seulement les environnements alimentaires ne conduisent pas les consommateurs à faire des choix plus sains, mais le coût pour manger sainement a aussi beaucoup augmenté et est devenu inabordable pour une grande partie de la population (FAO, IFAD, UNICEF, WFP and WHO, 2022).

Même si la pandémie et les conflits ont aggravé la situation alimentaire dans plusieurs pays, ces évènements ne constituent pas la principale cause de nos failles pour nourrir le monde de façon saine et durable. En fait, le système alimentaire qui régit la production, la transformation, la distribution et la consommation de la plupart des aliments consommés de nos jours est nocif pour la santé des humains, des animaux et des écosystèmes (Willet and et al, 2019). Il s'agit d'un système alimentaire que l'on peut qualifier de « conventionnel », dans la mesure où il a été mis en place lors de la révolution industrielle, dans un contexte de croissance démographique et

économique (Rastoin, 2017). L'explosion de la demande, associée à l'essor technologique, a permis aux entreprises agroindustrielles d'accroître tout en adoptant des stratégies pour maximiser leurs profits et leurs économies d'échelle. Cependant, malgré les grandes quantités d'aliments produits, les faiblesses de l'agriculture industrielle proviennent de ses caractéristiques principales : les principes de spécialisation et d'uniformité pour faciliter la production de masse, d'une part, et la dépendance aux intrants chimiques en tant qu'agents de gestion des écosystèmes pour atteindre une productivité maximale, d'autre part (IPES-Food, 2016). Par conséquent, des externalités négatives sont générées dans l'environnement. En fait, la production alimentaire est responsable de 30 % des émissions de gaz à effet de serre dans le monde, menaçant les écosystèmes locaux (Vermeulen et al., 2012; Willet and et al, 2019). Par ailleurs, les conditions de travail vécues dans les différentes étapes du système alimentaire conventionnel sont souvent précaires, ce qui représente un important déterminant de la santé chez ses travailleurs. En somme, le système alimentaire[1] endommage l'environnement et participe à « l'aggravation des inégalités socio-économiques » dont l'une des manifestations est « la montée de la précarité alimentaire partout dans le monde » (Rastoin, 2017, p. 19).

Les débats contemporains sur les systèmes alimentaires mettent en évidence la nécessité d'un changement de cap vers la poursuite de la santé dans son ensemble (Touzard, 2016). Il s'agit d'une vision plus globale de la santé, ne concernant pas seulement celle des individus, mais aussi la santé des sols, des plantes, des animaux, des humains producteurs, des consommateurs, etc. C'est la vision d'une alimentation « une seule santé » ("*one health*") qui se met en place graduellement, mais qui doit encore progresser (Touzard, 2016). En ce sens, les systèmes alimentaires sont aujourd'hui en pleine transition et l'émergence d'innovations responsables, susceptibles de modifier durablement la façon dont les aliments sont produits, transformés, distribués et consommés, est au cœur de cette transition (Khan et al., 2016; Lubello et al., 2016). De telles innovations proviennent principalement des systèmes alimentaires alternatifs et s'appuient sur des organisations et des pratiques qui incarnent des caractéristiques de

[1] Le lecteur pourra noter que dans la thèse « système alimentaire » est utilisé à la fois au singulier et au pluriel. Lorsqu'il est utilisé au singulier, c'est pour faire référence au système alimentaire dominant. Lorsqu'il est utilisé au pluriel, c'est pour faire référence à la coexistence de plusieurs systèmes alimentaires.

responsabilité (p. ex. agriculture sur les toits, réseaux de paniers bio, approvisionnement local) (da Silva, 2019; Le Velly, 2017) que nous définirons plus en détail dans le chapitre suivant.

La transition des systèmes alimentaires est considérée actuellement comme le principal levier pour améliorer la santé humaine et réduire les impacts négatifs sur l'environnement, deux facteurs primordiaux pour atteindre les ODD (Willet and et al, 2019). Cependant, l'état actuel des connaissances ne permet pas de déterminer comment les organisations et les pratiques des systèmes alimentaires plus responsables émergent dans un contexte dominé par le système conventionnel. D'ailleurs, la façon dont ces initiatives composent avec le système dominant et sont influencées par des pratiques institutionnalisées n'est encore pas bien comprise, d'autant plus qu'il s'agit d'un champ en émergence et en rapide évolution. Ainsi, il est urgent de mieux conceptualiser et analyser les dynamiques affectant la transition des systèmes alimentaires afin de guider les acteurs concernés et contribuer à la consolidation des systèmes alimentaires plus favorables à la santé.

Objectifs de la thèse

Cette thèse a pour but de mieux comprendre la transition des systèmes alimentaires en l'examinant empiriquement dans le contexte d'une économie établie et dans celui d'une économie émergente : la province de Québec et l'État de São Paulo (Brésil). Ces deux régions font face à des défis différents en matière d'alimentation, mais démontrent toutes deux une dépendance élevée envers le système alimentaire dominant et un intérêt accru pour les systèmes alternatifs.

Pour atteindre ce but, trois **objectifs spécifiques** sont poursuivis :

1) Caractériser les systèmes alimentaires dans la province de Québec et l'État de São Paulo;

2) Clarifier comment les contraintes et les opportunités de ces contextes régionaux affectent l'émergence de la responsabilité dans les systèmes alimentaires;

3) Analyser les pratiques et les dimensions organisationnelles qui soutiennent la transition vers des systèmes alimentaires plus responsables.

Pertinence de la thèse

Le champ de recherche qui s'intéresse à l'évolution des systèmes alimentaires a pris forme au cours des années 90. Des chercheurs de différents domaines analysent ce phénomène et se questionnent par rapport à une possible transition du système dominant vers des systèmes alternatifs. Le système alternatif va-t-il remplacer le système dominant? Comment les systèmes alternatifs influencent-ils, et sont-ils influencés par le système conventionnel? Ce sont des questions complexes qui rallient différentes perspectives disciplinaires, mais qui jusqu'à présent ont été peut abordées par la recherche en santé publique.

En fait, la société tout comme la recherche se sont traditionnellement tournées vers le secteur de la santé pour répondre à des préoccupations principalement d'ordre sanitaire. Par contre, même si les soins de santé sont un des déterminants sociaux de la santé, une grande partie de la charge de morbidité est due aux « conditions dans lesquelles les gens naissent, grandissent, vivent, travaillent et vieillissent » (Marmot, Bell, Goldblatt, 2013, p. S127). Ainsi, assurer la sécurité alimentaire est un enjeu de santé publique car, pour favoriser la santé des individus et des communautés, une action cohérente doit être façonnée par les déterminants sociaux de la santé (Marmot et al., 2013).

En analysant l'émergence d'organisations et de pratiques alimentaires innovantes favorables à la santé et à l'environnement, cette thèse vise à produire des connaissances originales qui intègrent les forces de la recherche en santé publique et celles de la recherche sur les systèmes alimentaires. Selon Khan et al. (2016), ce type d'intégration est urgent pour informer les politiques et les pratiques et soutenir une production plus durable d'aliments sains et abordables. La santé publique est ainsi la « toile de fond » de la thèse davantage que son objet principal. Par ailleurs, en documentant de manière structurée les systèmes alimentaires au Québec et dans l'État de São Paulo, cette thèse vise à dégager des apprentissages réciproques sud-nord et nord-sud en matière de pratiques alimentaires responsables. Cette thèse vise donc à apporter une contribution aux connaissances actuelles, sur les plans théoriques et pratiques, et à consolider un nouveau créneau de recherche pour la santé publique afin de lui permettre de faire face aux défis contemporains de sécurité alimentaire.

Positionnement de l'auteure

Cette thèse doctorale a été menée dans le cadre du programme de recherche In Fieri, dirigé par ma directrice de thèse, qui porte sur la conception, le financement et la commercialisation de l'innovation responsable en santé. Ce programme de sept ans (2016-2023) a été financé par l'intermédiaire du volet Fondation des Instituts de recherche en santé du Canada (IRSC). La thèse a été initialement financée par le programme In Fieri et j'ai par la suite obtenu une bourse des FRQ-SC (2021-2023). Le sujet de cette thèse a été inspiré par les axes du programme In Fieri, mais ce sont surtout ma formation et mon expérience de travail qui m'ont amenée à définir mon objet de recherche et la manière de l'aborder.

Ma formation de premier cycle en Sciences des aliments à l'École d'agriculture « Luiz de Queiroz » (2007-2012), combinée avec mon expérience de travail au Centre d'études avancées en économie appliquée (2011-2016) et ma formation de deuxième cycle à l'École supérieure de publicité et de marketing (2013-2015) au Brésil, ont suscité des doutes quant à la réussite du système alimentaire conventionnel. En fait, les producteurs agricoles auxquels je parlais tous les jours travaillaient extrêmement fort et n'arrivaient pas à recevoir un retour juste pour leurs efforts, et c'était le cas surtout pour les plus petits producteurs qui disparaissaient du secteur l'un après l'autre. L'un de mes souvenirs les plus marquants de cette époque est celui d'un producteur de cacao du sud de l'État de Bahia passionné par son activité mais qui pleurait devant moi parce qu'il était tellement endetté qu'il ne savait plus quoi faire. Poursuivre des études doctorales représentait pour moi une façon de contribuer éventuellement à la vie de ces personnes.

J'ai trouvé au sein de l'équipe In Fieri l'accueil dont j'avais besoin pour évoluer avec une large autonomie scientifique. Ce programme de recherche a attiré mon attention parce qu'il cherche à comprendre les causes profondes des défis auxquels les systèmes de santé sont confrontés et la façon dont l'innovation peut y répondre. En outre, le groupe propose une nouvelle perspective sur la manière de relever ces défis à la lumière du concept de l'Innovation responsable en santé (IRS), un concept développé par le programme de recherche In Fieri. L'IRS consiste en une démarche collaborative au sein de laquelle les parties prenantes s'engagent à clarifier et à appliquer un ensemble de principes, de valeurs et d'exigences éthiques, économiques, sociales

et environnementales lorsqu'ils conçoivent, financent, produisent, distribuent, utilisent et mettent au rencart des solutions sociotechniques afin de répondre aux défis et besoins des systèmes de santé de façon pérenne (Silva et al., 2018).

Le concept de l'IRS fournissait ainsi une perspective novatrice et pertinente pour analyser le système alimentaire et avait le potentiel de contribuer à faire avancer les réflexions contemporaines sur les défis du système alimentaire. Par ailleurs, les questionnements liés au système alimentaire ne faisaient pas partie des objets de recherche de l'équipe In Fieri quand je l'ai rejointe. Cela augmentait le défi de ma thèse mais, du même coup, me donnait l'occasion de développer une recherche entièrement originale dans le domaine. Ainsi, avec la direction généreuse de Dre Pascale Lehoux, j'ai parcouru le chemin de cette thèse en totale autonomie, avec la motivation que les résultats générés contribueraient d'une manière ou d'une autre à améliorer la vie de ceux qui travaillent à cultiver, transformer et distribuer les aliments que nous mangeons chaque jour.

Structure de la thèse

Cette thèse s'articule autour de quatre articles dont trois dans la section Résultats et un dans les annexes. Les trois articles qui composent les Résultats de la thèse répondent aux trois objectifs évoqués plus haut. Le premier article vise à caractériser le système alimentaire de la province de Québec et de l'État de São Paulo. En utilisant la province et l'état comme unité d'analyse, nous avons recueilli des données secondaires auprès de sources gouvernementales et non gouvernementales. La recherche de données comprenait une analyse secondaire de données socioéconomiques (principalement issues des ministères concernés) sur la production, la transformation et la distribution des aliments, y compris les échanges internationaux. En caractérisant deux systèmes alimentaires issus de contextes économiques différents, l'étude met en évidence des vulnérabilités partagées par ces systèmes. Des vulnérabilités régies par des dynamiques interconnectées qui demeurent largement similaires et qui sont établies et renforcées au fil des ans.

Les deux autres articles sont élaborés à partir du même ensemble de données primaires recueillies au Québec et dans l'État de São Paulo. Le deuxième article vise à générer une

compréhension empirique sur la façon dont les contraintes et les opportunités de ces deux contextes régionaux affectent l'émergence d'organisations et de pratiques dotées de caractéristiques de responsabilité dans le système alimentaire (Sabio and Lehoux, 2022). Pour atteindre ce but, une analyse des données issues des 34 entrevues semi-structurées menées dans 30 organisations (15 au Québec et 15 à São Paulo) a été faite. L'analyse des éléments contextuels est appuyée par un cadre analytique des systèmes alimentaires durables créé par le Groupe d'experts de haut niveau sur la sécurité alimentaire et la nutrition (HLPE, 2020), qui fournit une vue d'ensemble des différentes composantes d'un système alimentaire, y compris ses principaux éléments contextuels.

Le troisième article a pour objectif d'analyser les pratiques et organisations qui soutiennent la transition vers des systèmes alimentaires plus responsables dans la province de Québec et dans l'État de São Paulo. L'étude combine les données des 34 entrevues semi-structurées ainsi que l'analyse de notes de terrain et de documents portant sur des organisations et des pratiques présentant des caractéristiques de responsabilité dans les deux régions. L'analyse est soutenue par le cadre de l'Innovation responsable en santé (IRS) (Silva et al., 2021, 2018) et enrichit de manière inductive la littérature sur les systèmes alimentaires responsables. Les résultats de l'étude clarifient la façon dont les organisations et les pratiques axées sur l'innovation responsable transforment l'offre et la demande alimentaire, et contribuent à la transition à l'échelle systémique.

Le quatrième article de la thèse (annexe A) propose une réflexion sur comment une approche renouvelée en Science, Technologie et Innovation (STI) peut soutenir l'émergence d'innovations plus responsables dans le système alimentaire. Une telle approche permettrait ainsi d'aller au-delà du profit économique et serait basée plutôt sur des principes de responsabilité comme la durabilité et l'équité. Cet article complète la thèse car il propose une réflexion en amont, sur l'approche en STI et son rôle sur le type d'innovation généré pour et par le système alimentaire.

Chapitre 2 – État des connaissances et cadre conceptuel général de la thèse

Le système alimentaire et la santé publique

Le système alimentaire joue un rôle fondamental dans la santé, non seulement de façon directe, par les liens entre ces différentes composantes et la santé, mais aussi de façon indirecte, puisque la production, la transformation, la distribution et la consommation des aliments a des effets sur les plans économique, environnemental et social qui, ultimement, influencent la santé des individus. Par conséquent, les liens entre la nourriture et la santé sont depuis longtemps d'intérêt pour la santé publique. Dans son ouvrage dédié à l'histoire de la santé publique, Rosen (1993) souligne que les études sur la valeur nutritive des aliments ont en effet joué un rôle très important dans la prévention des maladies, notamment avec la découverte des vitamines. En fait, tel que souligné par Tulchinsky et Varavikova (2014), même si la plupart des « succès » des réalisations en santé publique dans les dernières décennies concerne l'assainissement et le contrôle des maladies transmissibles, « la contribution de la nutrition et de la sécurité alimentaire à l'amélioration de la santé fut énorme » (traduction libre, p. 327).

Bien que les implications des découvertes sur le rôle de la nutrition dans la santé soient claires, la malnutrition est encore largement répandue dans le monde (FAO, IFAD, UNICEF, WFP and WHO, 2022; Rosen, 1993; Tulchinsky and Varavikova, 2014). De plus, des enjeux liés à la « nutrition inappropriée » représentent des grands défis en évolution rapide pour les systèmes de santé dans des économies établies et émergentes (FAO, IFAD, UNICEF, WFP and WHO, 2022; Tulchinsky and Varavikova, 2014). Ces enjeux sont, en partie, liés à la consommation d'aliments ultra-transformés, amplement présents dans l'offre alimentaire des pays à revenu élevé et de plus en plus présents dans les pays à revenu intermédiaire (Juul et al., 2022; Levy et al., 2022; Monteiro et al., 2013). Ces produits sont souvent peu coûteux à produire pour les industries et très appétissants pour les consommateurs (Monteiro et al., 2013). Des études montrent déjà les conséquences négatives de la consommation des aliments ultra-transformés sur la santé (Levy et al., 2021; Nilson et al., 2023; Pagliai et al., 2021). Nilson et coll. (2023) ont constaté que la

consommation de ces aliments représente une cause importante de décès prématuré au Brésil. Pagliai et coll. (2021) ont réalisé une revue systématique sur les impacts des aliments ultra-transformés sur la santé et ont constaté que, même si le nombre d'études était encore limité, une consommation accrue d'aliments ultra-transformés était associée à de nombreux problèmes de santé, notamment, un risque plus élevé de maladie cardiovasculaire, de maladie cérébrovasculaire, de dépression et de mortalité toutes causes confondues.

En fait, la littérature montre que la nourriture n'est pas seulement une nécessité pour « le maintien de la vie », mais aussi « une marchandise […] inextricablement liée aux formes d'organisation économique » et, alors, soumise à des intérêts qui vont bien au-delà de la sécurité alimentaire (Rosen, 1993, traduction libre, p. 394). Par ailleurs, les études scientifiques et les politiques publiques élaborées en « silos disciplinaires », soit pour améliorer le système de santé, soit pour contribuer à la production des aliments, ne fournissent pas de solution claire aux défis de sécurité alimentaire contemporains. Or, assurer la sécurité alimentaire est un enjeu de santé publique car pour favoriser la santé des individus une action cohérente doit être façonnée par les déterminants sociaux de la santé (Marmot et al., 2013).

Dans la définition internationalement reconnue de sécurité alimentaire formalisée lors du Sommet Mondial de l'Alimentation en 1996, « la sécurité alimentaire existe lorsque tous les êtres humains ont, à tout moment, un accès physique et économique à une nourriture suffisante, saine et nutritive leur permettant de satisfaire leurs besoins énergétiques et leurs préférences alimentaires pour mener une vie saine et active » (World Food Summit, 1996) . Plus précisément, l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO) met en évidence quatre dimensions de la sécurité alimentaire, soit la disponibilité des aliments, l'accès physique et économique à la nourriture, l'utilisation des aliments pour accéder à un état de bien-être nutritionnel et la stabilité de toutes ces dimensions (FAO, 2008). Ces dimensions touchent ainsi plusieurs aspects de la chaîne de production alimentaire. La loi brésilienne comporte une définition qui met davantage en évidence les dimensions sanitaire, économique, environnementale et culturelle de l'alimentation. Dans cette conceptualisation, la sécurité alimentaire et nutritionnelle consiste à « réaliser le droit de tous à un accès régulier et permanent à une alimentation de qualité, en quantité suffisante, sans compromettre l'accès à d'autres

besoins essentiels, sur la base de pratiques alimentaires favorables à la santé, respectueuses de la diversité culturelle et durables sur les plans environnemental, culturel, économique et social » (Brasil, 2006, traduction libre).

C'est à l'intérieur d'un système alimentaire que les aliments sont produits, transformés, distribués et consommés. Un système alimentaire se définit ainsi comme étant « l'ensemble des activités qui concourent à la fonction alimentation dans une société donnée, et représente la façon dont les personnes s'organisent pour produire et consommer » des aliments (Malassis, 1994, p. 118). Tel que souligné dans l'introduction de cette thèse, la plupart des aliments consommés aujourd'hui proviennent d'un système alimentaire conventionnel, caractérisé par une production intensive et hautement dépendante d'intrants chimiques.

Les débats scientifiques contemporains mettent en évidence la nécessité d'une transition vers des systèmes alimentaires plus favorables à la santé de façon globale. Cela ne concerne pas seulement la santé des individus, mais aussi la santé des sols, des plantes, des animaux, des humains producteurs et des communautés (OHHLEP, 2021). Cependant, même si le rôle de la nourriture dans la santé est d'intérêt pour la santé publique, une approche systémique de l'alimentation ne semble pas encore avoir été intégrée dans les études en santé publique. Or, la vision « réductionniste » du rôle des systèmes alimentaires dans la santé ne fournit pas de réponses claires aux enjeux actuels (Mozaffarian et al., 2018). En se concentrant sur la transition des systèmes alimentaires selon une perspective de santé publique, cette thèse vise ainsi à contribuer à combler cette lacune dans les connaissances.

La transition des systèmes alimentaires

Il y a un consensus parmi les experts que le système alimentaire doit être transformé afin de répondre aux besoins de sécurité alimentaire de façon saine et durable. Ceux-ci arguent pour une transition vers des systèmes alimentaires durables et résilients, justes et équitables pour les travailleurs et bénéfiques pour l'environnement et la santé (Fanzo et al., 2022). Alors que le terme transition réfère au « mouvement de passage d'un état à un autre » (von Braun et al., 2021, traduction libre, p. 749), la notion de transition dans les systèmes alimentaires renvoie à l'idée d'une dissolution de continuité entre « le processus de développement duquel nous partons et

l'état de soutenabilité que nous visons » (Lubello et al., 2017, p. 8). La transition est aussi perçue comme un changement fondamental dans la structure (les organisations, les institutions), la culture (les normes, le comportement) et les pratiques (les routines, les compétences) (Grin et al., 2010). La réduction de la dépendance à l'égard des aliments d'origine animale, la réduction des déchets, une meilleure gestion des eaux et des terres et la réduction des impacts négatifs sur les écosystèmes sont quelques exemples d'éléments clés de cette transition (Fanzo et al., 2022).

Toutefois, il reste encore à clarifier comment mener cette transition dans les systèmes alimentaires. Slater, Baker et Lawrence (2022) ont analysé 41 rapports élaborés par des experts et des organisations pour parvenir à la transformation saine et durable des systèmes alimentaires. Les auteurs concluent qu'il existe une « déconnexion » entre « l'objectif déclaré » des rapports versus le potentiel de leurs recommandations à réaliser une véritable transformation. En effet, la plupart des recommandations proposent des « ajustements » à la marge pour améliorer les systèmes alimentaires actuels, plutôt qu'un changement de paradigme.

La façon dont la transition des systèmes alimentaires a été abordée dans la littérature varie. Dans un ouvrage dédié aux systèmes agroalimentaires en transition, Lubello, Falque, et Temri (2016) soulignent la « coexistence paradoxale » de « diverses tendances antagonistes » à l'œuvre au sein des systèmes agroalimentaires actuels. Selon ces auteurs, le système dominant semble avoir intégré l'aspiration sociétale et politique à un système économique durable. Par conséquent, des modèles alternatifs plus durables s'accumulent en marge du système dominant, sans vraiment promouvoir une transition entre le système dominant et un système qui serait nouveau (Lubello et al., 2016). Les auteurs expliquent « qu'en même temps que les circuits courts se développent, la division internationale du travail ne cesse de s'approfondir et les échanges mondiaux sont de plus en plus dominés par les géants financiers de l'agroalimentaire » (Lubello, Falque, Temri, 2016, p. 16). Ainsi, lorsque des modèles émergents gagnent du terrain, ceux-ci sont souvent « capturés » par les grandes compagnies établies dont le modèle d'affaires demeure conventionnel (Lubello et al., 2016).

La transition a également été analysée du point de vue des interactions entre les niveaux macro, méso et micro. Le niveau macro représente le paysage (le contexte), le niveau méso est appelé le régime (représenté par le système dominant) et le niveau micro est la niche (où se logent les

initiatives en émergence) (Bui et al., 2016; Ingram, 2015; Morone and Cottoni, 2016). Selon Brunori, Rossi et Malandrin (2011), les niches peuvent en effet contribuer à la reconfiguration du régime, car celles-ci « suggèrent différentes façons de voir les choses, différentes voies d'innovation et différentes règles et normes » (traduction libre, p. 29). Ces mécanismes sont capables de transformer la politique publique, conduisant à une inclusion progressive et authentique de ces visions et acteurs dans le régime (Bui et al., 2016). Pour Morone et Cottoni (2016), une transition se produit chaque fois qu'une pression à l'échelle du paysage déstabilise le régime, créant une opportunité pour les niches. Selon ces auteurs, un changement de paradigme est possible quand une pression exercée par les acteurs du paysage sur le régime et une pression exercée par les niches d'innovation prêtes à remplacer le régime en place se produisent « simultanément ».

Ingram (2015) a examiné les processus qui relient les réseaux d'innovation du système alternatif au régime dominant. L'auteur confirme que la transition d'un régime agricole industriel vers un régime construit autour des principes de la production durable est complexe et il critique la pertinence et les prémisses analytiques des niches et régimes pour l'analyse des interactions entre les innovations à l'échelle locale et le régime agricole. Il suggère que l'analyse doit être conçue différemment pour tenir compte de circonstances complexes, dynamiques et diverses. Ainsi, « plutôt que d'envisager un lien entre une hiérarchie de niveaux, l'analyse doit se pencher sur les liens entre une nouveauté et son contexte » (Ingram, 2015, traduction libre, p. 73) .

Dans une revue systématique, Conti, Zanello, et Hall (2021) ont identifié les principales difficultés d'une transition dans les systèmes alimentaires : la persistance des technologies dominantes au détriment de meilleurs alternatives parce qu'elles sont déjà socialement ancrées; le désalignement entre la recherche, les institutions et les politiques par rapport aux orientations du changement; des questions culturelles et comportementales qui inhibent l'adoption de technologies, les habitudes de consommation et l'ignorance des externalités négatives actuelles; le pouvoir économique de certains acteurs; et la rigidité des infrastructures. Les auteurs soulignent que ces éléments sont liés à la nature « autorenforcée » du système dominant, en raison de la dépendance aux sentiers (soit le concept de "*path-dependance*") consolidée au fil des

ans. Afin de déverrouiller le système, les auteurs arguent pour la nécessité de changement dans les différentes composantes du système alimentaire à la même échelle temporale.

Plus récemment, le sujet de la transition numérique et son potentiel pour changer la production, la transformation, la distribution et la consommation des aliments a pris de l'espace dans cette littérature (Barrett and Rose, 2022; Eastwood et al., 2021; Klerkx and Rose, 2020). Les arguments qui soutiennent ces études soulignent surtout la puissance des technologies numériques comme les drones, l'internet des objets, la robotique et l'intelligence artificielle pour augmenter la production d'aliments (Espig et al., 2022; Jakku et al., 2022). Toutefois, même si le numérique attire beaucoup l'attention et « d'importantes sommes d'argent » (Klerkx and Rose, 2020), les questions d'équité et de pouvoir autour de cette « révolution numérique » sont rarement débattues (Béné, 2022). Bronson (2019) a mené des entretiens avec des concepteurs nord-américains de données massives ("*big data")* et de plateformes agricoles et a conclu que leurs valeurs et motivations servent principalement à « quelques puissants acteurs du système alimentaire » (traduction libre, p. 1). Par conséquent, ces technologies sont peu ou pas utiles aux organisations et pratiques opérant en dehors du système dominant. L'auteur conclu que « les décisions relatives à la collecte de données et à la construction d'infrastructures reproduisent les relations historiques de pouvoir » car elles servent aux acteurs du système alimentaire dominant (Bronson, 2019, traduction libre, p. 3). Selon Sodano (2019), l'innovation menée par l'agroentreprise pourra conduire à un régime alimentaire de type responsabilité environnementale de l'entreprise ("*environment-corporate*") avec le développement et la mise en place de nombreuses technologies qui semblent apporter des avantages environnementaux évidents à court terme, mais qui pourraient avoir des effets secondaires négatifs inattendus et des risques élevés dans l'avenir. Ce régime s'inscrit dans une dynamique déjà en place dans le système alimentaire et peut ainsi tirer parti des réseaux et des économies d'échelle qui caractérisent les technologies numériques, créant ainsi une situation de verrouillage ("lock-in") et de dépendance au sentier (Sodano, 2019). Klerkx et Rose (2020) affirment que l'importance accordée au numérique crée des effets « d'inclusion et d'exclusion » potentiels ainsi que des discours encore plus « techno centriques » pour répondre aux défis de sécurité alimentaire contemporains.

Malgré le nombre croissant d'études sur la transition des systèmes alimentaires, notre revue de littérature montre que ce phénomène n'est pas encore bien compris. En fait, le champ de recherche s'intéressant à la transition dans les systèmes alimentaires est encore largement « mal défini » (El Bilali, 2019). El Bilali (2019), dans une revue systématique sur la recherche dans la transition agroalimentaire, conclut sur le besoin d'études incluant les pays du Sud global et met en évidence qu'il faut mieux comprendre le rôle des entreprises dans ce phénomène. Selon l'auteur, les organisations agroalimentaires sont souvent considérées comme faisant « partie du problème » plutôt que comme un acteur important de la solution (El Bilali, 2019). De plus, même si les initiatives émergentes, populaires et communautaires représentent « l'épine dorsale » des systèmes alimentaires alternatifs, un tel thème n'est pas abordé de manière « adéquate » dans ce domaine de recherche (El Bilali, 2019). En somme, la recherche devrait accorder une plus grande attention à la transition des systèmes alimentaires et prendre en compte les conséquences interconnectées de cette transition, ainsi que l'asymétrie de pouvoir, la justice, l'équité et l'inclusion dans les systèmes alimentaires.

L'émergence de l'innovation responsable dans les systèmes alimentaires

L'innovation dans les modes de production, de transformation et de distribution des aliments est en plein essor, notamment avec l'intérêt accru des consommateurs pour des aliments issus de chaînes d'approvisionnement plus durables. Ces initiatives émergentes ne sont pas forcément nouvelles. En effet, plusieurs d'entre elles promeuvent le retour à certaines pratiques du passé, comme l'agriculture urbaine ou territorialisée. Même si les initiatives sont hétérogènes, elles appartiennent aux systèmes alimentaires dits « alternatifs » (SAA) qui renvoient aux formes alternatives de production, de transformation, de distribution et de consommation des aliments (Le Velly, 2017). L'un des exemples les plus connus est celui de l'agriculture soutenue par la communauté (ASC) qui propose d'encourager la production locale par la collaboration entre les producteurs et les consommateurs qui partagent les risques et les avantages de la production (Barbieri et al., 2017).

Cette thèse repose sur l'hypothèse que ces organisations et pratiques sont en mesure de promouvoir une transition vers des systèmes alimentaires plus favorables à la santé, basés sur

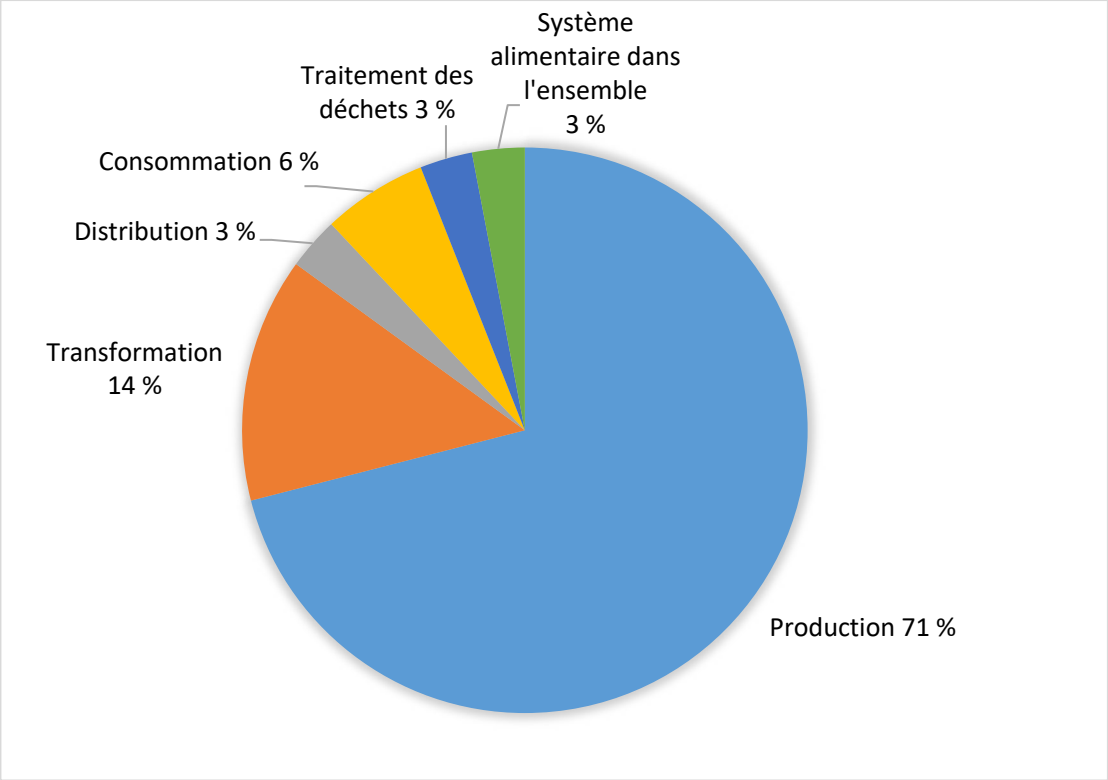
des principes de durabilité et de justice économique et sociale. Les organisations et pratiques émergentes sont ainsi analysées selon la perspective de la recherche et de l'innovation responsables. Mieux connu sous l'acronyme RRI, le "*Responsible Research and Innovation*" (recherche et innovation responsables) est une approche de gouvernance de l'innovation sur laquelle cette thèse repose lui permettant de poser ce postulat qui fait intervenir la durabilité et la désirabilité sociétale des processus et des résultats de l'innovation (von Schomberg, 2013). Le RRI appelle les acteurs impliqués à prendre en compte les aspects éthiques et sociaux de l'innovation avec l'idée que, ce faisant, les technologies ne viseront pas seulement à être économiquement rentables, mais aussi plus durables, socialement désirables et éthiquement acceptables (von Schomberg, 2013). Plus précisément, quatre exigences procédurales sont mises de l'avant : l'anticipation des risques, des impacts et des conséquences des innovations; la réflexivité à l'égard des systèmes de valeurs et des pratiques sociales qui régissent l'innovation; les processus de développement inclusifs; et la réactivité face aux connaissances, aux résultats et aux changements des contextes émergents (Stilgoe et al., 2013). Le RRI cherche à « aller au-delà de la réflexion et de l'interaction vers un soutien actif de l'adoption sociétale des innovations » (Asveld et al., 2015, p. 572). Ainsi, au lieu « protéger la société contre des conséquences indésirables, le RRI vise à relever les défis sociétaux par l'utilisation de la technologie » (Asveld et al., 2015, p. 572).

Le développement d'une approche RRI pour les systèmes alimentaires peut promouvoir des innovations technologiques ou sociales ayant le potentiel de contribuer à résoudre les enjeux de sécurité alimentaire (Gremmen et al., 2019). Toutefois, le RRI est actuellement en émergence dans la littérature sur les systèmes alimentaires (Blok, Scholten, et Long, 2018). Selon Khan et al. (2016), une approche de l'innovation qui transcende le progrès technologique et les impacts économiques doit être appliquée dans la politique et la recherche autour des régimes alimentaires sains et durables parce que « l'innovation de produit seule ne produira pas les impacts requis pour prévenir ou faire face au changement climatique » (Khan et al., 2016, p. 86 traduction libre, p. 86).

Même si les systèmes alimentaires sont encore sous-représentés dans la littérature RRI (Blok et al., 2018), la publication d'études dans ce domaine a augmenté au cours des dernières années.

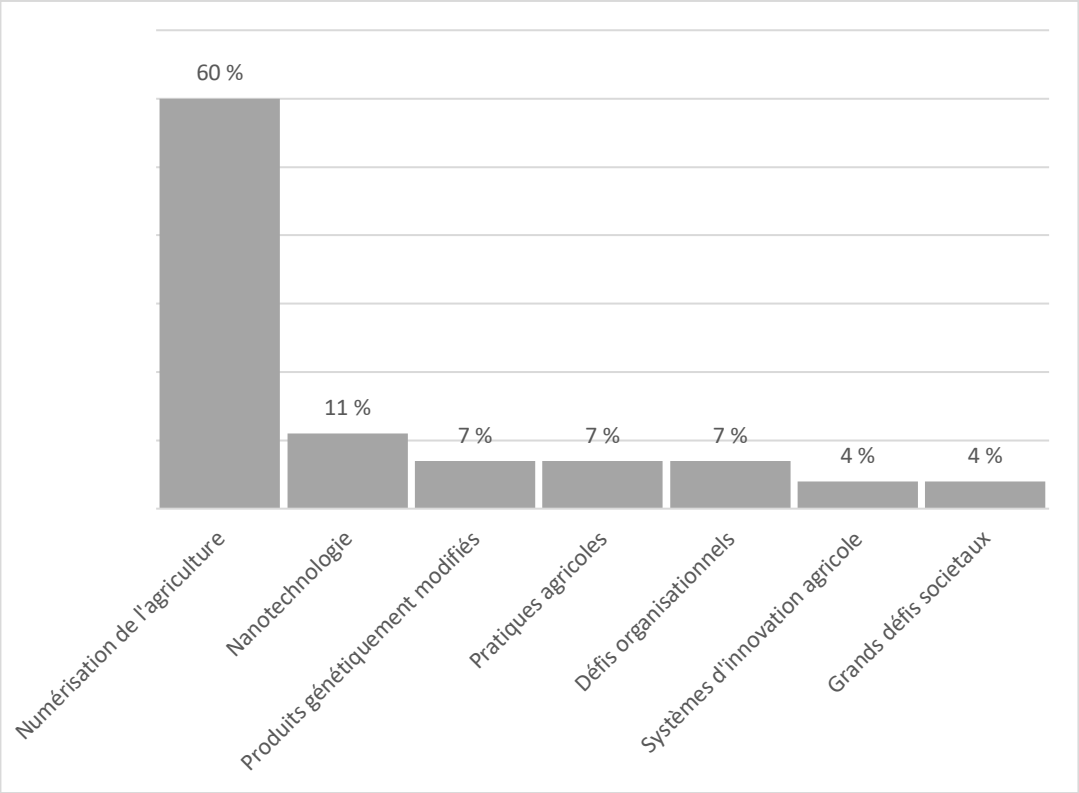
Lors de la préparation de cette revue de la littérature, environ 30 articles publiés entre 2019 et 2022 ont été trouvés. Afin de mieux comprendre les avancées et les lacunes dans cette littérature, nous avons analysé les étapes du système alimentaire abordées par ces articles ainsi que les principaux sujets de recherche de ces études. Cette analyse a permis de constater que plus de 70 % des articles répertoriés se concentrent sur l'étape de la production alimentaire (voir la Figure 1). Les autres étapes du système alimentaire sont peu présentes et très peu d'études ont porté sur le système alimentaire dans son ensemble.

Figure 1. Étape du système alimentaire analysée dans les études



Le sujet de recherche des études est principalement lié à la « transition numérique » ou ses synonymes comme « l'agriculture 4.0 » ou encore la « quatrième révolution agricole » (voir la Figure 2). En effet, très peu d'études se concentrent sur des sujets de recherche liés aux grands défis sociétaux ou aux systèmes d'innovation (4 %).

Figure 2. Sujet de recherche dans les études



La contribution conceptuelle de ces études à la littérature liant RRI et systèmes alimentaires reste limitée. En effet, dans la plupart des études, les quatre principes de l'innovation responsable développés par Stilgoe, Owen, et Macnaghten (2013) sont appliqués comme cadre d'analyse, sans viser une véritable contribution théorique. Dans l'ensemble, ces dimensions processuelles de la responsabilité sont conceptualisées comme un moyen de rendre les innovations ou projets de recherche plus responsables. Le tableau 1 présente un résumé de cette revue de la littérature en expliquant tout d'abord pourquoi la responsabilité est étudiée dans ces articles, comment la responsabilité est interprétée par les auteurs et, finalement, comment ils envisagent la concrétisation de la responsabilité.

Tableau 1. L'application du concept RRI dans la littérature sur le système alimentaire (2019-2022)

Thème	*Pourquoi la responsabilité?*	*Ce qu'est la responsabilité?*	*Comment concrétiser la responsabilité?*
1. La numérisation de l'agriculture	Exploiter le potentiel des technologies numériques à transformer la production de connaissances et les interactions homme-machine Identifier et évaluer les risques potentiels et les conséquences involontaires de la numérisation	Prendre en compte les connaissances des utilisateurs Appliquer la réglementation pour protéger les fermiers des grandes entreprises Avoir un cadre pour soutenir les actions pratiques visant à faire participer diverses parties prenantes au processus de développement technologique	Utiliser des approches participatives dans le développement de technologies (p. ex. "*Living lab*") Promouvoir une autoréflexion et d'une réflexivité permanentes au niveau du chercheur individuel, de l'équipe du projet de recherche et de l'organisme de recherche
2. L'agriculture 4.0	Assurer le partage des avantages de l'agriculture 4.0	Évaluer les impacts potentiels des relations de pouvoir et de la question des transferts potentiels de pouvoir des agriculteurs individuels vers les grandes entreprises S'assurer que l'objectif des développeurs va « au-delà du développement du dernier capteur ou dispositif »	Faire une analyse d'anticipation de la part des chercheurs et des développeurs Adopter une perspective plus globale et prendre en compte le développement de la réglementation, des modèles d'entreprise, des conseils et des capacités
3. La nanotechnologie	Comprendre que l'innovation responsable est contextuelle et doit être adaptée à la nanotechnologie pour la production d'aliments et pour minimiser les risques potentiels et maximiser les avantages pour la société	Développer des produits qui ne nuisent pas à la santé humaine ou à l'environnement Développer des produits efficaces ou efficients S'assurer que les produits répondent à un problème important ou à un besoin sociétal	Appliquer les quatre principes de Stilgoe, Owen et Macnaghten (2013) dans le processus de développement des produits Éduquer la prochaine génération de chercheurs et d'innovateurs Intégrer des systèmes de suivi et d'apprentissage Impliquer les parties prenantes, prendre en compte l'impact sociétal et ne pas se concentrer

			uniquement sur le profit/intérêt personnel
4. Les pratiques agricoles	Savoir que les études sur l'innovation responsable en pratiques agricoles sont très limitées, en particulier dans les contextes des pays en développement	Anticiper la fragmentation des terres et la diversification de l'agriculture Substituer les importations Mettre l'accent sur l'inclusion des ingénieurs, des innovateurs entrepreneurs, des artisans et des utilisateurs finaux Développer des machines produites localement, plus adaptables aux conditions locales biophysiques, et conviviales pour les jeunes et les femmes Susciter une réflexion sur les pratiques, afin de promouvoir l'agriculture écologique Savoir qu'il existe une réactivité aux faibles demandes du marché et aux impacts environnementaux potentiels des grandes machines agricoles	Appliquer les quatre principes de Stilgoe, Owen et Macnaghten (2013) dans le développement de politiques agricoles
5. Les produits génétiquement modifiés (GM)	Augmenter la confiance du public dans la science et l'innovation Réduire les risques d'une réaction sociale négative	Avoir un cadre pour aider à ralentir, voire renverser la tendance à la réduction de confiance de la société envers les décideurs politiques, les scientifiques, les entrepreneurs et les innovateurs	Engager les différentes parties prenantes dans les premières phases du processus d'innovation Communiquer avec les consommateurs, les médias Assurer l'étiquetage des produits génétiquement modifiés (ne pas « tromper » le public)
6. Les défis organisationnels	S'assurer que le résultat de l'innovation soit conforme aux exigences sociales, environnementales et éthiques des parties prenantes	Connaître l'alignement entre l'innovation et les exigences sociales, environnementales et éthiques des parties prenantes	Inclure les parties prenantes aux premiers stades de l'innovation Rendre l'IR attrayante pour les gestionnaires en faisant appel à la tendance des petites et moyennes

			organisations à envisager leurs entreprises comme des agents de changement, en les aidant à intégrer l'IR dans leur histoire entrepreneuriale
7. Technologies de rupture	Contribuer à l'autorisation sociale et l'acceptabilité des technologies émergentes dans le système alimentaire, si ces acteurs ne participent pas à l'innovation responsable, des technologies potentiellement puissantes risquent de ne pas être adoptées	-	Engager les parties prenantes dans le processus de développement d'innovation
8. Systèmes d'innovation agricole	Aligner l'innovation et la politique scientifique sur les valeurs, besoins et attentes de la société civile	Savoir que c'est la cocréation de connaissances et de l'innovation	Utiliser le modèle d'innovation en "matrice" : gouvernement, industrie, université et société civile
9. Défis sociétaux	Savoir que les innovations appliquées à la production alimentaire peuvent avoir des conséquences sociétales négatives, comme la dégradation de l'environnement, un cadre d'innovation responsable permet un débat sur les relations éthiques entre les animaux, l'agriculture et l'alimentation	Implémenter des actions pour la lutte contre l'insécurité alimentaire	Connaître la pression institutionnelle : les organisations tiennent compte des pressions institutionnelles, tant de la société que dans leur propre domaine, pour orienter leurs actions Inviter et encourager les organisations à orienter leurs stratégies commerciales selon des lignes directrices socialement responsables et à mettre en avant des actions durables Implémenter la réactivité : l'adaptabilité aux besoins des parties prenantes, aux valeurs publiques et à tout changement de circonstances.

Cette revue de littérature indique qu'il n'existe pas un cadre de l'innovation responsable spécifique aux systèmes alimentaires. Cette thèse en santé publique mobilise donc comme point d'ancrage théorique la littérature en Innovation responsable en santé (IRS) qui, à son tour, est inspirée de la littérature RRI (Silva et al., 2020, 2018). L'IRS résulte d'un travail systématique pour adapter le RRI aux spécificités du secteur de la santé. L'IRS est définie comme

> « un effort collaboratif dans lequel les parties prenantes s'engagent à clarifier et à respecter un ensemble de principes, de valeurs et d'exigences éthiques, économiques, sociales et environnementales lorsqu'ils conçoivent, financent, produisent, distribuent, utilisent et mettent au rancart des solutions sociotechniques pour répondre aux besoins et aux défis des systèmes de santé de manière pérenne » (Silva et al., 2018 traduction libre, p. 5).

L'IRS considère un ensemble de neuf attributs de responsabilité qui élargissent la compréhension sur les produits, les processus et les organisations qui développent et mettent en place des innovations (voir le Tableau 2) (Silva et al., 2018). Cette perspective offre ainsi des éléments importants pour atteindre les objectifs de cette thèse. Comme l'indique la Figure 3, l'IRS a été utilisée comme cadre de départ qui nous a permis de pousser plus loin des aspects conceptuels, méthodologiques et d'analyse empirique des résultats de ma thèse.

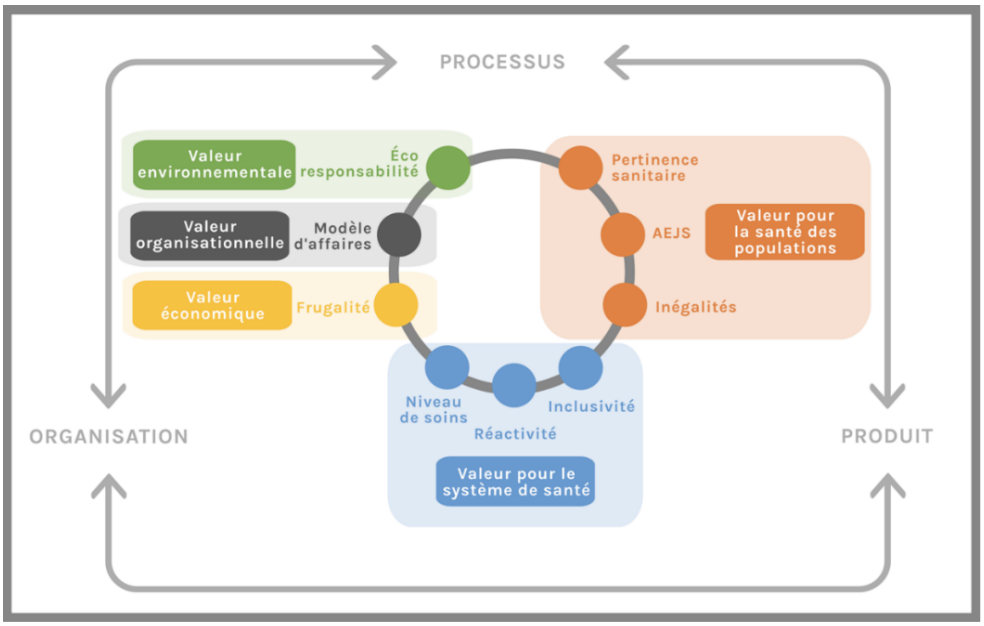
Tableau 2. Les attributs de l'innovation responsable en santé

Attribut	Définition
Pertinence sanitaire	Importance des besoins de santé auxquels l'innovation répond dans le cadre de la charge globale de morbidité, compte tenu des causes de décès, de blessures et d'invalidité et des facteurs de risque associés dans la région où se trouvent les utilisateurs visés.
Aspects éthiques, juridiques et sociaux (AEJS)	Moyens permettant d'atténuer les effets négatifs de l'innovation sur le bien-être moral et socioculturel des individus et des groupes, ainsi que les problèmes juridiques et réglementaires qu'elle soulève.
Inégalités de santé	Mesure selon laquelle l'innovation contribue à la réduction (ou à l'augmentation) des différences évitables d'état de santé entre les individus et les groupes qui sont associées au statut socio-économique, à la position sociale et aux capacités de chacun.
Inclusivité	Degré d'engagement des parties prenantes dans les phases de conception, de développement et de pilotage d'une innovation en utilisant une méthode responsable.

Attribut	Définition
Réactivité	Capacité à fournir des solutions dynamiques aux défis existants et émergents des systèmes de santé (p. ex. les changements démographiques ou épidémiologiques, la prestation de services ou les lacunes en matière de gouvernance).
Niveau de soins	Optimisation de l'intensité du travail en mobilisant l'unité la plus décentralisée du système de santé pour fournir le service lorsqu'il est possible de le faire de manière efficace et sécuritaire.
Frugalité	Fournir une plus grande valeur à un plus grand nombre de personnes en utilisant moins de ressources, ce qui peut impliquer : (i) un prix abordable; (ii) une concentration sur les fonctionnalités de base et la facilité d'utilisation; et (iii) des performances optimisées.
Modèle d'affaires	Propension organisationnelle à fournir plus de valeur aux utilisateurs, aux acheteurs et à la société grâce à un modèle d'entreprise qui soutient : (i) une mission sociale, à but non lucratif ou environnementale; (ii) une innovation librement utilisable ou exploitable; (iii) un système de prix redistributif; (iv) des employés ayant des besoins particuliers; ou (v) le respect de programmes de responsabilité sociale.
Éco-responsabilité	Réduction des impacts environnementaux négatifs tout au long des étapes du cycle de vie de l'innovation : approvisionnement en matières premières, fabrication, distribution, utilisation et élimination.

Source : Silva et al. (2018) et Silva et al. (2021)

Figure 3. Cadre conceptuel de l'IRS



Source : Silva et al. (2018) et infieri.umontreal.ca

La théorie institutionnelle pour comprendre la transition des systèmes alimentaires

Cette thèse s'appuie également sur la théorie institutionnelle parce qu'elle permet d'analyser les dynamiques entre les innovations émergentes et le système dominant. Le Réseau de recherche sur les transitions durables (STRN de l'acronyme en anglais – S*ustainability Transitions Research Network*) affirme qu'un ancrage théorique plus profond dans la théorie institutionnelle est une voie de recherche importante pour « mieux comprendre des processus ou des dimensions particuliers des transitions » (Köhler et al., 2019, traduction libre, p. 10). Plus précisément, l'étude du changement institutionnel dans une perspective néo-institutionnelle est un sujet de recherche prometteur dans la recherche sur les transitions durables (Köhler et al., 2019). L'approche néo-institutionnelle peut saisir les configurations institutionnelles formelles et informelles qui engendrent la pauvreté, l'inégalité et l'exclusion, ainsi que les changements institutionnels associés au développement technologique (Fuenfschilling and Truffer, 2014).

La transition des systèmes alimentaires est ainsi appréhendée comme un changement institutionnel. Le système alimentaire est observé du point de vue d'un champ institutionnalisé, dominé par des organisations et des pratiques consolidées au fil des ans. Toutefois, celui-ci est transformé par l'émergence d'organisations et de pratiques qui s'inscrivent dans des systèmes alimentaires plus responsables. La théorie institutionnelle est puissante et très répandue pour comprendre des phénomènes organisationnels (Scott, 1987; Rouleau, 2007). Cependant, les recherches antérieures sur le changement institutionnel n'ont pas pris en compte l'émergence de nouvelles formes organisationnelles en tant que processus capables d'entraîner des transformations dans les champs institutionnels (Dacin, Goodstein, et Scott 2002).

La théorie institutionnelle renouvelée prend en compte la capacité des individus de changer les « règles du jeu » (Tracey et al., 2011), mais, en se concentrant sur l'aspect social; elle laisse de côté d'autres éléments qui peuvent contribuer aux changements institutionnels comme la matérialité. Afin de tenir compte de ces préoccupations qui sont bien présentes dans les systèmes alimentaires, la littérature sur la socio matérialité sera « imbriquée » à la théorie institutionnelle

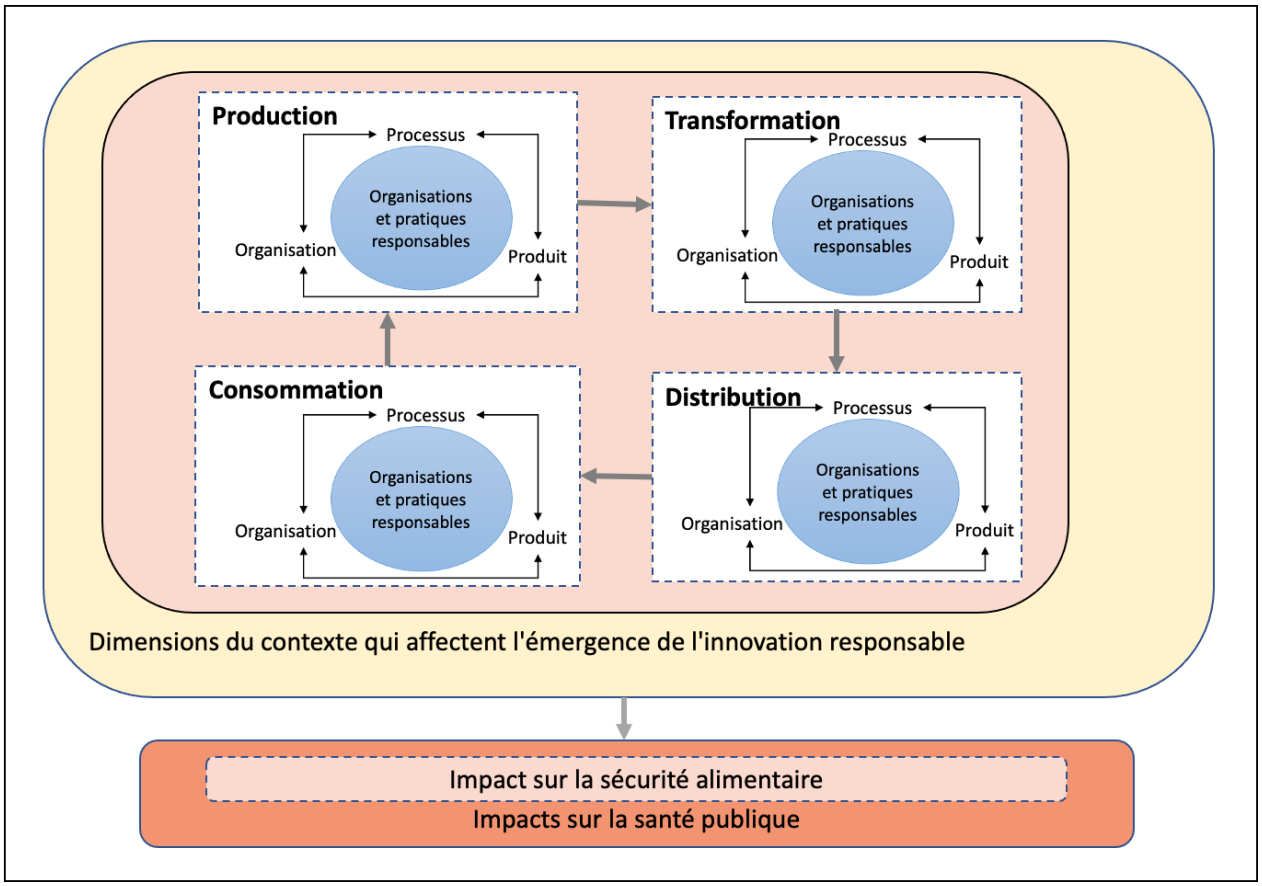
dans le cadre théorique de cette thèse. Il s'agit d'une approche en pleine émergence (Rouleau, 2007; Boxenbaum, Huault, et Leca, 2016;) qui reconnaît que la socio matérialité ne relève pas uniquement de la façon dont la matérialité influence les pratiques humaines, mais que cette dernière est « intrinsèque aux activités et relations quotidiennes » (Orlikowski, et Scott 2008, p. 455). Les aspects matériels sont donc constitutifs d'activités et d'identités et le « social » et le « matériel » sont inséparables (Orlikowski, et Scott 2008). Alors que les institutions sont ancrées dans le monde matériel, les représentations socio matérielles par lesquelles les humains créent, stabilisent et reproduisent les compréhensions et les significations qui influencent les processus institutionnels demeurent peu étudiées (Jones et al., 2017). L'imbrication entre la théorie institutionnelle et la socio-matérialité représente un des « points tournants » dans la recherche appliquant la théorie institutionnelle et s'avère alors une perspective pertinente pour cette thèse (Boxenbaum, Huault, et Leca, 2016).

Cadre conceptuel de la thèse

La Figure 4 présente le cadre conceptuel de la thèse. La décision de créer un cadre conceptuel pour structurer la recherche dans notre thèse plutôt que d'utiliser un cadre existant s'est avérée justifiée vu la nécessité d'imbriquer des concepts interdisciplinaires, comme les systèmes alimentaires, la sécurité alimentaire, l'innovation responsable et la théorie institutionnelle. Ainsi, nous avons développé un cadre conceptuel à partir des concepts mobilisés dans la revue de littérature de la thèse. Le cadre théorique représente le phénomène d'intérêt, soit la façon dont le système alimentaire poursuit sa transition à travers l'émergence d'innovations responsables. Il s'agit d'un cadre ancré dans la théorie institutionnelle parce qu'il s'appuie sur le concept de changement institutionnel (la transition des systèmes alimentaires). Les étapes du système alimentaire représentent le système dominant (le système institutionnalisé) et, à l'intérieur, il est possible d'observer l'émergence d'innovation responsable sous la forme de produits, processus et organisations orientés vers la responsabilité. L'émergence de ces innovations est toutefois soumise à des dimensions contextuelles qui peuvent faciliter ou limiter ce processus. Notre hypothèse dans la thèse est que ces innovations sont susceptibles de transformer le système alimentaire et promouvoir une transition vers des systèmes alimentaires plus favorables à la sécurité alimentaire et à la santé publique en général. Ce cadre permettra à nos travaux

empiriques de répondre aux trois objectifs de cette thèse ainsi que d'atteindre son but global, celui de mieux comprendre la transition des systèmes alimentaires.

Figure 4. Cadre conceptuel de la thèse



Le tableau 3 définit, à partir de la littérature actuelle, les principaux concepts mobilisés dans cette thèse. L'Innovation Responsable dans les Systèmes Alimentaires (IRSA), concept central dans ce travail, sera quant à elle définie de manière itérative et graduelle dans la thèse. Dans le premier article, nous allons plus simplement « signaler » les quelques éléments du cadre de l'IRS qui se dégagent de l'analyse secondaire des données socio-économiques sur les deux systèmes alimentaires (celui du Québec et celui de l'État de São Paulo). Dans le deuxième article, nous allons explorer davantage comment des caractéristiques de l'IRS se manifestent empiriquement dans ces deux systèmes alimentaires. Enfin, dans le troisième article, en nous appuyant sur la

littérature émergente dans le domaine et sur nos analyses empiriques, les lecteurs découvriront la définition suivante de l'IRSA :

> « L'Innovation Responsable dans les Systèmes Alimentaires (IRSA) est une approche collaborative et contextualisée de l'innovation à toutes les étapes du système alimentaire qui intègre les préoccupations des multiples parties prenantes concernant les impacts éthiques, sociaux et environnementaux de ces activités dans le but de relever les défis de sécurité alimentaire de manière durable ».

L'IRSA doit aussi tenir compte de la santé et du bien-être de ceux qui consomment les aliments et de ceux qui les produisent, les transforment et les distribuent (agriculteurs, travailleurs de l'agriculture et de la pêche, employés de la transformation et de la distribution des aliments).

Tableau 3. Concepts mobilisés dans la thèse

Concepts	**Définitions**
Sécurité alimentaire	« La sécurité alimentaire existe lorsque tous les êtres humains ont, à tout moment, un accès physique et économique à une nourriture suffisante, saine et nutritive leur permettant de satisfaire leurs besoins énergétiques et leurs préférences alimentaires pour mener une vie saine et active » (World Food Summit, 1996) Dans la loi brésilienne, la sécurité alimentaire et nutritionnelle consiste à « réaliser le droit de tous à un accès régulier et permanent à une alimentation de qualité, en quantité suffisante, sans compromettre l'accès à d'autres besoins essentiels, sur la base de pratiques alimentaires favorables à la santé, respectueuses de la diversité culturelle et durables sur les plans environnemental, culturel, économique et social » (Brasil, 2006, traduction libre).
Système alimentaire	« L'ensemble des activités qui concourent à la fonction alimentation dans une société donnée, et représente la façon dont les personnes s'organisent pour produire et consommer » des aliments (Malassis, 1994, p. 118).
Transition dans les systèmes alimentaires	Alors que le terme transition réfère au « mouvement de passage d'un état à un autre » (von Braun et al., 2021, traduction libre, p. 749), la notion de transition dans les systèmes alimentaires renvoie à l'idée d'une dissolution de continuité entre « le processus de développement duquel nous partons et l'état de soutenabilité que nous visons » (Lubello et al., 2017, p. 8). Une transition suggère ainsi un changement fondamental dans la structure (les organisations, les institutions), la culture (les normes, le comportement) et les pratiques (les routines, les compétences) des systèmes alimentaires (Grin et al., 2010).
Transition juste des systèmes alimentaires	Le concept de transition « juste » des systèmes alimentaires préconise l'intégration des considérations de justice dans le processus de transition vers des

	systèmes alimentaires plus durables (Kaljonen et al., 2021). Une transition juste repose sur trois formes de justice (Kaljonen et al., 2021): - *Distributive* : la façon dont les ressources matérielles et immatérielles, les dommages et les avantages sont distribués. - *Procédurale* : l'équité dans la participation et la prise de décision dans les processus politiques. - *Reconnaissance* : respect des différentes valeurs socioculturelles dans le débat sociétal, la réglementation et la communication institutionnalisées. La reconnaissance met également en évidence que les acteurs ne sont pas dans la même position de départ en ce qui concerne l'adaptation à la transition.
Innovation	« Résoudre un problème d'une manière nouvelle, en combinant de nouveaux composants, matériaux ou interventions sociales, ou de nouveaux processus de production, de distribution, de commercialisation ou de livraison » (Silva et al., 2021, traduction libre, p. 185). Selon Silva et al. (2021), le caractère novateur d'une innovation doit être considérée dans son contexte d'utilisation.
Responsible Research and Innovation (RRI)	Approche de gouvernance de l'innovation qui appelle les acteurs impliqués à prendre en compte les aspects éthiques et sociaux de l'innovation avec l'idée que, ce faisant, les technologies ne viseront pas seulement à être économiquement rentables, mais aussi plus durables, socialement désirables et éthiquement acceptables (von Schomberg, 2013). Plus précisément, quatre exigences procédurales sont mises de l'avant (Stilgoe et al., 2013) : - L'anticipation des risques, des impacts et des conséquences des innovations; - La réflexivité à l'égard des systèmes de valeurs et des pratiques sociales qui régissent l'innovation; - Des processus de développement inclusifs; - La réactivité des politiques face aux connaissances, aux résultats et aux changements des contextes émergents.
Innovation responsable en santé (IRS)	« Un effort collaboratif dans lequel les parties prenantes s'engagent à clarifier et à respecter un ensemble de principes, de valeurs et d'exigences éthiques, économiques, sociales et environnementales lorsqu'ils conçoivent, financent, produisent, distribuent, utilisent et mettent au rancart des solutions sociotechniques pour répondre aux besoins et aux défis des systèmes de santé de manière pérenne » (Silva et al., 2018 traduction libre, p. 5).
Innovation responsable dans les systèmes alimentaires (IRSA)	Approche collaborative et contextualisée de l'innovation à toutes les étapes du système alimentaire qui intègre les préoccupations des multiples parties prenantes concernant les impacts éthiques, sociaux et environnementaux de ces activités, dans le but de relever les défis de sécurité alimentaire de manière durable. L'IRSA doit aussi tenir compte de la santé et du bien-être de ceux qui consomment les aliments et de ceux qui les produisent, les transforment et les distribuent (agriculteurs, travailleurs de l'agriculture et de la pêche, employés de la transformation et de la distribution des aliments).
Éléments du contexte	Le contexte est conceptualisé dans cette thèse comme « un ensemble de caractéristiques et de circonstances constituées de facteurs actifs et uniques » qui, ensemble, peuvent interagir, influencer, modifier, faciliter ou contraindre l'émergence de la responsabilité dans les systèmes alimentaires (Pfadenhauer et al., 2016, traduction libre, p. 13).

	Les éléments de contexte qui orientent notre analyse sont tirés du cadre des systèmes alimentaires durables du Groupe d'experts de haut niveau sur la sécurité alimentaire et la nutrition (HLPE, 2020) et incluent : Contexte biophysique et environnemental; Technologie, infrastructure et connaissances; Aspects économiques et de marché; Contexte politique et institutionnel; Contexte socioculturel et démographique; Chaîne d'approvisionnement alimentaire; Comportement des consommateurs et régimes alimentaires.
Émergence de la responsabilité	L'émergence de la responsabilité dans cette thèse est définie comme l'émergence d'organisations et de pratiques qui intègrent des caractéristiques d'innovation responsable tant en termes de processus que de résultats. Même si certaines de ces organisations et pratiques ont pris forme au cours des dernières décennies, elles ont joué un rôle marginal dans l'organisation actuelle des systèmes alimentaires. L'émergence de la responsabilité est donc abordée dans cette thèse selon une logique de transition et renvoie à la capacité de telles organisations et pratiques à évoluer et éventuellement occuper une place plus centrale dans les systèmes alimentaires.

Chapitre 3 – Méthode

Ce chapitre décrit les choix méthodologiques qui ont été faits afin de rencontrer les trois objectifs de la thèse et auxquels se rattache chacun des trois articles qui la constituent. Chaque article apporte des détails méthodologiques supplémentaires qui sont spécifiques aux objectifs respectifs des trois articles.

Devis de l'étude

Afin d'atteindre le but de cette thèse, une étude de cas multiple a été retenue comme devis de recherche. L'étude de cas est une méthode de recherche empirique qui permet d'étudier un phénomène en profondeur et dans son contexte réel (Yin, 2018). Ce devis permet d'expliquer, de décrire ou d'explorer des événements ou des phénomènes dans les contextes quotidiens où ils se produisent (Yin, 2018). L'étude de cas s'appuie sur un échantillonnage raisonné selon lequel des cas riches en information sont sélectionnés de manière stratégique et délibérée (Patton, 2002). Les cas riches en information « sont ceux à partir desquels nous pouvons apprendre beaucoup sur les questions d'importance centrale à l'étude » (Patton, 2002, traduction libre, p. 230). Nous clarifions ci-dessous pourquoi les deux cas choisis sont les systèmes alimentaires de la province de Québec (Canada) et de l'État de São Paulo (Brésil).

Les dépenses de santé en augmentation constante sont parmi les principales préoccupations pour le système de santé au Québec. La prévalence croissante de maladies chroniques est un facteur important de cette problématique. Plus spécifiquement, les données probantes sur les liens entre la consommation d'aliments ultra-transformés et les maladies chroniques sont de plus en plus concluantes (Levy et al., 2021; Louzada et al., 2021). L'alimentation de la population au Québec est, en grande partie, composée par des aliments ultra-transformés offerts par un système alimentaire conventionnel (Équiterre, 2005; Moubarac, 2017). En parallèle, il y a un intérêt accru dans la province pour des innovations dans les pratiques alimentaires, notamment la consommation d'aliments locaux (Novae and Les Affaires, 2020; SAM, 2021). À Montréal, la mise en place d'un Conseil des politiques alimentaires (CPA) et du Système alimentaire montréalais (SAM), espace d'échanges et de partage intersectoriel entre différents acteurs, met en évidence

ces efforts (Chahine, 2016; SAM, 2021). Ce scénario de transition fait du système alimentaire du Québec un cas pertinent pour cette thèse.

L'État de São Paulo se révèle également un contexte pertinent pour atteindre le but de cette thèse car il est possible d'y trouver des réalités très différentes et contrastantes quant aux questions alimentaires. Malgré la puissance économique de l'État de São Paulo, l'insécurité alimentaire est encore répandue (IMDS, 2022; Rede PENSSAN, 2022). Par ailleurs, la consommation d'aliments ultra-transformés augmente de plus en plus dans la région du Sud-Est, où se trouve l'État de São Paulo (Levy et al., 2022). São Paulo est aussi un pôle important d'innovation et de recherche au Brésil d'où émergent des initiatives novatrices qui visent à transformer le système alimentaire. Par exemple, des chercheurs de l'Université de São Paulo ont été impliqués dans la mise à jour du guide alimentaire du Brésil, publié en 2014 par le ministère de la Santé. Ce guide est devenu une référence pour les experts en nutrition et pour les autres pays du monde, y compris le Canada (Brasil, 2014). Il offre des repères importants pour favoriser la transition du système alimentaire brésilien.

Sources de données

Pour documenter chaque cas, deux principales sources de donnée qualitatives ont été recueillies et analysées : des entrevues et des documents.

Entrevues en profondeur

Des entrevues semi-structurées en profondeur ont été menées avec l'équipe de direction d'organisations appartenant aux systèmes alimentaires alternatifs (définis plus bas). Les entrevues en profondeur permettent d'explorer des sujets « complexes », comme c'est le cas pour cette thèse (Rubin and Rubin, 2012). Les organisations participantes ont été sélectionnées à partir de deux critères de diversification interne établis en amont. Ces critères comprennent le rôle des organisations dans le système alimentaire ainsi que la portée de leurs activités : pour une ville (micro), pour plus d'une ville (méso), ou pour la province/état (macro). Par exemple, au niveau micro, une organisation peut se charger de l'installation et de la gestion de marchés publics mobiles et fixes pour commercialiser des aliments frais et locaux à des prix justes dans des quartiers à faible revenu. Au niveau méso, une organisation peut faciliter la mise en place de

fermes urbaines dans plusieurs villes dans le but créer des emplois et d'augmenter l'offre de produits frais. Au niveau macro, une organisation peut élaborer et mettre en œuvre des programmes de financement pour inciter des institutions publiques comme des hôpitaux ou des garderies à acheter des aliments locaux. La liste complète qui décrit toutes les organisations participantes se trouve dans le Matériel Supplémentaire de l'article 2 dans le chapitre Résultats. Ces deux critères ont permis d'élaborer une stratégie de documentation similaire entre les cas et d'établir des points de comparaison et de contraste pertinents pour l'analyse des données en vue de l'atteinte des objectifs de la thèse.

La sélection et le recrutement des participants ont été faits par la candidate, avec le soutien de sa directrice de recherche et de l'équipe In Fieri. Tout d'abord, une recherche (via internet et par des informateurs-clé) visant à répertorier les principales organisations appartenant aux systèmes alimentaires alternatifs (SAA) dans les deux régions a été effectuée. Les définitions du concept de SAA varient dans la littérature, mais en général, les organisations qui composent les SAA visent à répondre aux enjeux alimentaires actuels avec moins d'impact sur la communauté et l'environnement. Ceux-ci incluent les pratiques écoresponsables ou plus respectueuses des animaux, des objectifs économiques d'inclusion (femmes, fermes familiales), de consolidation de la demande pour des aliments de qualité, abordable, locaux, etc. L'un des exemples les plus connus de pratiques issues des SAA est celui de l'agriculture soutenue par la communauté (ASC), qui met l'accent sur la solidarité et la collaboration entre producteurs et consommateurs, qui partagent les risques et les avantages de la production afin de soutenir la production locale (Barbieri et al., 2017).

Les organisations retenues sur une liste préliminaire ont été contactées par courriel ou par téléphone (en français, en anglais et en portugais) afin d'évaluer leur intérêt à participer à l'étude. Les participants qui ont accepté d'y contribuer ont été invités à une entrevue en présentiel (principalement pour le Québec, et cela, avant l'émergence de la pandémie de COVID-19) ou par le biais d'une plateforme en ligne, suivant leur préférence (principalement pour São Paulo, et cela, en partie pendant la pandémie) (Tableau 3). Dans la province de Québec, la sélection des participants et la réalisation des entrevues ont eu lieu entre juillet et novembre 2019. Au total, 20 organisations ont été invitées, 5 n'ont pas répondu à l'invitation et 15 ont accepté de

participer. Dans l'État de São Paulo, la sélection et le recrutement des participants ont eu lieu entre février et octobre 2020. Au total, 25 organisations ont reçu une invitation, 2 ont refusé, 8 n'ont pas répondu et 15 ont accepté de participer. Au total, 30 organisations ont été recrutées, 15 dans la province de Québec et 15 dans l'État de São Paulo. Les grilles d'entrevue en français, portugais et anglais utilisées pour la collecte de données se trouvent aux annexes J, K et L de cette thèse. Afin de mieux organiser les données des entrevues nous avons élaboré une fiche descriptive pour chaque organisation, dont modèles sont disponibles aux annexes B et C de la thèse.

Tableau 4. Caractéristiques des participants, nombre et modalité des entrevues

Région	Participant	Structure	Niveau	Rôle dans le système alimentaire*	Nombre d'entrevues	Modalité
Québec	QC-1	Sans but lucratif	Méso	Transformation/Préparation	1	En personne
	QC-2	Coopérative	Macro	Connexion/Échange	1	Téléphone
	QC-3	Sans but lucratif	Méso	Consommation institutionnelle	3	En personne
	QC-4	Sans but lucratif	Micro	Consommation institutionnelle	1	En personne
	QC-5	Sans but lucratif	Macro	Connexion/Échange	1	En personne
	QC-6	Organisation privée	Méso	Production	1	En personne
	QC-7	Sans but lucratif	Micro	Production	1	En personne
	QC-8	Organisation privée	Micro	Production	1	En personne
	QC-9	Organisation gouvernementale	Macro	Plaidoyer/Pouvoir public	1	En personne
	QC-10	Organisation privée	Méso	Distribution	1	En personne
	QC-11	Coopérative	Méso	Production	1	En personne

	QC-12	Sans but lucratif	Méso	Connexion/Échange	1	En personne
	QC-13	Sans but lucratif	Micro	Transformation/ Préparation	1	En personne
	QC-14	Sans but lucratif	Micro	Distribution	1	En personne
	QC-15	Sans but lucratif	Macro	Information/Formation/ Certifications	1	En personne
	SP-1	Sans but lucratif	Méso	Distribution	1	Skype
	SP-2	Sans but lucratif	Méso	Production	1	Skype
	SP-3	Coopérative	Méso	Distribution	1	Zoom
	SP-4	Organisation privée	Micro	Information/Formation/ Certifications	1	Skype
	SP-5	Organisation gouverne-mentale	Macro	Plaidoyer/Pouvoir public	2	WhatsApp
	SP-6	Sans but lucratif	Macro	Distribution	1	Skype
	SP-7	Organisation privée	Micro	Transformation/ Préparation	1	Google meet
São Paulo	SP-8	Organisation privée	Méso	Production	1	Google meet
	SP-9	Sans but lucratif	Macro	Information/Formation/ Certifications	1	Zoom
	SP-10	Sans but lucratif	Micro	Distribution	1	Zoom
	SP-11	Organisation privée	Méso	Production	2	Teams
	SP-12	Organisation privée	Micro	Distribution	1	Zoom
	SP-13	Organisation gouverne-mentale	Méso	Consommation institutionnelle	1	Zoom
	SP-14	Organisation privée	Micro	Production	1	WhatsApp

	SP-15	Sans but lucratif	Méso	Connexion/Échange	1	Zoom

*Comme plusieurs organisations jouent plus d'un rôle dans le système alimentaire, nous avons considéré leur rôle principal comme critère de sélection.

Analyse de documents

Afin de suppléer le contenu des entrevues, cette thèse s'appuie également sur l'analyse de documents. La capacité de trianguler les sources de données est fortement recommandée dans les études de cas afin de mieux développer des « chaînes de données probantes » (Yin, 2018). Ces documents incluent les notes de terrain rédigées par la candidate pendant la réalisation des entrevues, des documents fournis par les participants (décrivant leur organisation, ses innovations ou ses retombées) ainsi que des publications gouvernementales et d'instances sectorielles ou communautaires appartenant aux systèmes alimentaires des deux régions. Ces documents sont particulièrement importants pour l'atteinte des objectifs 1 et 3 de cette thèse. Plus spécifiquement, les publications gouvernementales contiennent des statistiques descriptives essentielles pour caractériser les systèmes alimentaires dans l'article 1. Il s'agit ici d'une utilisation secondaire de données recueillies par une autre source.

Stratégie d'analyse

La stratégie d'analyse pour répondre aux trois objectifs de la thèse est résumée dans le Tableau 4. Chaque objectif fait l'objet d'un article distinct et, pour développer chacun de ces articles, nous avons appliqué les techniques d'analyse propres aux études de cas multiples qui permettaient le mieux de rencontrer l'objectif en question (analyses intra- et inter-cas, croisées et multiniveaux). Globalement, nos analyses ne visaient pas, comme résultat final, à dresser une comparaison directe des deux cas, mais plutôt à faire ressortir les éléments partagés aussi bien que les éléments propres à chacun des systèmes alimentaires.

Tableau 5. Stratégie pour répondre aux trois objectifs de la thèse

Objectif	Sources de données	Analyse des données	Revue
Objectif 1. Caractériser les systèmes alimentaires dans la province de Québec et l'État de São Paulo	• Données socio-économiques rendues disponibles par des sources gouvernementales et non gouvernementales relatives à la production, la transformation et la distribution des aliments • Revue de la littérature sur les différentes étapes du système alimentaire de chaque région	• Analyse secondaire de données produites par d'autres sources • Analyse intra-cas détaillée, suivie d'un résumé inter-cas	*Renewable Agriculture and Food Systems*
Objectif 2. Clarifier comment les contraintes et les opportunités contextuelles affectent l'émergence de la responsabilité dans les systèmes alimentaires	• 34 entrevues semi-structurées auprès de 30 organisations du système alimentaire qui intègrent des caractéristiques de responsabilité au Québec et à São Paulo	• Analyse de cas croisés adoptant une stratégie mixte : déductive-inductive	*Sustainability*
Objectif 3. Analyser les pratiques et les dimensions organisationnelles qui soutiennent la transition vers des systèmes alimentaires plus responsables	• 34 entrevues semi-structurées auprès de 30 organisations du système alimentaire qui intègrent des caractéristiques de responsabilité au Québec et à São Paulo • Notes de terrain, documents	• Analyse de cas croisés adoptant une stratégie mixte : déductive-inductive	*Environmental Innovation and Societal Transitions*

Considérations éthiques de la recherche

Trois comités d'éthique ont approuvé la réalisation de cette thèse : le Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal (certificat 18-126-CERES-D); le Comité d'éthique de la recherche du Centre Hospitalier Universitaire Sainte-Justine (CERSJ) le 20 juin 2019 (certificat 2019-2121); le Comité d'éthique de la recherche du Conseil National de

la Santé du Brésil (certificat 3.979.121). Les trois certificats se trouvent aux annexes D, E et F de cette thèse.

Cette recherche a respecté les principes éthiques de la bienfaisance, du respect de l'autonomie des participants, de la non-malfaisance, de la responsabilité, de l'imputabilité, du respect de la confidentialité et de la protection de la vie privée des personnes. Pour la partie de la recherche qui a impliqué la participation directe des participants humains, un formulaire de consentement a été transmis aux participants (en français, anglais ou en portugais) avec une explication orale et écrite des objectifs de la recherche, des risques et des bénéfices à y participer, ainsi qu'une mention de la possibilité de se retirer en tout temps de la recherche (annexes G, H et I).

Les considérations éthiques de cette thèse comprennent aussi la responsabilité quant à la divulgation des résultats de la thèse aux participants. Pour répondre à la générosité des participants, nous nous sommes engagés à partager les résultats de cette thèse avec eux par l'élaboration d'un rapport. Nous élaborons actuellement ce rapport et il sera envoyé aux participants avant la soutenance de la thèse.

Chapitre 4 – Résultats

Tableau 6. Sommaire des articles

Article 1: Characterizing food systems to better understand their vulnerabilities: A case study in Québec and São Paulo Cet article a été publié dans la revue *Renewable Agriculture and Food Systems* en 2023. Dans cet article nous avons utilisé des données secondaires disponibles pour faire une caractérisation des systèmes alimentaires de la province du Québec et de l'état de São Paulo. **Citation** : Sabio RP, Lehoux P, Rastoin JL (2023). Characterizing food systems to better understand their vulnerabilities: a case study in Québec and São Paulo. Renewable Agriculture and Food Systems 38, e25, 1–11. https://doi.org/10.1017/S1742170523000170
Article 2: How Does Context Contribute to and Constrain the Emergence of Responsible Innovation in Food Systems? Results from a Multiple Case Study Cet article a été publié dans la revue *Sustainability* en 2022. Il utilise des données provenant des entrevues qualitatives avec les 30 organisations participantes de l'étude. Dans cet article, nous analysons les différents éléments contextuels qui contribuent ou limitent l'émergence d'organisations et de pratiques responsables dans les systèmes alimentaires de la province du Québec et de l'état de São Paulo. **Citation:** Sabio R P, Lehoux P. How Does Context Contribute to and Constrain the Emergence of Responsible Innovation in Food Systems? Results from a Multiple Case Study. Sustainability 2022, 14, 7776. https://doi.org/10.3390/su14137776
Article 3: The contribution of Responsible Innovation to food systems transition: Results from a multiple case study Cet article a été soumis à la revue *Environmental Innovation and Societal Transitions*. Il vise à analyser comment l'innovation responsable transforme les différentes étapes du système alimentaire et contribue à la transition vers des systèmes alimentaires plus durables et favorables à la santé.

Contribution aux articles: En tant que première auteure de chacun de ces articles, mon rôle a consisté à établir la méthodologie et à concevoir les instruments de collecte des données, faire la collecte de données, à traiter et à analyser les données, ainsi qu'à rédiger chaque manuscrit. Mes coauteurs pour chaque article m'ont apporté un soutien essentiel dans la définition des objectifs de la recherche et des méthodes d'analyses et dans l'interprétation des résultats, en révisant chaque manuscrit et en fournissant des conseils généraux. Au-delà de ces contributions, ma directrice de recherche Pascale Lehoux a fourni une supervision généreuse dans toutes les étapes de rédaction de chaque manuscrit.

Article 1: Characterizing food systems to better understand their vulnerabilities: A case study in Québec and São Paulo

Statut de publication : Publié dans la revue Renewable Agriculture and Food Systems

Coauthors	Affiliation	Autorization
Professor Pascale Lehoux	Department of Health Management, Evaluation and Policy. Université de Montréal - École de santé publique - 7101 avenue du parc, 3e étage - H3N 1X9 Montréal, Canada	Obtained
Professor Emeritus Jean-Louis Rastoin	Montpellier SupAgro, Member of the French Academy of Agriculture, founder, and scientific advisor of the UNESCO Chair in "Food for the World" - 2 Place Pierre Viala - 34060 Montpellier, France	Obtained

Abstract

Characterizing food systems, i.e., describing their organizational features, can help to generate a better understanding of the structural vulnerabilities that constrain a transition towards sustainable food security. However, their characterization across different economic contexts remains challenging. In this paper, by linking key concepts from research on food regimes, food system vulnerabilities, and responsible innovation, we aim to characterize food systems in a developing and a developed economy to identify their shared vulnerabilities. We applied a case study design to characterize food production, processing, and distribution in the province of Québec (Canada) and in the state of São Paulo (Brazil). In both territories, the processing and distribution stages have a higher economic predominance when compared to the agricultural production stage. Furthermore, we observed a concentration in a few activities in both food systems, with a focus on export-oriented supply chains. Vulnerabilities in both food systems include: (1) increased interdependence because some supply chains are export-oriented or

depend on foreign labor and are, therefore, exposed to external risks; (2) concentration in a few activities, which creates a threat to present and future local food diversity; and (3) unequal power relations, making small and medium players vulnerable to decisions made by big players. The characterization developed in this study shows that the two food systems are mainly pursuing an economic goal, following the institutional logics of the neoliberal food regime, which are not necessarily aligned with food security goals. It also exposes the presence of characteristics of responsibility that may eventually help overcome food systems' vulnerabilities and support a transition toward sustainability.

Introduction

Food systems in most established and emerging economies are highly industrialized (IPES-Food, 2016) because of the globalization of agricultural activities and the many technological advances developed throughout the past decades. Despite these advances, industrial food systems still fail to fulfill one of their most important societal goals: achieving sustainable food security (FAO, IFAD, UNICEF, WFP and WHO, 2020; von Braun et al., 2021). Several researchers have argued that current industrial food systems are not able to achieve this goal (Bezerra et al., 2019; de Schutter, 2014; IPES-Food, 2016; Touzard, 2016; Willet et al, 2019) and show vulnerabilities that threaten present and future food security (Moragues-Faus, Sonnino, Marsden, 2017; Paloviita et al., 2016). Food systems scholars are indeed called to generate a better understanding of the renewability and resilience of food systems (Swisher et al., 2018). The onset of the COVID-19 pandemic has certainly brought to light the close relationships between food security and the vulnerabilities of current food provision. For Paloviita et al. (2016), vulnerabilities refer to both environmental and social factors. Such vulnerabilities include, for instance, increased interdependencies, power imbalances, and low institutional capacities (Moragues-Faus et al., 2017).

Identifying food system vulnerabilities is a crucial step towards developing public policies and more responsible food production practices to address these vulnerabilities. This can be achieved by characterizing the structure and dynamics of food systems (Moragues-Faus et al., 2017; Rastoin and Ghersi, 2010). To contribute to this emerging literature, we aim to characterize food systems in a developing and a developed economy to identify their shared vulnerabilities and

discuss policy implications. To do so, we establish linkages between research on food regimes, food system vulnerabilities, and responsible innovation. In this paper, the term characterization is used to describe how food system activities are organized in a given geographic location (Rastoin and Ghersi, 2010). Characterizing food systems across different economic contexts is challenging but likely to prove very informative because the literature on food regimes indicates that globalized food systems tend to share similarities (Friedmann, 1995). While applying a similar characterization process that can expose food systems' shared vulnerabilities, we conducted a multiple case study design in the Canadian province of Québec, a developed economy, and in the Brazilian state of São Paulo, a developing economy. We selected these two cases to increase the feasibility of our study as well as the robustness and transferability of our findings.

Below, we clarify the connections between food security, food regimes, and responsible innovation and then describe our methodology, which relied on secondary data analyses of governmental and non-governmental reports and a contextual literature review. In the results section, we present our characterization of the Québec and São Paulo food systems, including an across case summary of their main structure and dynamics. In the discussion section, we analyze three categories of shared vulnerabilities that emerged from their characterization. We conclude with the main contribution of this study, which lies with an in-depth understanding of shared vulnerabilities across food systems from different economic contexts and with some elements of responsibility that may offer counterpoints to the current neoliberal food regime.

Theoretical background of the study

Food security

A food system is defined as "an interdependent network of actors, located in a given geographical area and participating directly or indirectly in the creation of flows of goods and services oriented towards satisfying the food needs of one or more groups of consumers locally or outside the area under consideration" (Rastoin and Ghersi, 2010, p. 19 own translation). This definition highlights the interdependence between regions and the globalized nature of food systems by emphasizing a supply-side perspective. On the demand-side, the Food and Agricultural Organization's (FAO) definition of food security emphasizes a consumer's perspective (FAO, 2006) and states that food

security is met when “all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (World Food Summit, 1996). This definition includes four dimensions: food availability, access, utilization, and stability (FAO, 2006). In this paper, we focus on the “availability” dimension, which refers to the ability of a food system to provide “sufficient quantities of food of appropriate quality, supplied through domestic production or imports” (FAO, 2006). This dimension is well aligned with the aim of our study and offers a relevant and original lens to characterize food systems, identify their vulnerabilities, and discuss societal responsibility concerns (which are further defined below).

The globalized nature of food systems, highlighted in the definition of Rastoin and Ghersi (2010) and in the FAO’s definition of food security (2006), fosters a reflection about local food sovereignty versus food systems as a globalized economic activity. However, the role of food systems has only been recently discussed by policy-makers, even though scholars had previously called for sustainable and resilient local food systems (FAO, IFAD, UNICEF, WFP et WHO, 2018; IPES-Food, 2016; Willet and et al, 2019). The COVID-19 pandemic highlighted how fragile food systems and food security can be (Fontoura, 2021; La Presse canadienne, 2020; Rede PENSSAN, 2021) and reinforced the importance of creating linkages between these two concepts. Therefore, one conceptual premise of this study is to recognize that food systems are more than an economic activity as they play a central role in fulfilling local food security. The dynamics of food systems can be better understood under the light of the food regimes literature.

Food regimes

The literature on food regimes helps situate the Canadian and Brazilian food systems we are characterizing within a historical context and can inform policy directions to foster the emergence of a new food regime. A food regime is a “rule-governed structure of production and consumption on a world scale” (Friedmann, 1993, p. 30-31). According to Magnan (2012), stable food regimes emerge “when key actors —farmers, consumers, states, and capital— agree on

implicit rules tying them into predictable relations of food production, consumption and trade" (p. 3).

So far, the literature on food regimes has described three dominant regimes in history. The first food regime described in the literature is the 'settler-colonial regime' (1870-1914), led by Britain with its policy of 'cheap food'. Second, there was the 'surplus regime' (1945-1973), led by the United States of America which, "under the umbrella of food aid programs, invaded their informal empire of postcolonial states with their food surpluses" (Sodano, 2019, p. 5). Lastly, there is the 'neoliberal regime' (1980s-present), also referred to as 'food from nowhere' or 'corporate food regime,' where the "hegemonic powers are no longer nation states but large transnational companies controlling the global food chains" (Sodano, 2019, p. 5).

The main characteristics of the neoliberal food regime include: 1) increased corporate power at the manufacturer and retail level; 2) division of labor based on the features of global commodity chains; 3) market differentiation with low-quality mass products alongside high-tech/high-quality rich products; 4) new technologies and intellectual property rights as the new frontiers for profit extraction; and 5) accelerated depletion of natural resources (Garnett, 2008; Shiva, 2008; Sodano, 2012).

Food system activities are means of capital accumulation and domination in the neoliberal food regime. However, this has been the case since the first food regime, when the reorganization of agriculture undermined the goals of food security or the preservation of communities and replaced them by economic goals (Friedmann and McMichael, 1989). Aligned with this perspective, Moragues-Faus et al. (2017) identified several structural vulnerabilities of the present European food system: 1) a lack of coordination and integration to achieve long-term food security goals; 2) an excessive interdependence among food systems; 3) power imbalances among food system actors; 4) the dominance of a non-cooperative, outdated, segmented, and incoherent institutional framework leading to "low institutional capacity" to address food security issues in a coordinated way; 5) "unequal rights and entitlements in the food system, linked to poverty, inequality, social exclusion and unemployment" (p. 191), which constrain certain actors' access to resources; and 6) conflicting values and interpretations of food security,

which constrain the development of a unified policy vision that "ensures and delivers food as a human right" (Moragues-Faus et al., 2017, p. 191).

While changes in the balance of power have been the main reason for food regimes' transitions in the past, it is still not clear what will bring the present neoliberal regime to its "turning point" (Sodano, 2019). One of the possibilities pointed out by Sodano (2019) refers to the rise or re-emergence of alternative and innovative practices in food systems, such as grassroots movements, organic and biodynamic agriculture, and short supply-chains. This is where the literature on responsible innovation can be helpful.

Responsible innovation

The literature on responsible innovation can help us observe whether the characterization of the two food systems under study contains innovative responsibility-oriented practices and whether the latter can potentially address food system vulnerabilities. The policy-oriented field of research called Responsible Research and Innovation (RRI) was developed to tackle major societal challenges, such as the United Nations' Sustainable Development Goals (SDGs) (Blok and Lemmens, 2015; Inigo and Blok, 2019). RRI entails a forward-looking reflection about the "ethical acceptability, sustainability and societal desirability" of the processes and outcomes of innovation (von Schomberg, 2011). Responsibility in food systems may take various forms (e.g., organic certification, short supply chains, family farmers, cooperatives), but generally include practices that seek to address societal challenges (Silva et al., 2018). RRI points to the economic, social, and environmental impacts of new technologies and, more importantly, it stresses the very purpose of technological innovation, which should serve the greater good. For instance, the Responsible Innovation in Health (RIH) framework draws on the RRI literature and seeks to make health systems more equitable and sustainable by fostering the development of innovations that offer more value to society. According to Silva et al. (2018), RIH "consists of a collaborative endeavour wherein stakeholders are committed to clarify and meet a set of ethical, economic, social and environmental principles" (p. 5) to address the needs and challenges of health systems in a sustainable way. As indicated above, in the case of food systems, the neoliberal food regime relies heavily on technologies that serve corporate goals, tends to concentrate power in a few large agri-food companies, and exacerbates food system vulnerabilities. Hence, inspired by RIH's

aim, we posit in this paper that food security is a societal end (as well as a common good) that food systems should be geared to deliver. Overall, we draw on these linkages between research on food regimes, food system vulnerabilities, and responsible innovation to characterize food systems in two different economic contexts.

Methodology

Study design

We adopted a multiple case study design in the province of Québec (Canada) and in the state of São Paulo (Brazil). Both regions are comparable from a policy standpoint as they are influenced by federal government-level policies but have considerable autonomy over food and agricultural issues. Québec has a globalized food supply, but its population is increasingly interested in understanding and improving food autonomy in the province (Mundler, 2020). São Paulo is a major food producer, playing an important role in the international supply for certain food products. More detailed information about the food systems of the two cases is provided in the results section and as supplementary material.

A case study design in two different contexts is likely to increase the robustness of the results because it can reveal structural elements and dynamics that are shared across them and thus likely to be found elsewhere (Gioia et al., 2013). We followed the classification of the World Economic Situation and Prospects (WESP), which classifies countries according to their economic conditions. In this classification, Canada is described as a developed economy and Brazil as a developing economy (World Economic Situation and Prospects, 2021). Likewise, the classification of the United Nations Conference on Trade and Development (UNCTAD) defines Canada as a developed region and Brazil as a developing region (United Nations Conference on Trade and Development, 2021). These regions face different food security challenges and possess different innovation capacities, offering empirical variations that can enrich our findings. Québec is the second largest Canadian province and accounts for about 20 % of the country's Gross Domestic Product (GDP) (Statistics Canada, 2023). The proportion of food insecure households in the province is 7,5 % (Institut national de santé publique du Québec, 2019). São Paulo is the most economically developed Brazilian state, accounting for about 30 % of its GDP (Fundação Seade,

2020; IBGE, 2020). While the economic growth of São Paulo in the past decades has contributed to the reduction of food access problems, there are large social inequalities, with areas of high living standards and others of extreme poverty (Munhoz, 2010).

Data collection

We focused our data collection on food production, processing, and distribution, as described by Rastoin and Ghersi (2010). Using the province/state as our unit of analysis, we sought data from governmental and non-governmental sources. Our search yielded data on food production, processing, and distribution, including international exchange. The variables we aimed to systematically document include, for instance, the production value, the portion of GDP generated by each activity, the number of jobs, and the number of agricultural establishments and companies. In Québec, the main source of data was the Ministry of Agriculture, Fisheries, and Food (MAPAQ is the French acronym). In São Paulo, we relied on statistics from the Brazilian Institute of Geography and Statistics, the Institute of Agricultural Economics, as well as reports elaborated by the Center for Advanced Studies on Applied Economics.

We used the year 2017 as a baseline because it provided us with the most recent and complete information for both cases. When specific data were not available for 2017, we used the closest year. To identify each region's specificities, we complemented the secondary data collection with contextual narrative findings. To this end, we conducted a literature review on the two food systems.

Data analysis

The analytical strategy involved performing a detailed within-case analysis, followed by an across-case summary. The documents were analyzed following a "narrative review" methodology, which is "a form of storytelling" (Popay et al., 2006, p. 5) that relies on the use of text to interpret, summarize, and explain the evidence (Dixon-Woods et al., 2004). We analyzed data pertaining to each case to identify the overall structure and dynamics of each food system. This characterization is showed in the results, but more detailed information can be found in supplementary material. Following the characterization, we conducted an analysis of the vulnerabilities documented in the two food systems. Vulnerabilities are defined as food system

characteristics that pose a potential negative impact if challenges arise (Moragues-Faus et al., 2017; Paloviita et al., 2016). To inform our empirical analyses, we used the work of Moragues-Faus et al., (2017) who adopted a holistic perspective and identified a series of food system vulnerabilities. As food systems worldwide have been following similar paths (IPES-Food, 2016), it was likely that similar vulnerabilities were also present in the Québec and São Paulo food systems. In the final step of our data analysis, we identified indicators of responsible innovation by drawing from the RIH framework (Silva et al., 2018). A description of its nine responsibility attributes is available in supplementary material (Health relevance; Ethical, legal, and social issues; Health inequalities; Inclusiveness; Responsiveness; Level and intensity of care; Frugality; Business model; Eco-responsibility). Because the literature specific to responsible innovation in food systems still lacks a clear framework, we relied on the RIH attributes that were more pertinent to our study to identify signs of responsible innovation in food systems. For instance, we qualified organic production as a sign of responsibility because it meets the RIH attribute of eco-responsibility, which refers to the "reduction of negative environmental impacts along the innovations' lifecycle stages" (Silva et al., 2021, p. 185). Likewise, family farms reflect the business model attribute, which refers to the components through which an organization creates, delivers and captures social and economic value for society (Silva et al., 2021).

Results

An overview of the two food systems

The two food systems under study possessed key characteristics of a neoliberal food regime, which are summarized in Table 1. Altogether, food production, processing, and distribution accounted for almost 8 % of the GDP and 12 % of all jobs in Québec (Québec, 2019). The economic distribution of these three components followed the logic of industrialized food systems (Table 1). This means that the stage of distribution was the most economically preponderant component of the food system, followed by processing and, lastly, by the stage of production (Québec, 2019).

Our characterization of the São Paulo food system revealed a strong presence of agri-food complexes, represented by coordinated chains composed of "large processing companies," the

most predominant being the industries of sugar, orange juice, and coffee (Saes et al., 2019). About 12 % of the São Paulo state's GDP resulted from the activities of food production, processing, and distribution (CEPEA, 2019). São Paulo's food system was centred on processing and distribution compared to production, reflecting the industrial profile of the state's food system and differing from other Brazilian states (Sachs, 2017; Seade, 2019)[2]. The food system provided close to 15% of the formal jobs in the state (Barros et al., s/d).

Tableau 7. (Table 1 from paper 1) Gross domestic product (%) and job distribution (%) at each stage of the food systems of Québec and São Paulo in 2017

FOOD SYSTEM STAGE		PCT OF FOOD SYSTEM GDP		PCT OF THE NUMBER OF JOBS GENERATED	
		QC	SP	QC	SP
PRODUCTION	Crop and livestock farming	16 %	11 %		
	Agricultural support activities	1 %	5 %	12 %	18 %
	Total	17 %	16 %		
PROCESSING	Total	33 %	41 %	14 %	35 %
DISTRIBUTION	Total	51 %	43 %	74 %	47 %

Adapted from: Québec (2019), CEPEA (2017), Barros et al. (2019)

Production

In ***Québec***, the production stage was characterized by a loosely coordinated balance between the internal and external demand. While some products were governed by internal demand (it was the case for milk, eggs, and poultry) and produced under supply management policies that

[2] São Paulo has played a leadership role in the evolution of food production in Brazil. It was only after the 1960s that agricultural production spread throughout the country. Before that, it was mainly concentrated in São Paulo. The expansion of coffee production in the state in the latter part of the nineteenth century transformed the state "from a cattle-raising area to one of the wealthiest and most dynamic areas of the country" (Missiaen and Ruff, 1975, p. 60). Later, the 1929 economic crisis followed by a coffee crisis in 1930 had a negative impact on coffee production, so farmers started to diversify to produce commodities such as sugarcane and beef, currently two of the most important productions in the state.

match production to domestic demand (Heminthavong, 2018), others followed the external demand. For instance, pork production was four times bigger than the internal demand and oriented toward exports (Mundler, 2020). Even though the production of cereals and pulses was significant (represented 15% of the total production value), most of it was intended for animal feed and ethanol production. Consequently, the province met less than 10% of its domestic demand for cereals and pulses for human consumption (Mundler, 2020). Another characteristic of this food system component was the dependence on foreign labor. From the total of jobs generated in the agricultural sector more than 20 % was fulfilled by foreign workers, mostly from Mexico and Guatemala (Statistics Canada, 2018a, 2018b) . Finally, we found that Québec had the largest number of farms with organic certification in Canada. Keable (2018), who developed a general portrait of organic farming in Canada using the Agricultural Census, found that about 4 % of Québec farms were certified for organic production, while only 2 % of farms in other Canadian provinces had such certification.

Production in ***São Paulo*** was concentrated on sugarcane (41 % of the agricultural production value), produced for the alcohol and sugar industries and for domestic and international markets. Using data from the Brazilian Institute of Geography and Statistics, Silva et al. (2015) analyzed the size and composition of agribusiness in São Paulo and found that the production of sugarcane covered close to 67 % of the cultivated area in the state. Drawing on complementary data from the Institute of Agricultural Economics, we found that cattle breeding and the production of oranges for the beverage industry were also important activities (12 % and 6 % of the production value, respectively). About 70 % of Brazil's orange production was concentrated in São Paulo, which presently remains the main world producer of this fruit[i] (Buainain et al., 2019; Neves et al., 2010). Another characteristic of the production stage was the important participation of family farms[3], which represented 65 % of all the agricultural establishments[4] in São Paulo. However,

[3] Oranges are grown on farms of independent growers as well as large-sized farms that belong to companies that produce and export orange juice (Boteon et al., 2013).

[4] "Every production/exploitation unit dedicated, totally or partially, to agricultural, forestry and aquaculture activities, regardless of its size, legal form (if it belongs to a producer, several producers, a company, a group of companies, etc.), or location (urban or rural area), with the objective of production, either for sale (marketing the production) or for subsistence (sustenance of the producer or his family)" (IBGE, 2017, p. 38 own translation).

they contributed only 13 % of the agricultural production value in the state, highlighting the state's agrarian structure, i.e., the way in which agricultural properties are distributed and organized in a territory. According to data from the Agricultural Census, properties larger than 100 hectares represented only 13 % of the total number of agricultural establishments in São Paulo but used 80 % of the farming area, underscoring the concentration of large properties in the state. Organic production represented 2,6 % of all agricultural establishments[5], which was higher than the Brazilian average of 1,3 % (IBGE, 2019).

Processing

Food processing[6] was one of ***Québec's*** main economic activities and the leading employer in the province's manufacturing sector (Lacharité, 2017). We found that food processing was concentrated around the meat and dairy industries, which represented more than 40 % of the income generated at this stage. Food processing in Québec was characterized by a strong presence of small- and medium-sized companies (MAPAQ, 2016), including cooperatives, differing from the other Canadian provinces, where the "presence of foreign multinationals" was stronger (Gouvernement du Québec, 2016). Nonetheless, we found that approximately 70 % of processed food sales in Québec were made by the 30 largest companies present in the province – including local, national, as well as European and American multinationals (Gouvernement du Québec, 2016).

Brazil's most important food processing companies were part of the ***São Paulo*** food system: 30% of the country's gross value of food industries was concentrated in the state. A significant part of the food processed in São Paulo came from other parts of the country and were then consumed locally or in other parts of Brazil, or still exported to other countries (Silva et al., 2015). Food processing in São Paulo was characterized by "strictly coordinated chains" (Saes et al., 2019)

[5] According to 2006 data, only 6% of agricultural establishments involved in organic agriculture had a certification for organic production. Thus, we can infer that, in the 2017 data, just a small percentage of agricultural establishments that rely on organic agriculture have certification.

[6] The analysis of food processing in Québec includes the beverage and tobacco industries, following the same methodology of the MAPAQ reports.

composed of large companies, specially the sugar, meat products, starch and animal feed, and orange juice (Chaddad, 2016; IBGE, 2019).

Distribution

Our findings showed that 45% of the food produced in ***Québec*** was sold to consumers within the province, 23% was sold to other Canadian provinces, and 32 % was sold to other countries, mainly the United States of America (MAPAQ, 2016). Likewise, the food available for the population of Québec originated from the province, but also from other Canadian provinces and other countries. This food system reflected the logic of integrated markets, where both exports and imports of food play an important role (Riopel, 2020). As for the distribution channels, two-thirds of food sales (almost $ 26 billion) went through retail outlets and almost one-third ($ 14 billion) through food services (Gouvernement du Québec, 2016). An increasing part of food sales was made through alternative distribution channels, which included short-circuit markets (MAPAQ, 2016) as well as zero waste food stores (MAPAQ, n.d.). For instance, using data from the Agricultural Census, Boudreau (2018) concluded that close to one in five farms sold directly (in part or entirely) to the consumer in the province, especially for products such as vegetables, fruits, or maple products. However, alternative distribution channels were still limited, representing 2.5 % of the food distributed across the province (Gouvernement du Québec, 2016).

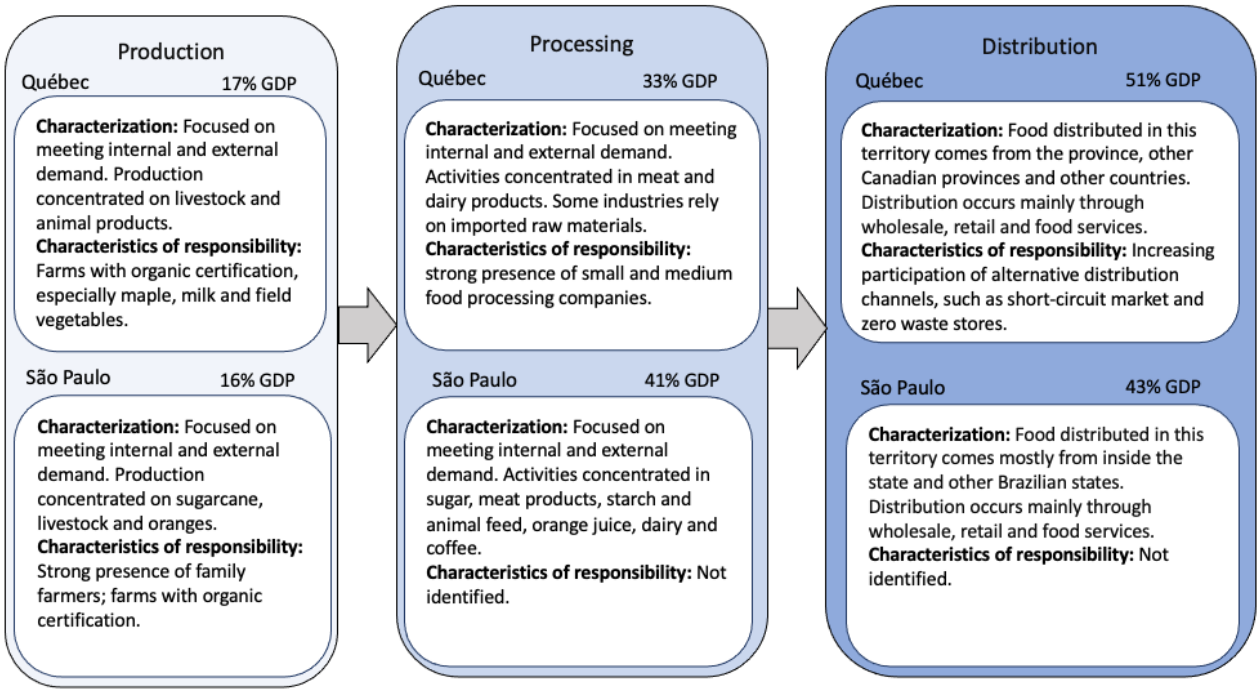
When it comes to food distribution in ***São Paulo***, our results showed that food products that dominate production and processing were clearly export-oriented chains, such as sugar and orange juice. We did not find enough information about the origin of the food distributed across the state. Yet, the types of food imported and the lower volumes of imports when compared to exports (exports are four times bigger than imports) suggest that food available in this region originated mostly from inside the state as well as from other Brazilian states (Ministry of Industry, Foreign Trade and Service, 2019). Furthermore, some narrative findings supported this hypothesis. For instance, researchers from the Instituto Escolhas (2020) who used secondary data to analyze the food system of the São Paulo metropolitan region found that 42 % of the fruits, 73 % of the vegetables, and 96 % of the greens sold at the largest supply center for fresh food in Latin America (Entreposto Terminal São Paulo) originated from the state of São Paulo.

Across case summary of the food systems of Québec and São Paulo

Figure 1 presents an across case summary of the Québec and São Paulo food systems. First, our characterization of these food systems highlighted common aspects of a neoliberal food regime. In both territories, we observed a higher economic preponderance of the processing and distribution stages when compared to the agricultural production stage, a typical pattern of industrialized food systems. Furthermore, both food systems focused on a few activities, with a particular focus on export-oriented supply chains. Each of these food systems also had particularities. While the food system of Québec reflected the logic of globally integrated markets, relying on both exports and imports, the available data did not allow us to conclude the same about São Paulo. Based on the available information, the food system of São Paulo was structured as an international food supplier because it exported much more than it imported. As we explain below, our characterization of both food systems points to shared vulnerabilities that deserve policy attention because they affect food security.

Second, in both food systems, we observed characteristics of responsible innovation. As defined previously, responsibility refers to the presence of alternative or new practices or organizations that aim to tackle societal challenges, such as climate change, poverty, and food security. In the province of Québec, we found indicators of responsibility, including farms with organic certification in an average that is higher than the Canadian average; a strong presence of small- and medium-sized companies in the processing stage; and, finally, increasing food sales through alternative distribution channels or directly from farmers to consumers. In São Paulo, the most relevant signs of responsibility that we found included: the strong presence of family farmers, as well as the existence of farms with organic certification in an average higher than the country's average. Though these elements of responsibility may remain marginal within a neoliberal food regime, they offer potential avenues to support food systems transition. Nevertheless, it is important to point out that even though these elements may indicate the presence of responsible innovation, our data cannot ascertain whether the actors leading such practices were following responsibility principles.

Figure 5. (Figure 1 from paper 1) Characterization of the food systems of Québec and São Paulo



From: Prepared by the authors

Discussion

Food systems vulnerabilities and their likely consequences on food security

The characterization developed in this study showed two food systems from different economic contexts ruled by the neoliberal food regime, as power was held by a few key actors. The analysis also exposed the presence of vulnerabilities that can constrain the ability to transition towards sustainable food security (Moragues-Faus et al., 2017; Paloviita et al., 2016). We found three main categories of vulnerabilities that are summarized in Table 2.

The first category is called ***increased interdependencies*** and it refers to structural vulnerabilities that arise when food systems rely heavily on the external context. In both food systems, we observed a strong presence of export-oriented supply chains. These activities were among the most economically important for the food systems of these territories. In São Paulo, the supply chains of sugar, orange juice, soybeans, beef, and coffee were notable examples as they relied

heavily on international demand. In Québec, the pork industry was devoted to the international market. For instance, Québec produced four times its domestic demand for hogs but only 10% of its demand for cereals and pulses for human consumption (Mundler, 2020). International food trade is mostly based on an economic logic that does not take into consideration food security issues. Because these market dynamics affect food production practices, they can negatively impact the availability of food (Coalition for agriculture and food exception, 2020; Gerbet, 2019). According to Kummu et al. (2020), the diversity of food production seems to have decreased in "major exporting countries" in recent years, creating vulnerabilities and dependencies "for both exporters and importers alike" (p. 9). We also observed the presence of this vulnerability in the reliance on foreign workers for the production of fruits and vegetables in Québec, which makes this food system vulnerable to external context risks. This was clearly observed in 2020 at the onset of the COVID-19 pandemic when border closures in Canada destabilized growers in Québec, resulting in production losses because of the lack of workforce (Cameron, 2020; Lauzon, 2020; Riopel, 2020).

The second category of vulnerabilities is the ***low diversity in terms of economic importance*** category, and it refers to the economic concentration of food systems activities on a few products. This is a vulnerability because it encourages producers, processors, and distributors to increasingly concentrate their activities. In the food systems of both territories, we observed a concentration of activities in a few products in the production and processing stages. This concentration was notably observed in the export-oriented chains. While in Québec the production of livestock and animal products contributed to more than 50 % of the agricultural production value, sugarcane represented 41% of the agricultural production value in São Paulo and occupied 67 % of the cultivated area. According to Gómez et al., (2013), a high degree of diversity in the food system can facilitate "increased dietary diversity and better nutrition" (p. 16). Fraser et al. (2005) argue that food systems relying on highly productive monocultures are considered vulnerable because future disturbances in such food systems "may cause significant collapses" (p. 473). For Aguiar and Souza (2014), the concentration of food production in a few supply chains negatively affects local food systems, for instance, by reducing their capacity to produce other varieties of food as well as increasing stress on ecosystems. Therefore, even

though a variety of other products was found in both regions, the low diversity in economic importance encouraged the focus on some activities and, consequently, may result in lower local food diversity.

The third category refers to ***unequal power relations***. This structural vulnerability concerns the differences of power between small and big players in the food system. It is considered a vulnerability because it hinders the ability of small growers and companies to participate in decision-making, making them vulnerable to the decisions of bigger and more influential players. We found evidence of this vulnerability in both food systems. In Québec, even though there was an important number of small- and medium-sized food enterprises, the majority of food sales were made by the largest companies in the province. In São Paulo, family farms represented the majority of agricultural establishments, but contributed only a small portion of the gross agricultural value (13 %). Thus, even though small farms play a key role as "the combination of food self-provisioning and income provision contributes to food availability and access", these discrepancies in economic participation then translate into unequal power relations in the food supply chain (Galli et al., 2020, p. 49). Differences in power relations can create vulnerabilities for small- and medium-sized actors in both food systems, reducing the likelihood that their interests are fully considered in decision-making and, therefore, constraining their capacity to contribute to food security.

Tableau 8. (Table 2 from paper 1) Indications of vulnerability identified in the food systems of Québec and São Paulo

Indications of vulnerability	Supporting data	Examples	Likely consequences for food availability
Increased interdependencies	Trade agreements in both territories based on economic logics	• **Québec:** The province produces four times more hogs than it needs, and the entire pork industry is organized around the international market. • **São Paulo**: Focus on supply chains that are export-oriented: sugar, orange juice, soybeans, beef, and coffee.	The diversity of food production decreased in major exporting countries, creating vulnerabilities and dependencies "for both exporters and importers" (Kummu et al., 2020).

	Strong participation of foreign workers in agricultural activities	• **Québec**: Each year, more than 8,000 seasonal workers come mostly from Mexico and Guatemala to work on the farms of Québec.	Border closures caused by the COVID-19 pandemic directly affected fruit and vegetable producers in the province of Québec (Lavoie, 2020).
Low diversity in economic importance	Concentration in a few supply chains	• **Québec:** Livestock, poultry, and animal products (milk, eggs) represent more than 60% of the agricultural production value. • **São Paulo:** Sugarcane represents 41 % of the agricultural production value and occupies 67 % of the cultivated area.	A high degree of diversity in the food system can facilitate "greater dietary diversity and better nutrition" (Gómez et al., 2013). The concentration of activities can limit local capacity to produce other food products. It also puts stress on local ecosystems (Aguiar and Souza, 2014).
Unequal power relations	Low economic importance of small growers and companies	• **Québec:** Strong presence of small- and medium-sized enterprises in the processing stage, but 70 % of food sales are made by the 30 largest companies. • **São Paulo:** Family farms represent 65 % of all the agricultural establishments, but only 13 % of the agricultural production value.	"Family farmers provide healthy, diversified and culturally appropriate foods" (FAO, 2019). Small farms and food businesses contribute to the alleviation of rural poverty, whilst delivering environmental and social benefits (Galli et al., 2020) Unequal power relations can constrain the ability of these actors to fulfill these goals.

From: Prepared by the authors

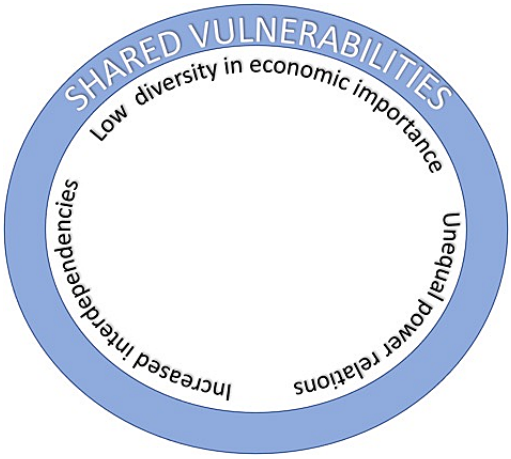
Contributions of the study and policy implications

Recognizing the highly globalized world in which food systems operate, a key motivation behind this paper was to examine whether and how it is possible to characterize food systems using the meso-level of the state/province as the unit of analysis. Our first contribution with this study is, therefore, to confirm that food systems anchored in different contexts —that are shaped by broader macro-level dynamics (Magnan, 2012)— can be rigorously and systematically characterized at this level of analysis. This empirical validation is important because meso-level

analyses can foster the development of local initiatives and policies that contribute to food security (FAO, 2022).

Second, this study generates a better understanding of the relations between food systems characteristics and the shared vulnerabilities that constrain their ability to transition towards sustainable food security. Our analysis showed the existence of three categories of vulnerabilities across the two food systems. The vulnerabilities summarized in Figure 2 are likely to be transferable to other contexts, notably in emergent and established economies.

Figure 6. (Figure 2 from paper 1) Shared vulnerabilities in the food systems of Québec and São Paulo



From: Prepared by the authors

The third contribution of our study is to show how food systems are approached by public authorities in their own territories. The information sources we used reflect the extent to which food systems are governed as an economic activity among many others. The literature on food regimes helps to understand why food systems are approached this way. According to Friedmann and McMichael (1989), since the 19th century, when agriculture became oriented towards capital accumulation, societal goals such as “food security” and the “preservation of communities” were replaced by the “power of capital.” This was intensified during the second and third food regimes, with the increasing separation between agriculture and industrial activities (Friedmann and McMichael, 1989; Sodano, 2019). As agricultural products became “raw materials” for the industry, food systems became “a statistical artifact” highly integrated into an international

market dominated by “large industrial capitals” (Friedmann and McMichael, 1989). The food systems of Québec and São Paulo are examples of this “path-dependency” (Vanloqueren and Baret, 2009) where agriculture follows the demand of “transnational agro-food corporations” for inputs that are then processed into food products and distributed globally (Friedmann and McMichael, 1989). As put by Friedmann and McMichael (1989), “not only is agriculture no longer a coherent sector, but even food is not. It is linked, for instance, to the chemical industry at all phases, from fertilizers to preservatives” (p. 112). As we observed, the neoliberal food regime relies heavily on technologies that serve corporate goals, tends to concentrate power in a few large agri-food companies, and exacerbates the vulnerabilities identified in our study.

Considering the findings of our study and the present context of food security challenges and climate change, we argue that food systems need to be approached by policymakers no longer as only an economic activity, but through a careful consideration of their social, environmental, and economic role in the tackling of today’s societal challenges.

The fourth contribution of our study reinforces the above argument as it concerns the indicators of responsibility identified in both food systems. Friedmann and McMichael (1989) suggest that a “re-localization” of the food system can help to redirect food systems towards “comprehensive goals” such as proper land use and ecological practices. According to Sodano (2019), an “agroecology food regime” would respect sustainability and food sovereignty principles. Inspired by RIH’s aim, which is to steer innovation towards equitable and sustainable health systems, our characterization sought to emphasize that food security is an end that food systems should be geared to deliver. Our findings signaled the presence of practices that can foster responsible food system innovation in Québec and São Paulo, for instance: the predominance of family farmers in São Paulo, the high number of small- and medium-sized processing local companies in Québec, the considerable participation of organic food production in both regions, and the increasing food sales through alternative distribution channels in Québec. Nevertheless, these practices still have a modest economic presence in the dominant food system and require policy-makers to build a favorable institutional environment for their emergence and consolidation (Rastoin, 2020; Sabio and Lehoux, 2022; Schot and Steinmueller, 2018; Sodano, 2019; Swisher et al., 2018). Such

initiatives need to be leveraged by public policies that can promote structural changes across all stages of the food system towards food security.

Lastly, even though the literature on food regimes provided a rich theoretical lens to situate the food systems of Québec and São Paulo within an evolutionary historical context and thus generate a better understanding of their current dominant dynamics, our findings suggest that food systems cannot be conceptualized or empirically examined as monolithic entities. By searching for indicators of responsibility, we observed an emerging diversity within food systems that we could not have captured without using the RIH framework. Therefore, our study contributes to overcome a conceptual and empirical limitation in the food regimes literature.

Limitations of the study and further research

The data we used reflect how governments approach food systems, that is, mainly as an economic activity. Such data were well suited to highlight systemic vulnerabilities because they reflect a globalized market logic that is disconnected from what resilient food systems should seek to achieve (Branca et al., 2020; Sellberg et al., 2020). Data pertaining to the food distribution stage were however less abundant even though it represents the biggest share of the food system's GDP in both regions. Specifically in the case of São Paulo, there were limited data regarding the origin of the food available for the population. Our study also lacks consumer-centred data, which could have highlighted additional systemic vulnerabilities and trends. This gap could be addressed by further research. Our study signaled the presence of responsibility-oriented practices and organizations in food systems, but further research is needed to define in greater detail what such practices are and are not and to assess how responsible organizations in the different stages of the food systems may contribute to food systems transition. It would also be important to characterize food systems using longitudinal data rather than a cross-sectional study design like ours. Lastly, because the way food systems in both emerging and mature economies may transition remains globally interconnected, further research could examine how different regions achieve food security through responsible food system-level innovation and how the latter can be scaled or adapted to other contexts.

Conclusion

"Climate change and sudden system shocks" as well as "pandemics such as the one caused by COVID-19" have shown "how fragile food provision can be" (Jensen and Orfila, 2021, p. 2). Current food systems transformation is indeed "key to increasing food security" and "strengthening the sustainable management of natural resources in the face of climate change" (Dupouy and Gurinovic, 2020, p. 2). By characterizing two food systems from different economic contexts, our study highlighted shared vulnerabilities that are driven by similar interconnected dynamics that have been established and reinforced over the years. For instance, the Brazilian economic history is linked to commodity exports after a period of diversification (Toni, 2015). In the Canadian context, food supply management has existed since the 1970s and has been criticized because of the institutional barriers it creates for local and regional food system development and for food diversity in Canada (Heminthavong, 2018; Mundler et al., 2020; Mundler and Ubertino, 2022). This institutional structure is embedded to varying degrees in the structure and dynamics of the neoliberal food regime.

The shared vulnerabilities identified in our research reinforces the need for food systems transition. Furthermore, the additional challenges imposed by the COVID-19 pandemic exposed and amplified many societal vulnerabilities, including those underlying the two food systems examined in this paper. The need to tackle vulnerabilities that hinder a transition towards sustainable food systems is now much more visible. While 20th century scientists and innovators helped to shape a major transition in food systems, a renewed contribution to a 21st century transition will be necessary to achieve food security through more responsible food systems. One of the ways to constructively promote such a transition —as pointed out in our study— is through research and policies that foster the development and consolidation of responsible innovation in food systems in order to integrate their social, economic, and environmental impacts. This concept is increasingly being applied in food studies (Gremmen et al., 2019; Khan et al., 2016; Long et al., 2018; Purwins and Schulze-Ehlers, 2018), but still lacks a consensual definition and a common vision of the structural systemic vulnerabilities embedded in the present food regime.

Acknowledgements

We would like to thank members of our research team who provided us with insightful comments: Hudson Silva, Lysanne Rivard, Hassane Alami, and Robson Rocha. A special thanks goes to Lysanne Rivard, who proofread the revised version of this paper. We thank the Associate Editor and the three anonymous reviewers of the Journal Renewable Agriculture and Food Systems for their careful reading of our manuscript and their many insightful comments and suggestions.

Funding

The first author holds a PhD training grant from the Fonds de la recherche du Québec — Société et culture (FRQ-SC; #292266) and is supported by the In Fieri research program, which is funded by the Canadian Institutes of Health Research (CIHR; #FDN-143294). Our research center, the CReSP, is supported by the Fonds de la recherche du Québec — Santé (FRQ-S).

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Supplementary Material

The Responsible Innovation in Health Framework

Responsible Innovation in Health (RIH) consists in a "collaborative endeavour wherein stakeholders are committed to clarify and meet a set of ethical, economic, social and environmental principles, values and requirements when they design, finance, produce, distribute and use sociotechnical solutions to address the needs and challenges of health systems in a sustainable way" (Silva et al., 2018, p. 5). The RIH Framework is composed of nine attributes, which are described in Table S-1.

Tableau 9. (Table S-1 from paper 1) The Responsible Innovation in Health attributes

Attribute	Definition
Health Relevance	Importance of the health needs addressed by the innovation within the overall burden of disease, considering the causes of death, injury and disability and associated risk factors in the region where the intended users are located.
Ethical, Legal and Social issues	Means by which the negative impacts of the innovation on the moral and sociocultural well-being of individuals and groups and the legal and regulatory issues it raises can be mitigated.
Health Inequalities	Extent to which the innovation contributes to the reduction (or increase) of avoidable health status differences across individuals and groups that are associated with one's socioeconomic status, social position, and capabilities.
Inclusiveness	Degree of stakeholder engagement in the design, development, and pilot stages of an innovation using an accountable method.
Responsiveness	Ability to provide dynamic solutions to existing and emerging challenges in health systems (eg, demographic or epidemiologic shifts, service delivery or governance gaps).
Level and intensity of care	Labour intensity optimization by mobilizing the most decentralized unit in the health system to provide the service when it is possible to do so effectively and safely.
Frugality	Provision of greater value to more people using fewer resources, which may entail: (i) affordability; (ii) focus on core functionalities and ease of use; and (iii) optimized performance.

Attribute	Definition
Business model	Organizational propensity to provide more value to users, purchasers, and society through a business model that supports: (i) a social, not-for-profit and/or environmental mission; (ii) a freely usable or exploitable innovation; (iii) a redistributive price scheme; (iv) employees with particular needs; or (v) compliance with social responsibility programs.
Eco-responsibility	Reduction of negative environmental impacts along the innovation's lifecycle stages: raw material sourcing; manufacturing; distribution; use; and disposal.

From: Silva et al. (2018) and Silva et al. (2021)

Characterization of the Québec food system

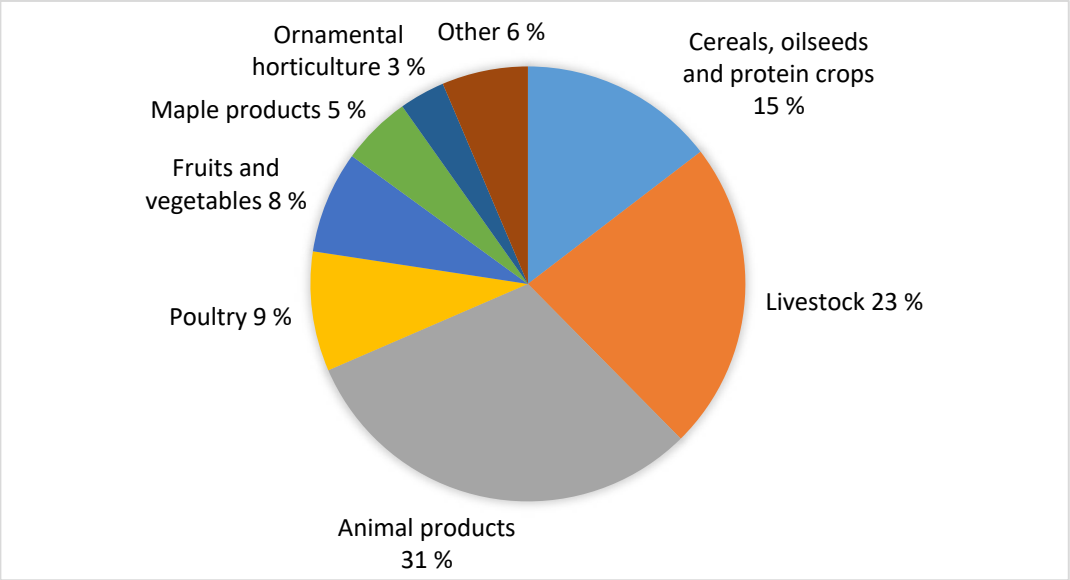
Production

We found that agriculture[7] was an important economic sector in Québec (ÉcoRessources, 2016). Local agricultural production was diversified but concentrated around a few products (Figure S-1). The production value of livestock (where pigs represented more than 70% of the livestock production), poultry, and animal products (milk, eggs, and honey) accounted for 63 % of agricultural output in 2017. While the production of milk, eggs, and poultry was governed by supply management to match the domestic demand (Heminthavong, 2018), pork production was oriented toward exports. Consequently, the province produced four times more pork than it needed and this entire industry was organized around the international market (Mundler, 2020).

Cereals, oilseeds, and protein crops represented 15 % of the total production. Within this category, corn and soybeans respectively accounted for 52 % and 38 % of the total (Québec, 2019). Québec had the largest blueberry, cranberry, berries, nuts, and maple syrup production of any province in Canada. With over 90 % of all maple taps in the country, the province was a global leader in this culture (StatCan, 2017b). Canada produced more than 70 % of all the maple syrup in the world, and more than 90% of the Canadian production came from Québec (World Atlas, 2017).

[7] "Agriculture is the most comprehensive word used to denote the many ways in which crop plants and domestic animals sustain the global human population by providing food and other products" (Harris and Fuller, 2014).

Figure 7. (Figure S-1 from paper 1) Agricultural production in Québec, according to production value (% in 2017)



]

Adapted from: Québec (2019)

Québec had the biggest and largest number of farms with organic certification in the country. About 4 % of its farms were certified for organic production compared to 2 % in other provinces. Out of 1,049 certified farms, 345 were dedicated to maple production (33 %). Milk and field vegetable production followed, accounting respectively for 13 % and 10 % of certified farms (Keable, 2018).

The number of farms in Québec has declined over the years with the evolution of agriculture. Nonetheless, productivity had been on the rise (StatCan, 2017b). The development of new technologies contributed largely to this trend. Such technologies are more accessible for medium and large farmers at the expense of smaller producers who can rarely benefit from policy incentives for increased productivity (Zombre, 2019).

Processing

Food processing was one of Québec's main economic activities and the leading employer in its manufacturing sector (Lacharité, 2017). This sector was the biggest consumer of agricultural products in the province: it purchased approximately 70 % of the local production, which contributed to 80 % of its agri-food exports (Antunes et al., 2015). The meat and dairy industries

led the most important income-generating activity with 43 % of the total income generated in the processing stage (Québec, 2019). The beverage industry, notably breweries and soft drinks, represented 15 % of the income, followed by bakeries and tortilla manufacturing, which represented 9 % of total income. While meat and dairy producers generated the most income and employed the most workers, bakeries and tortilla producers accounted for the highest number of companies, representing almost 30 % of the food processing units in the province. Other important food processing industries in Québec are shown in Table S-2.

Tableau 10. (Table S-2 from paper 1) Food, beverage, and tobacco industries' revenues in Québec in 2016 and their participation in the processing stage

Industry	Income ($M)	Pct in the processing stage
Meat products	6,909	24 %
Dairy products	5,388	19 %
Bakeries and tortillas	2,638	9 %
Fruit and vegetable canning and speciality production	2,030	7 %
Animal feedstuffs	2,152	7 %
Milling of cereal grains and oilseeds	1,036	4 %
Sugar and confectionery	1,203	4 %
Preparation and packaging of fish and seafood products	480	2 %
Other food products	2,528	9 %
Total - Food Manufacturing	*24,365*	*85 %*
Total - Beverage and Tobacco Product Manufacturing	*4,418*	*15 %*
Food, Beverage, and Tobacco Product Manufacturing	**28,783**	**100 %**

Adapted from: Québec (2019)

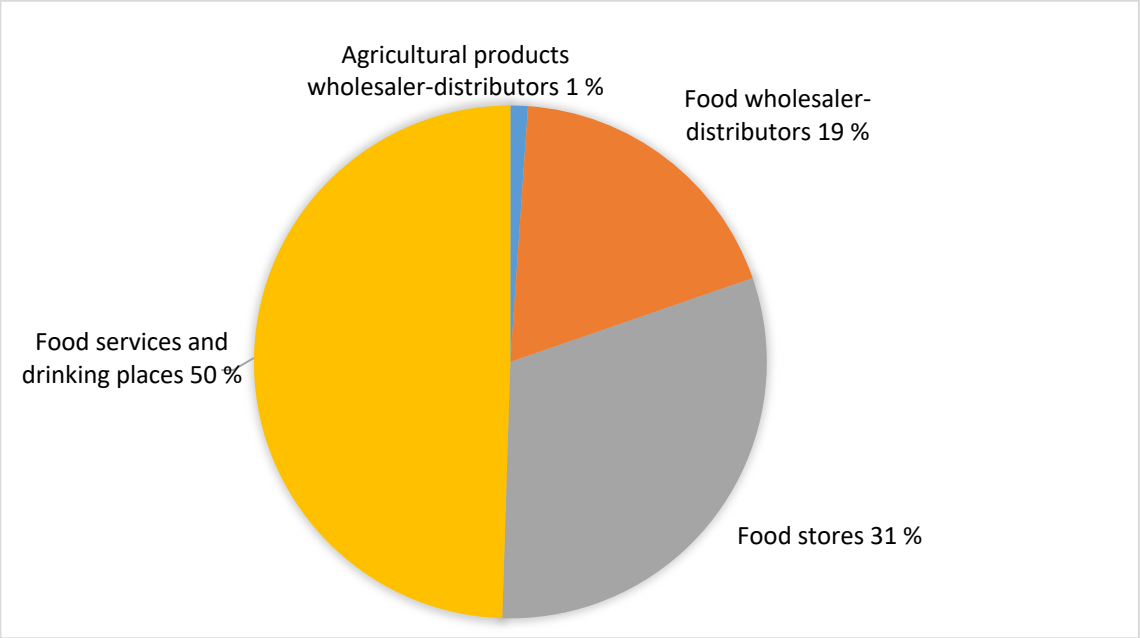
Distribution

Around 45 % of the food produced in Québec was sold to consumers within the province, while 23 % was sold to other Canadian provinces and 32% to other countries, mainly in the United

States of America (USA) (MAPAQ, 2016). The Ministry of Agriculture, Fisheries, and Food (the French acronym is MAPAQ) indicates that these proportions have been quite stable over the last 10 years.

Following MAPAQ's four categories of food distributors, the largest part of the GDP was generated by food services and drinking venues, with almost 50 % of the total, followed by food stores with 31 %. Food wholesaler-distributors occupied the third place (19 %), followed by agricultural products wholesaler-distributors with only 1 % of GDP (Figure S-2).

Figure 8. (Figure S-2 from paper 1) GDP of food distributors (M$) in the province of Québec in 2017



Adapted from: Québec (2019)

Food sales in Québec were estimated at around Can$ 40 billion dollars per year. About two thirds (around Can$26 billion) of sales were made through retailers and almost one third through food services (MAPAQ, 2016). Warehouse clubs and big box stores have increased in importance as points of purchase over the last few years. Other points of purchase were convenience stores and specialized shops, such as butcheries and natural food stores (MAPAQ, 2016).

International trade

Both food exports and imports have grown in Québec over the years. MAPAQ data for 2017 show that the value of exports reached Can$ 8.8 billion, 26 % higher than imports, which stood at Can$ 7.0 billion in the same year.

In 2017, about 70 % of the food products exported by Québec went to the USA, with more than 50 % of the export value concentrated in a few products: meat (21 % of the total, 90 % of which is associated to pork); oilseeds, cereals, and their by-products (18 %); cocoa, chocolate, and their by-products (13 %); food preparations and miscellaneous products (8 %), and maple, sugars, and honey (7 %) (Québec, 2019). When it comes to imports, the biggest value was concentrated in imports of beverages (including alcoholic beverages but excluding juice), which represented 22 % of imports in 2017. Imports of fruits and nuts accounted for 11 %, followed by cocoa, chocolate, and their by-products with 10 % of the total. Altogether, these four categories accounted for 43 % of the value of food imports made by the province in 2017. Imported food products came from the European Union (29 %), the USA (21 %), China (4 %), Mexico (1,5 %), Japan (0,2 %), as well as from other countries (44 %) (Québec, 2019)[8].

Characterization of the São Paulo food system

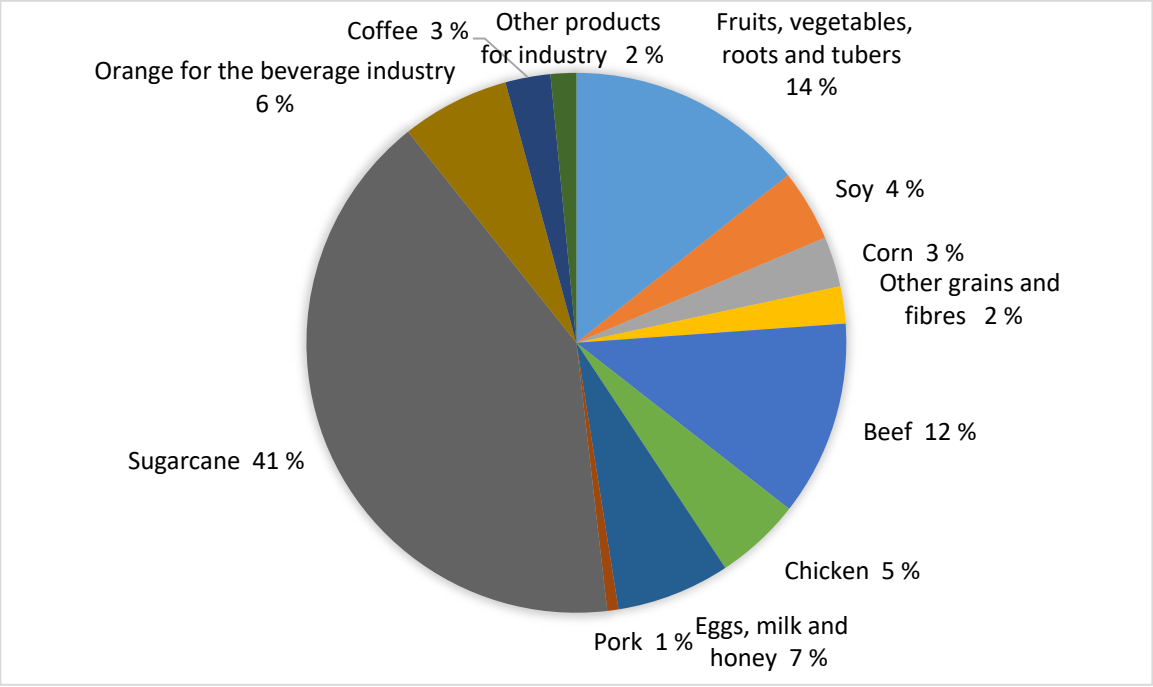
Production

When it comes to agricultural production, vegetable production accounted for 8 % of the sector's GDP and was more important from an economic perspective than livestock at 3 % of the GDP (CEPEA, 2017). Sugarcane, which is used to produce both alcohol and sugar for the domestic and international markets, was the main agricultural product in the state of São Paulo, representing

[8] We may infer that Québec tends to import products with lower added value (less processed) that are used as raw material by food companies, except for the beverage sector. Exports, on the other hand, tend to be more concentrated in processed products with higher added value. Nevertheless, the lack of sufficiently detailed data in the reports does not enable us to confirm this interpretation. However, the presence of some important food companies points to this type of trade. For example, the local branch of the Swiss company Barry Callebaut is an important supplier of primary processed products (such as cocoa butter and cocoa mass, which is obtained by processing cocoa beans) to the biggest chocolate brands in North America. The company Green Mountain coffee, which owns the Québec-based company Van Houtte, is also an important exporter of coffee to the United States (Lacharité, 2017).

41 % of its agricultural production value. Its production covered close to 67 % of the cultivated area (Silva et al., 2015). Cattle production was another important activity in São Paulo, representing 12 % of the agricultural production value in the state. Likewise, orange production for the beverage industry was among the most important agricultural activities. About 70 % of Brazil's orange production was concentrated in São Paulo, which was the main world producer of this fruit[9] (Buainain et al., 2019; Neves et al., 2010). São Paulo produced a variety of other crops. Altogether, the production of fruits, vegetables, roots, and tubers contributed to 14 % of the total agricultural production value. It included a variety of products, the most representative of which were bananas, citrus fruits (excluding orange for the beverage industry), grapes, tomatoes, and potatoes (IEA, 2017). The production value of the different agricultural products in the São Paulo food system is presented in Figure S-3.

Figure 9. (Figure S-3 from paper 1) Total production value of agricultural products in São Paulo in 2017 (%)



Adapted from: Institute of Agricultural Economics (2017)

[9] Oranges are grown on farms of independent growers as well as large-sized farms that belong to companies that produce and export orange juice (Boteon et al., 2013).

Processing

Food processing in São Paulo represented almost 30 % of the country's gross value of industrial food production. A significant part of the food processed in São Paulo comes from other parts of the country. These foods are processed and consumed locally or in other parts of Brazil or exported to other countries (Silva et al., 2015, p. 112). Food processing was characterized by "strictly coordinated chains" (Saes et al., 2019, p. 77) composed of large companies (Chaddad, 2016, p. 15).

The sugar industry represented 24 % of the production value generated in processing and leads the sector in this territory. Despite its economic importance, sugar industries represented only 3 % of all food and beverage companies' units. We can infer that the sugar sector was thus characterized by the presence of large units (IBGE, 2019). Meat processing (especially beef) constituted another important activity. The firms operating in the São Paulo meat sector were consolidated in the 2000s and their activities became more international after 2005. Other important activities included grinding and manufacturing of starch and animal feed, canned fruit and vegetables manufacturing (especially orange juice), dairy and coffee (Table S-3) (IBGE, 2019).

Tableau 11. (Table S-3 from paper 1) Industrial production value in the state of São Paulo per food sector

Sector	Product	Industrial production value (1,000 R$)	Pct in production value
Food Manufacturing	Sugar manufacturing and refining	43,980,386	24 %
	Slaughter and manufacture of meat products (includes beef, chicken, and pork)	26,394,457	14 %
	Grinding, manufacture of starch and animal feed products	17,124,052	9 %
	Canned fruit and vegetables manufacturing (includes juices)	14,286,277	8 %
	Dairy products	13,283,065	7 %

	Coffee roasting and grinding	9,195,970	5 %
	Vegetable and animal oils and fats	6,056,123	3 %
	Other food products	34,151,484	19 %
	Total food manufacturing	*164,471,814*	*89 %*
Beverage Manufacturing	Alcoholic beverage manufacturing	13,126,568	7 %
	Non-alcoholic beverage manufacturing	6,348,103	4 %
	Total beverage manufacturing	*6,104,912*	*11 %*
Total food and beverage manufacturing		**183,946,485**	**100 %**

Adapted from: IBGE – Censo Agropecuário (2019)

Distribution

Food distribution in São Paulo was mainly through wholesale, retail (food stores, including street markets), and food services. The revenue generated by food distribution through wholesale and retail added up to R$ 366 billion in 2017. Most of this income was in retail with 60 %, against 40 % in wholesale (IBGE, 2017). While most of the income generated in the retail sector came from non-specialized food shops, such as supermarkets (81 %), most of the income generated in wholesale came from specialized food shops(71 %), such as the wholesale of fruits and vegetables (IBGE, 2017).

International trade

São Paulo's food system evolved from being primarily an exporter of traditional tropical products during Brazil's colonial period, such as coffee and sugar, to being a global exporter in several major production chains in the beginning of the twenty-first century (Buainain et al., 2019). Since then, São Paulo has played an important role in the global food supply (Jank et al., 2019). Food exports from São Paulo added up to US$ 14.6 billion in 2017 (Ministry of Industry, Foreign Trade and Service, 2019)[10]. The main export is sugar, which represented 51 % of all food products

[10] About 54% of the food products exported by São Paulo in 2017 were sold to international food industries and 46% for international consumption (Ministry of Industry, Foreign Trade and Service, 2019). Products sold to industries are usually lower added-value products, such as sugar and soy, which are used to manufacture other

exported from São Paulo (in US$). Other important exported products are orange juice (12 %), soy (9 %), beef (6 %), and coffee (5 %). The main country buyers are China, the USA, the United Arab Emirates, Bangladesh, Belgium, and India (Ministry of Industry, Foreign Trade and Service, 2019).

Exports were more than four times greater than food imports. Data from the Ministry of Industry, Foreign Trade and Service show that food imports added up to US$ 3.5 billion in 2017[11]. Most food imports came from South America, including fish and crustaceans, molluscs, and other aquatic invertebrates (20 % of the total), followed by cereals, mostly wheat and rice (10 %).

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food products (Ministry of Industry, Foreign Trade and Service, 2019). As a consequence, they will not be identified as products from São Paulo (or even Brazil) in the consumer market (Paloviita et al., 2016).

[11] It is not possible to affirm that all food products imported in São Paulo are consumed within this state. Sometimes, São Paulo serves as a gateway for imports that are then distributed to other Brazilian regions.

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Article 2: How Does Context Contribute to and Constrain the Emergence of Responsible Innovation in Food Systems? Results from a Multiple Case Study

Statut de publication : publié dans la revue Sustainability

Coauthors	Affiliation	Autorization
Professor Pascale Lehoux	Department of Health Management, Evaluation and Policy. Université de Montréal - École de santé publique - 7101 avenue du parc, 3e étage - H3N 1X9 Montréal, Canada	Obtained

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How Does Context Contribute to and Constrain the Emergence of Responsible Innovation in Food Systems? Results from a Multiple Case Study

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Sustainability **2022**, *14*(13), 7776; https://doi.org/10.3390/su14137776

Received: 17 March 2022 / Revised: 20 June 2022 / Accepted: 22 June 2022 / Published: 25 June 2022

(This article belongs to the Special Issue Sustainable Food System Transition)

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Abstract

Organizations and practices that contribute to the resolution of major societal challenges are key to achieving a transition towards sustainable and resilient food systems. Previous research identified contextual elements that affect the emergence of organizations and practices with responsibility characteristics, but how this process unfolds remains poorly articulated. Our study thus focuses on how contextual dimensions may contribute to or constrain the emergence of responsibility in food systems. We applied a multiple case study design and conducted 34 semi-structured interviews with 30 organizations in the province of Québec (Canada) and in the state of São Paulo (Brazil). Our across-case analyses clarify how multiple contextual dimensions both contribute to and constrain the emergence of responsibility. More specifically, our findings show that while contextual dimensions shaped by the dominant food system constrain the emergence of responsibility, the same dimensions also contribute to it when they embed responsibility principles. One key contribution of our study is to show that interpersonal relations are an important mediation mechanism that helps to modify contextual elements, so they can contribute to the emergence of responsibility. This study's findings can inform research and policy aiming to design institutional environments that promote a transition towards more responsible food systems

Abstract

Organizations and practices that contribute to the resolution of major societal challenges are key to achieving a transition towards sustainable and resilient food systems. Previous research identified contextual elements that affect the emergence of organizations and practices with responsibility characteristics, but how this process unfolds remains poorly articulated. Our study thus focuses on how contextual dimensions may contribute to or constrain the emergence of responsibility in food systems. We applied a multiple case study design and conducted 34 semi-structured interviews with 30 organizations in the province of Québec (Canada) and in the state of São Paulo (Brazil). Our across-case analyses clarify how multiple contextual dimensions both contribute to and constrain the emergence of responsibility. More specifically, our findings show that while contextual dimensions shaped by the dominant food system constrain the emergence of responsibility, the same dimensions also contribute to it when they embed responsibility principles. One key contribution of our study is to show that interpersonal relations are an important mediation mechanism that helps to modify contextual elements, so they can contribute to the emergence of responsibility. This study's findings can inform research and policy aiming to design institutional environments that promote a transition towards more responsible food systems.

Introduction

The negative health, environmental and social externalities that arise from the established food system have been emphasized by a growing body of scientific evidence (Bezerra et al., 2019; IPES-Food, 2016; Touzard, 2016; Willet and et al, 2019). However, the emergence of initiatives that concurrently address 21st-century societal challenges, including climate change, food security, health inequalities, and community well-being has become more evident in the past years (Khan et al., 2016; Lubello et al., 2016). It includes, for instance, organic basket networks, local family farming and institutions that adhere to local sourcing (Khan et al., 2016; Le Velly, 2017; Lubello et al., 2016). These organizations and practices embody characteristics of responsible innovation, which preconizes the development of innovations that are sustainable, ethically acceptable and

socially desirable (Reyes-Galindo and Monteiro, 2018; Stahl et al., 2017; von Schomberg, 2013). A responsible innovation approach calls for transcending the focus on 'downstream' impacts and incorporating 'upstream' practices in the innovation process (Reyes-Galindo and Monteiro, 2018; Silva et al., 2018; von Schomberg, 2013). Thus, the concept of responsible innovation offers a transformational approach to policy-oriented research on how responsibility can improve the resilience of food systems (Khan et al., 2016). Though responsible innovation seeks to support the societal uptake of responsible practices (Asveld et al., 2015), the characteristics of responsibility in food systems have not been clearly conceptualized and the application of this concept to study food systems is still in emergence (Blok et al., 2018; Khan et al., 2016).

Perspectives on responsibility in food research differ. For instance, industries may emphasize the adherence to mandatory safety concerns or the adoption of voluntary actions, such as Corporate Social Responsibility (European Commission, n.d.). Responsibility can also refer to the individual's responsibility for their own food choices. This perspective, renders the consumer accountable, as there are no "unhealthy foods", only "unhealthy diets" (Magnusson, 2010). The concept of responsibility is also often used to assess the social or environmental consequences of innovations, but it may not look into the development process that has led to the emergence of these particular innovations. In this paper, the concept of responsibility is anchored in the responsible innovation literature. A responsible innovation approach differs from the above-mentioned perspectives because it sheds light on innovation development processes and their outcomes (von Schomberg, 2013).

Therefore, in this study, the emergence of responsibility in food systems is defined as the emergence of organizations or practices that integrate characteristics of responsible innovation both in terms of process and outcomes. Such organizations and practices are crucial to a transition towards sustainable food systems. Even though some of these organizations and practices have taken form in the past decades, they have played a marginal role in the way food systems are currently organized. In this paper, the emergence of responsibility is approached from a transition logic and refers to the ability of such organizations and practices to move towards and eventually occupy a more central position in food systems.

A fundamental requirement for the emergence of responsibility is "a better understanding of the existing networks of responsibility", which calls for studies that take contextual elements into account (Stahl, 2019, p. 448). Indeed, for Herrero et al. (2020), responsible innovation "must be accompanied by a wide range of social and institutional factors that enable their deployment" because food systems transition is a "systemic process" that should not rely on innovation alone (p. 267). Therefore, a better understanding of the food systems' transition requires research that sheds light on the connections between innovative organizations and practices and their context (Ingram, 2015). As research on how networks contribute to responsibility across systems is nascent (Stahl, 2019), and responsible innovation in food systems is still under construction (Blok et al., 2018), the contextual elements that affect their emergence remain poorly articulated.

Based on the above observations, a clarification of the role context plays in the emergence of responsibility should approach this process as a systemic phenomenon. Thus, this study aims to generate an empirical understanding of how contextual dimensions interact with responsibility-oriented organizations and practices in food systems by addressing the following research question: How do different contextual dimensions contribute to or constrain the emergence of responsibility in food systems?

Below, we summarize current literature to conceptualize the role of context in food systems. We then describe our methodology, which relied on a multiple case study in the province of Québec (Canada) and in the state of São Paulo (Brazil). Our findings flesh out contextual elements that both enable and constrain the emergence of responsibility in food systems. In the discussion, we further analyze this dual role: while contextual elements shaped by the dominant food system constrain the emergence of responsibility, the same elements can contribute to its emergence when they embed responsibility principles and thus support food systems transition. For example, while established economic and market dynamics constrain the emergence of organizations and practices with responsibility characteristics, dedicated funding and market pressures integrating sustainable concerns contribute to the emergence of responsibility. We conclude with our key contributions to current knowledge, which include a deeper understanding of responsibility in food systems and practical insights for policymakers on ways to consolidate food systems transition.

The role of context in the emergence of responsibility

Context can be defined as "the physical environment in which practice takes place" and, as such, "has boundaries and structures that together shape the environment" (McCormack et al., 2002, p. 96). Context is usually considered "in relation to an intervention or object, with which it actively interacts" (Pfadenhauer et al., 2016, p. 4). In this paper, we conceptualize context as "a set of characteristics and circumstances that consist of active and unique factors" that together may interact, influence, modify, facilitate or constrain the emergence of responsibility in food systems (Pfadenhauer et al., 2016). Even though scholars have called for a greater examination of context (Bowen, 2011), our literature review did not find studies that specifically analyzed the way contextual elements affect the emergence of responsibility in food systems.

The literature highlights some of the contextual elements that are relevant to what we define in this paper as characteristics of responsibility in food systems, but they do not analyze this specific phenomenon. For instance, public pressure towards businesses' social and environmental responsibilities was found to be the main reason why private organizations engage in societal challenges, such as fighting hunger (2020). Similarly, social pressure, along with legislation and financial incentives, contribute to making food industries more willing to develop products that are responsive to societal needs (Blok et al., 2017; 2016). For example, legislation in Brazil requires that at least 30 % of the funding for the national school meals program be used to purchase food from family farmers (Rocha et al., 2012). Mckitterick et al. (2016) studied the role of institutional networks in supporting rural innovation in Northern Ireland and found that even though institutional support provided benefits to producers, it is "the relationships with informal network actors […] that primarily lead to knowledge exchange and innovation" (p. 49). Jones and Hills (2021) assessed the role of a national sustainable food program in the United Kingdom in influencing food governance, policy and practice in urban areas and found that multiple projects successfully emerged. For Abdullah et al. (2021), technological and policy support leveraged indoor and vertical farming as a way to improve food self-sufficiency in Kuwait.

The literature also examines constraining contextual elements. Covello and Iatridis (2021) observed that a lack of resources, including labor and money, limited the integration of

responsible innovation in small- and medium-sized food enterprises in London. Prag and Henriksen (2020) analyzed the possibility of a transition from animal-based to plant-based food production in Denmark and concluded that it requires "large-scale transformations at every level, from policymaking down to the individual farmer" (p. 14). The authors point to the need to "discourage large investments in technologies […] that are resulting in technological and financial lock-ins" (p. 16). Dias et al. (2017) argued that urban agriculture in Brazil is constrained by a lack of funding, conservative policies, and the difficulty of bringing actors together (Dias et al., 2017). Similarly, the IPES-Food report suggests that the emergence of agroecological food systems in West Africa is constrained by several factors, including investments mostly supporting export-oriented commodity production, difficult access to land and water, weak policy support, pressure on prices due to oversupply (as producers are forced to sell simultaneously), misaligned governance, lack of training and support and isolation of the initiatives (IPES-Food, 2020).

Table 1 summarizes the aforementioned studies that point to a diversity of contextual elements that may either contribute to or constrain the emergence of responsibility in food systems. Building on this nascent body of knowledge and recognizing that a multiple case study design can strengthen the study's usefulness for other settings (Marshall et al., 2021), we aim to empirically flesh out this phenomenon by examining systematically how it unfolds in two food systems.

Tableau 12. (Table 1 from paper 2) Contextual food system dimensions identified in the literature that may contribute to or constrain the emergence of responsibility

Contextual element	Contributes to	Constrains	Reference
Access to market	X		(Herrero and et al., 2020; Steiner et al., 2020)
Adapted infrastructure	X		(Herrero and et al., 2020; Steiner et al., 2020)
Conservative policies; misaligned policies		X	(Dias et al., 2017; IPES-Food, 2020)
Dedicated funding	X		(Steiner et al., 2020)
Economic incentives	X		(Blok et al., 2017; Shnayder et al., 2016; Steiner et al., 2020)
Horizontal and vertical networks; alliances	X		(Dias et al., 2017; McKitterick et al., 2016; Steiner et al., 2020)

Government support; supportive legislations and regulations; favorable governance	X		(Blok et al., 2018; Dias et al., 2017; Herrero and et al., 2020; Rocha et al., 2012; Shnayder et al., 2016; Steiner et al., 2020)
Incompatible resources		X	(Covello and Iatridis, 2021; IPES-Food, 2020)
Knowledge, skills & training; capacity building & values	X		(Herrero and et al., 2020; McKitterick et al., 2016; Steiner et al., 2020)
Low levels of cooperation; isolated initiatives		X	[25-27]
Misaligned funding		X	(Dias et al., 2017; IPES-Food, 2020)
Research, technology & innovation	X		(Steiner et al., 2020)
Societal awareness; favorable consumer behavior	X		(Crosta et al., 2020; Shnayder et al., 2016; Steiner et al., 2020)

Materials and Methods

Study design

A qualitative methodology is well suited for studying contextual dimensions because it "elicits multiple constructed realities" and can delve into "complexities and processes" (Marshall et al., 2021, p. 116). A multiple case study design also makes it possible to study a phenomenon in-depth and in its real-world context (Yin, 2018). A purposive sampling approach whereby information-rich cases are selected strategically and deliberately was put forward. Information-rich cases "are those from which we can learn a great deal about the central issues under consideration" (Patton, 2002, 230). We analyze the phenomenon of interest in two geographical regions to increase the robustness of our findings: the province of Québec (Canada) and the state of São Paulo (Brazil). Food production, processing and distribution together account for 6.5 % of the Gross Domestic Product (GDP) in Québec (Gouvernement du Québec, 2022). The dynamics of this food system follow the logic of industrialized food systems, with food processing and distribution being the most economically important stages, followed by the production stage

(Gouvernement du Québec, 2022). Québec has experienced the rise of food system innovations over the past years (Novae and Les Affaires, 2020; SAM, 2021), making it pertinent to achieve this study's goal.

São Paulo is a major food producer and its most economically important supply chains are export oriented. The São Paulo food system is characterized by a strong presence of agri-food complexes represented by coordinated chains composed of large processing companies (Saes et al., 2019). The activities of food production, processing and distribution represent about 12 % of the state's GDP (CEPEA, 2019). São Paulo's food system is also centred on processing and distribution rather than on production, thus reflecting the industrial profile of this food system (Sachs, 2017; Seade, 2019). Like in Québec, there are emerging food system innovations in São Paulo that make it a relevant region for this study.

Therefore, these two regions are rich cases to achieve the aim of this paper and generate findings that can account for and clarify different contextual dynamics.

Data collection

We selected food system organizations engaged in innovative practices and that integrate responsibility characteristics. Because the literature specific to food systems is still scarce, our selection criteria relied on a framework that was rigorously developed and validated to assess responsible innovation in health (2018). In this study, we define innovation following this framework's concept of innovativeness, which refers to "solving a problem in a novel way, combining novel components, materials or social interventions, or new processes of production, distribution, commercialization or delivery" (Silva et al., 2021, p. 185). Silva et al. (2021) argue that innovativeness should be considered within the context of use of the innovation. Using the responsibility characteristics of this framework that were the most pertinent to our study's aim (Business model; Eco-responsibility; Ethical, legal, and social issues; Inequalities; and Responsiveness), we searched for food system organizations that were involved in local or organic production or supply, that paid attention to animal welfare and/or that applied socially-oriented business models (e.g., addressing unemployment, gender, solidarity economy, etc.). To increase diversity while documenting each case in a systematic fashion, two diversification

criteria were applied: the organization's role in the food system and the level of its activities. We made sure to cover the following roles: production; processing; distribution; training or certifications; networking or exchange; public power or advocacy; and institutional consumption. We also recruited in each case organizations operating at three levels: the micro level, for activities within the range of a city; the meso level for activities throughout multiple cities; and the macro level for activities across the state or the province.

Overall, 20 organizations in Québec were contacted and 5 did not answer our invitation. In São Paulo, 25 organizations were contacted, 8 did not answer our invitation and 2 refused to participate. Thus, for each case, we recruited 15 organizations and conducted 17 semi-structured interviews (for a total of 30 organizations and 34 interviews). All interviews were conducted online or in-person and were recorded and transcribed verbatim with the consent of participants. Table 2 summarizes the innovative practices of our final sample.

Tableau 13. (Table 2 from paper 2) An overview of the innovative practices of the organizations recruited in the study

Case	Participant	Innovative practices
QC	QC-1	"Meals-on-wheels" to prepare and deliver food notably to seniors or people with reduced mobility or independence; gleaning from local farms to supply a collective kitchen
	QC-2	Network to improve local organic growers' access to resources and markets. Construction of low-cost machinery and tools adapted to organic farms, and promotion of community-supported agriculture by linking producers with local consumers
	QC-3	Implementation of local and organic food supply and room food service in a healthcare facility
	QC-4	Development of a sustainability plan that prioritizes local and organic food supply for the university
	QC-5	Development and implementation of programs to increase the presence of local and organic food in schools and healthcare facilities
	QC-6	Production of local honey; establishment of a partnership with a healthcare facility to become their direct honey supplier
	QC-7	Design, installation, and management of urban organic farms
	QC-8	Installation and management of gardens and urban agriculture projects; installation of an urban farm on the rooftop of a retail store
	QC-9	Development and implementation of public policy programs that encourage institutions to buy local food products

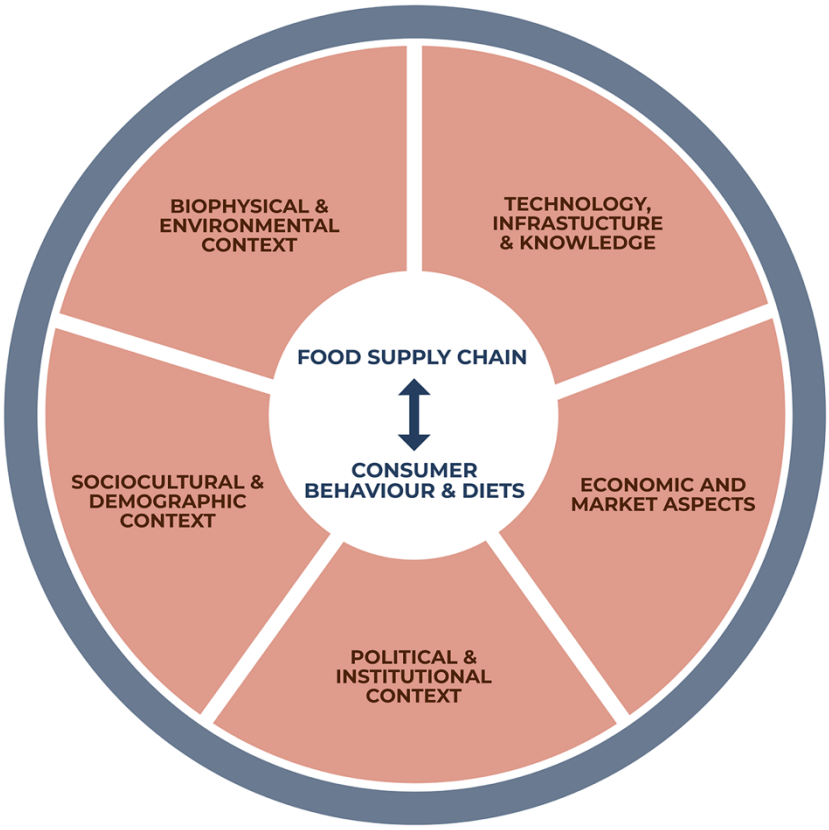
	QC-10	Group bulk purchases of eco-responsible non-perishable food in bulk
	QC-11	Production of organic fruits and vegetables; creation of a free service kiosk to sell to consumers
	QC-12	Ensuring strong regional leadership on food issues by mobilizing stakeholders, advising decision-makers, and supporting structuring initiatives
	QC-13	Preparation and delivery of meals made with local products for people with reduced mobility; urban and peri-urban farms that supply the preparation of meals and the delivery of weekly fresh food baskets
	QC-14	Installation and management of mobile and fixed public markets to sell local fresh food in low-income or food desert areas
	QC-15	Providing support to municipalities to strengthen their local food systems, including conferences, training, tools, strategic meetings, and advocacy
SP	SP-1	Development of an “urban harvest” project that collects fresh food and carries out educational and awareness-raising actions among stakeholders, including charities, donors, transportation companies, universities, volunteers, supporters, and service providers
	SP-2	Installation and management of frugal urban farms in low-income areas to generate jobs and supply fresh produce in these regions
	SP-3	Gathering small farmers’ cooperatives to improve the marketing of their agricultural production and coordinate interests, such as food supply for school meals
	SP-4	Development of workshops and courses to transform people’s relationship with food, including programs about responsible food practices to employees and the community
	SP-5	Creation of an online platform that aggregates institutional purchase calls and sends them to local family farmers
	SP-6	Implementation of the Community Supported Agriculture model
	SP-7	Lunch boxes made with locally produced organic food and prepared by women living in low-income areas; development of a digital app to connect actors and sell the lunch boxes to consumers
	SP-8	Production of organic food and commercialization through Community Supported Agriculture
	SP-9	Implementation of socio-environmental certifications for agricultural products; development of sustainable food supply chains; coordination of eco-responsible interests among actors with conflicting perspectives
	SP-10	Marketing of organic food at prices that vary according to consumers’ capacity to pay
	SP-11	Production of agricultural inputs for sustainable agriculture; production, processing, and distribution of eco-responsible food products, especially chicken without antibiotics
	SP-12	Marketing of organic food through a network of independent entrepreneurs

	SP-13	Development and implementation of programs to increase the supply from family farmers and organic agriculture in school meals following federal and municipal laws; contribution to the development of a municipal law that preconizes the supply of organic food to school meals
	SP-14	Development of a technology package that allows the use of regenerative practices in large-scale agricultural production; development of agroforestry production systems
	SP-15	Establishment of an agroecological network of women farmers in Quilombos

Data analysis

To generate a rich and encompassing understanding of how contextual dimensions contribute to and constrain the emergence of responsibility, we performed an across-case analysis to identify the most significant patterns. As such, we did not compare how contextual elements unfolded within the two cases. We used the qualitative data analysis software Dedoose™ to code interview transcripts. The coding scheme was developed and iteratively refined by both authors. Our analytical strategy combined a deductive and an inductive approach. The deductive approach was supported by the Sustainable Food Systems framework of the High-Level Panel of Experts on Food Security and Nutrition, which provides an overview of the different components of a food system, including elements that influence its evolution (HLPE, 2020). We adapted seven categories of this framework to support the deductive coding of our empirical material (Figure 1). It contains most of the contextual elements found in our literature review (Table 1), which reinforces its theoretical relevance.

Figure 10. (Figure 1 from paper 2) Contextual categories of the food system that informed the deductive coding strategy



Adapted from: HLPE (2020)

To support our inductive coding strategy, which is key for empirically fleshing out how potentially under-theorized contextual elements interact, we performed first-order and second-order analyses (Gioia et al., 2013). This led to the identification of an eighth contextual category emerging from participants' descriptions. In the next section, our findings describe all eight contextual dimensions, illustrated with participant quotes translated from French to English or from Portuguese to English when needed. Organizations are anonymized to maintain confidentiality. We use uppercase letters to designate the region, numbers to designate the organizations and uppercase letters to designate interviewees (e.g., SP-1A for organization 1 and interviewee A in São Paulo). Additional evidence for the findings can be found in the Supplementary Material of this paper.

Results

Biophysical and environmental context

Even though the biophysical and environmental context has been mostly shaped by dominant food system practices, it contributes to the emergence of responsibility when it serves as a trigger for the creation of responsibility-oriented organizations. For instance, the creation of SP-9 resulted from a cycle of deforestation that took place in the 80s and initiated a debate about the conservation of tropical forests, and sustainable development in general (SP-9A). Similarly, environmental goals can be used as guidelines for the integration of responsible practices. After developing their first "sustainability plan", QC-4A expects that "only 28 % of the food" they buy will be "animal-based food". Conversely, the negative biophysical and environmental consequences of the dominant food system also constrain the emergence of responsibility. For QC-6A, local honey production is compromised because "in Québec, there are many monoculture fields" and this "diminishes floral resources. […]. A bee, to be healthy, must have between 12 and 15 different kinds of pollen in its diet. So, when you have bees and there are only corn fields around […], they can get sick, are weakened". The presence of conventional agriculture constrains the production of organic honey because "a bee can [pollinize] 5km" and "if you are in the South Shore of Montreal [the largest urban center]", "it's impossible that within 5km everyone is organic" (QC-6A). For SP-3A, implementing "regenerative agriculture" is hard because agricultural properties are currently "very dependent on 'agrotoxics' […] ecologically speaking" and, as a consequence, "the properties are totally unbalanced ecologically".

Technology, infrastructure, and knowledge

Technology, infrastructure, and knowledge are contextual enablers in both small and large ways. The adoption of a "simple 4-column notebook" to record food products "consumed, exchanged, sold and donated" helped women farmers from Vale do Ribeira better keep track of their production, which increased their autonomy and brought "several reflections on how the production of women farmers is diverse" (SP-15A). QC-14A noted that "there were a lot of [fresh products] losses, because […] there was no cold room" in public markets. He thus invested in

infrastructure and installed a cold room that saved “two hours of logistics per market”, which allowed them to reduce the losses from “20 % to 5 %” (QC-14A).

Participants described how the integration of responsibility benefitted from knowledge availability. Being in contact with another organization with a similar structure was important to the creation of SP-10 because it relied on this other organization’s experience (SP-10A). QC-6A did not have “enough knowledge” to create an organization but discovered “a new course” that helped him to obtain “all the information” to “understand and manage the hives” (QC-6A). Gathering knowledge from successful models in alternative agriculture and social business was important to the creation of SP-7 because its model is an adaptation of the Community Supported Agriculture (CSA) and “an inspiration in terms of business […] from the Riverford farm”. The team put together this model “based on the Yunus theory” (SP-7A). To encourage institutions to increase their share of local food supply, QC-5 relied on “the final definition [about what is a local food] of *Aliments du Québec* [not-for-profit organization that promotes agri-food products from Québec]” because it was “clear” (QC-5A). SP-4 was created when the Brazilian Food Guide was published and the founder “used it as a basis” for the organization’s work. In addition, support from an experienced mentor gave SP-4A “all the foundation, all the security” and this was essential: “To be a woman entrepreneur is very hard, you don’t think you’re capable […] and having someone who says: ‘you’re capable’ […] is fundamental for things to happen” (SP-4A). The best way to develop SP-14’s business model, which includes regenerative agriculture technology to support large-scale production, was to “couple it with the huge knowledge that a grower already has.” As a result, “one ends up complementing the other” because “the person already […] knows a lot about the specific crop” (SP-14A).

Technology, infrastructure, and knowledge constrain the emergence of responsibility in different ways. SP-10A pointed out that “when you set up […] an internal management system […], what is available on the market is always within the same parameters: you buy for X, sell for X plus profit […] and nobody needs to know how much is X, nor how much is the profit, nor how much is the tax, nor how much is anything”. However, SP-10 needed a software to “show who the producer is, what you are paying, how much you are paying in taxes, how much you are paying in contribution” (SP-10A). For SP-11A, organic corn and soybeans production is limited because

“companies do not see organic as a consumer market for large tractors, agricultural machinery, harvesters” and offer machines that “compact and kill the organic soil”. Maladapted infrastructure constrains the emergence of responsible practices: SP-4 wished to do rooftop agriculture, but “the buildings are not prepared for this.” Likewise, QC-8A argued that the production of vegetables “doesn’t necessarily apply to all [roofs]”.

Economic and market aspects

Though economic and market aspects are mostly perceived as obstacles by our participants, dedicated funding and market pressures contributed to the emergence of responsibility. QC-1 “obtained 50,000 dollars” from a financial institution devoted to sustainable local economic development for “the implementation of a social integration pathway” (QC-1A). SP-7A “raised money from angel investment”, which enabled SP-7 to relocate to São Paulo and eventually scale their activities. Another contributor is the market pressure for food products that integrate responsibility principles. For SP-9A, “there is an international demand for sugar and ethanol without slave labour, without child labour, without deforestation. Orange juice with fewer agrochemicals, oranges that do not come from irresponsible practices”. This market demand for being “more responsible, more sustainable” puts pressure on actors (SP-9A).

One of the explanations for economic and market dynamics being perceived mostly as constrainers is that, while the values shared by actors who integrate responsible practices differ from those of the dominant food system, responsibility-oriented organizations still operate “in a capitalist market” (QC-7A) where dominant food practices tend to prevail. QC-15 faces challenges “to bring food industry actors to collaborate to improve the resilience of local food systems” because they “don’t see this as being part of their mission”, yet their contribution is “essential” (QC-15A). For QC-2A, retailers “who buy their vegetables at the Central Market, which are imported vegetables, […] don’t really know where they come from”, create a difficult competition because they end up being next to them even if they “offer products from small, local, organic farms”. For QC-11A, “if you talk to the big guys, the big producers, they’re aiming for export, always. [...]. It’s more advantageous in terms of price”. SP-3A explained that if you “go along the

conventional market" logic, "the banana has to be big and shiny", while for them, quality is related to "the way the fruit was produced, how it was made, what was applied to the fruit". But they are "excluded" from the market "anyway" because "there is no standard" (SP-3A). SP-5A argued that "the economy of scale pushes people out" of the market "naturally", making it difficult for small growers to resist. In his opinion, "the only way for small producers" is to operate in a "cooperative or a big agro-system", otherwise they tend to "disappear" (SP-5A). SP-10A mentioned the limited financial capacity to rent a place in São Paulo because it is "very expensive and the degree of guarantee required is unreal" (SP-10A). QC-3A was "trying to bring about changes" and asked other hospitals: "why don't we put in a bid through our purchasing group to get sustainable tuna?" But the others declined because institutions pay for the "cheapest" food products (QC-3A). Finally, though there is growing consumer interest for responsible food products, "there is a large portion of the population that cannot afford" to make these food choices "even if they wanted to" because they simply "don't have the [financial] means" (QC-12A).

Political and institutional context

Public programs and legislations that promote responsibility and create protective niches contribute to the emergence of responsibility. QC-12 emerged from "a mobilization led by the Regional Council of Elected Officials […] that wanted a network of people who work in food in Montreal" (QC-12A). Likewise, SP-2 started as a result of a "public program of the municipal government" (SP-2A). QC-8 was able to build an urban farm on the rooftop of a grocery store because "the mayor of the borough […] had this vision" and required the installation of green rooftops on buildings (QC-8A). QC-13's founders "had identified a need in their community" and applied to "a federal program" to create an organization that would "employ young people to deliver meals to seniors" (QC-13A). SP-15 emerged thanks to a "policy of public technical assistance" that the federal government launched for organizations that "work with women farmers" (SP-15A). QC-1 was preparing an application to a public program for organizations that "produce fruits and vegetables […] and that would give 75 % of its production to a food security

organization," which aligns with their mission. The Brazilian federal law requiring that "at least 30% of all federal resources passed to states and municipalities be used to purchase directly from family farmers for the school meals program" gave more stability to family farms (SP-13A). QC-7, which has a not-for-profit legal structure and for which there is rarely, if ever, any funding from the Ministry of Agriculture, "jumped in" when such an opportunity arose, "got the grant" and developed a training program with a regional college. SP-2 obtained "a lot of sponsorship" in the beginning, which was fundamental for creating the organization.

Regulations poorly adapted to responsibility principles were perceived as constrainers. Though QC-5 works to increase the share of local supply in institutions, food distributors are not required to indicate the origin of the products they offer: people who get "an order list and see 'carrots' […] are going to look for what's the best price available right now. So, if it's carrots from Québec, then, it's carrots from Québec" they get, but carrots have "the same code all year long", which means that the distributor "can't tell you if the carrots come from Turkey or from Québec" (QC-5A). Legislation that "helps companies wanting to donate food" would help SP-1 because supermarkets "are afraid to donate" and throw the food away since "it is cheaper and easier to trash it than to make a donation" (SP-1A). The main challenge faced by SP-9 "is the Brazilian government" because of its "environmental and social setbacks that go against everything" they "have been building in the past 25 years" (SP-9A). The recent dismantling of the National Council for Food Security and Nutrition (CONSEA) by the Bolsonaro government is a "very serious" threat to family farmers' public supply and to "the main pillar of the social participation structure in the food security scheme" (SP-13A). For QC-15A, "a societal vision to act in a systemic way" is still missing from the different ministries, and the need to "rally" all actors becomes more acute as "everyone is pursuing his or her own objectives". In SP-5B's view, "civil servants are very alienated, in the sense of being subject to alienation" when it comes to public policies: they usually "receive public policy guidelines that are often full of intentions, and very few tools to make them feasible." Furthermore, whenever there is a leadership change, they wonder "well, what will come this time?" Sometimes, good initiatives are simply "buried alive" because "those who come after don't think it deserves to continue living" or manifest a stronger opposition as these initiatives get "more structured, more efficient" (SP-5B).

Sociocultural and demographic context

Our results show that positive attitudes from civil society in favour of a food systems transition contribute to the emergence of responsibility. There "is a will to go further and faster in environmental issues" because "people are more informed" (QC-8A). QC-1 is the result of community concertation, "mainly women who asked themselves: 'what can we do in our community, in terms of health...in terms of development?'" (QC-1A). To SP-13A, social participation plays a "fundamental role" when it comes to food because "it touches on very basic things of the human being". The integration of organic products from family farms in school meals in São Paulo comes from "a demand from São Paulo's civil society since the 90s" (SP-13A). After a federal law was passed, resistance from the São Paulo City Hall was strong and it proved "very hard to get the managers down from their horses regarding the school food policy towards family agriculture" but "civil society came along and said: 'are you kidding me? […] It's a federal law, you need to respect it'" (SP-13A).

Public opinion evolved in favour of responsible practices, but challenges remain. For QC-9A, the "whole eco-responsible aspect" still lacks clarity. Responsible projects are also "limited by the fact that there is only a small percentage of the population" that is aware of the practices they are "trying to put forward" (QC-2A). Finding people to participate in SP-6's network was difficult in the beginning because it was something new and people would say: "this works in Germany; Brazilians want to take advantage of everything; this won't work here" (SP-6A).

Consumer behaviour and diets

In parallel to sociocultural and demographic changes, consumers' interest towards responsible practices in food systems has also increased. SP-2A observed that "middle and upper-middle-class" consumers want to know whether they are giving money "to a company that uses local labor, manages the land well, doesn't use pesticides, generates jobs and income". Consumers' willingness to access sustainable food products led to the creation of QC-10: "three roommates were tired of paying too much for over-packaged organic food and wanted to order in larger

quantities...to get better prices and create less waste." They chose to "create a buying group and invite people they know to order with [them]. And the response was great […], it grew very, very fast" (QC-10A).

Established consumer behaviour practices are mostly described as constrainers when the social or environmental value of responsible food products is not fully understood. "People have to believe in it" because, "from an economic point of view," we "end up offering things that are more expensive and for which the added value is not necessarily understood by the majority" (QC-2A). Conflicting views about the concept of food quality are also constraining. Sometimes "people criticize the quality of a product, without knowing about it" (SP-8A). For instance, "in this season, a tangerine may not look as good as it would in another season, but it's good inside, you can eat it and you'll see that it's good" (SP-8A). QC-10A realized that "there were people who placed one or two orders and did not return afterwards" and this was in part due to "the time it takes" to pack their orders. SP-6A observed that "a lot of people stopped" participating, saying: 'look, we think everything is wonderful, but we don't have time to cook at home […], with the rush in our daily lives, we prefer to have lunch somewhere where the food is ready'".

Food supply chain

Responsibility-oriented organizations and practices may require new kinds of suppliers or new ways to evolve within an existing supply chain, which may explain why we found more evidence of this contextual element as a constrainer. Nevertheless, exceptions were found. For instance, the creation of a network of women farmers was essential to SP-15 because, together, they were able to "guarantee a higher [volume] freight", which gave them a "sense of freedom" and capacity to sell larger quantities and more diversified products to a variety of buyers. Organizing "collective marketing" with other growers helped QC-11 to keep the volumes and quality high because if they do not "have a product one week, another producer brings it." To supply public markets directly from growers, QC-14A created a "supply mutual" to "share the cost of a human resource" and "a truck" along with three other public markets.

Multiple constraining effects of the supply chain were observed. QC-3C could “find suppliers” of local cheese but they may not “have the volume” or format needed and, if a large block of cheese needs to be cut into smaller pieces it means “an employee has to cut it” and “that’s a lot of time”. QC-5A realized that institutional supply from small growers requires “adjustments” at different levels, for example, “carrots are washed, but not pre-peeled”. QC-10’s “dream was to do direct trade” but they still “did business” with “major distributors” and found it hard to know who produced certain products (QC-10A). Despite the Brazilian legislation requesting public institutions to buy from family farmers, a misaligned supply chain explained why “there were many calls for a bid where nobody showed up or those who did were not qualified” (SP-5B). QC-15A recognized that, to many growers, pesticides are “an essential work tool” and “they are afraid that they will be required to use zero pesticides overnight”, which would “completely undermine” their “business model”. For SP-14A, the production of organic poultry was limited because “there was no organic food for these birds”. SP-12A realized “it is very difficult to find” a diversity of “organic fruits, vegetables and greens” to compose their food baskets in São Paulo. As aptly summarized by SP-7A, “the main challenge is to put to work a complex system that doesn't exist yet.” The complexity of the dominant food chain is much greater, “but it’s already working, it’s already there. It has been built over hundreds of years. So, it’s very challenging to build a chain from scratch” (SP-7A).

Interpersonal relations

From our inductive analysis, we found that interpersonal relations were an important mediation mechanism that helped to eventually turn contextual dimensions initially perceived as constrainers into enablers. This was observed through all the contextual dimensions, except for the biophysical and environmental context. SP-3 “realized that where there is a lot of competition”, nobody “stands out.” They thus started to “have collective meetings and coordinate interests”, which helped them to implement responsible market dynamics, including cooperative sales (SP-3A). To QC-11A, even though there are market opportunities for organic and small farmers to supply restaurants or institutions, “farmers may embark in projects” where

“the owner wants” to introduce innovative practices, “but the cook doesn’t.” Yet, “you need to have a good relationship with the kitchen, with the knife and the cutting board. If they love you, you’ll pass on a lot of vegetables. That’s the key” (QC-11A). QC-4A recognized the impact of the university as a consumer but thinks that if other universities worked in collaboration, they would have a bigger impact on the food supply chain. Therefore, she was building relationships to “get all the universities to really start tracking their purchasing”, hoping that “together” they will be able to “identify the gaps” and “put pressure on the distributors or the producers” (QC-4A). SP-6 started because parents participating in a local school wanted to change their food consumption practices but couldn’t find sustainable food products in their region. Building a relationship with a person who knew about Community Supported Agriculture (CSA) practices was essential as they “asked if he could come” to “talk to the interested parents” (SP-6A). QC-1 emerged out of civil society mobilization, but it was created by “people who came from elsewhere” and had to manage conflicts with local organizations that felt threatened by the newcomers (QC-1A). In SP-15A’s view, the Vale do Ribeira territory is “a little worn out” “because a lot of people had already been there and said a lot of things and left.” As they faced social resistance, “building trust with women farmers and also listening to them” were essential to the introduction of responsible practices. SP-11A had a good relationship inside the organization and felt trusted to develop innovative technology and infrastructure regarding chicken breeding without antibiotics. To QC-9A, raising the awareness of top-level managers within the institution was essential to the development of public policies that integrate responsibility characteristics.

Discussion

Context both contributes to and constrains the emergence of responsibility in food systems

Table 3 summarizes our key findings, stressing how the eight contextual dimensions we empirically fleshed out both contribute to and constrain the emergence of responsibility in food systems. Our findings bring more depth to recent research conducted by scholars with an interest in responsible innovation in food systems. They also articulate into a more systematic and coherent whole contextual elements that, so far, have been signposted in various studies that

did not analyze their relationships, how they contribute to or constrain the emergence of responsibility as well as their role in the food systems transition.

Tableau 14. (Table 3 from paper 2) Summary of the study's findings: the influence of eight contextual elements over the emergence of responsible practices and organizations in the food system

Contextual dimension	How it contributes	How it constrains
Biophysical and environmental context	Call for the creation of organizations addressing environmental issues and for the establishment of eco-responsible guidelines	The longstanding or site-specific effects of the dominant food system's biophysical and environmental consequences
Technology, infrastructure, and knowledge	Support the needs of responsible organizations and practices	Difficulty to perform the required actions due to lack of materials, technology, or knowledge
Economic and market aspects	- Market pressures to implement responsible practices - Funding dedicated to the integration of responsible practices	Responsible organizations and practices need to work within economic and market dynamics from the dominant food system
Political and institutional context	- Political will and vision of a transition towards responsible food systems - Public policies that promote the purchase of local and organic food in institutions - Public programs that support the emergence of responsible organizations and practices	- Regulations shaped by the dominant food system - Conservative political views promoting a social and environmental setback - Limited capacity for change in public administration bodies
Sociocultural and demographic context	Favourable change in public opinion towards responsibility in food systems	- Limited awareness and lack of consensus regarding responsible food practices - Societal resistance to innovative food practices
Consumer behaviour and diets	Increasing consumers' interest in sustainable food practices	- Consumers' limited understanding - Attitudes towards prices - Capacity to pay for the products - Behaviour changes required by responsible food practices
Food supply chain	Collaboration with other actors facing similar challenges	The need to create an entirely novel supply chain

Interpersonal relations	Mediation mechanism that can turn contextual constrainers into enablers

One key contribution of our study is to empirically show the more complex ways in which "context can bring about contrary effects" (Latour, 1996, p. 137) in the emergence of responsible innovation in food systems. As illustrated in Figure 2 and summarized below, seven contextual categories were both contributors and constrainers.

First, our findings highlighted that if biophysical and environmental elements can contribute to the emergence of responsibility when they serve as triggers or goals, the deleterious biophysical and environmental consequences of the dominant food system constrain the ability to integrate responsibility characteristics. Because our findings account for two regions with different biophysical and environmental characteristics, they reinforce the importance of linking responsibility in food systems to the domestic impacts of dominant food practices.

Second, while technology, infrastructure and knowledge meeting the needs of responsible initiatives enable their emergence, these elements have been shaped by the dominant food system and, as a result, they hinder the integration of responsibility characteristics. This adds to research highlighting the need for a transformation of innovation systems to enable the development of innovations that can positively impact food systems (Herrero and et al., 2020; Steiner et al., 2020).

Third, adding to previous studies indicating that access to the market, economic incentives and dedicated funding contribute to the emergence of responsibility (Blok et al., 2017; Herrero and et al., 2020; Shnayder et al., 2016; Steiner et al., 2020), our results show in greater depth how prevalent economic and market dynamics inhibit responsible food practices.

Fourth, several scholars have pointed to the contribution of government support, supportive regulations and favorable governance to the emergence of responsibility (Abdullah et al., 2021; Blok et al., 2017; Dias et al., 2017; Prag and Henriksen, 2020; Rocha et al., 2012; Shnayder et al., 2016; Steiner et al., 2020). Others have highlighted that conservative or maladjusted political scenarios encourage the maintenance of the status quo (Dias et al., 2017; IPES-Food, 2020). Our

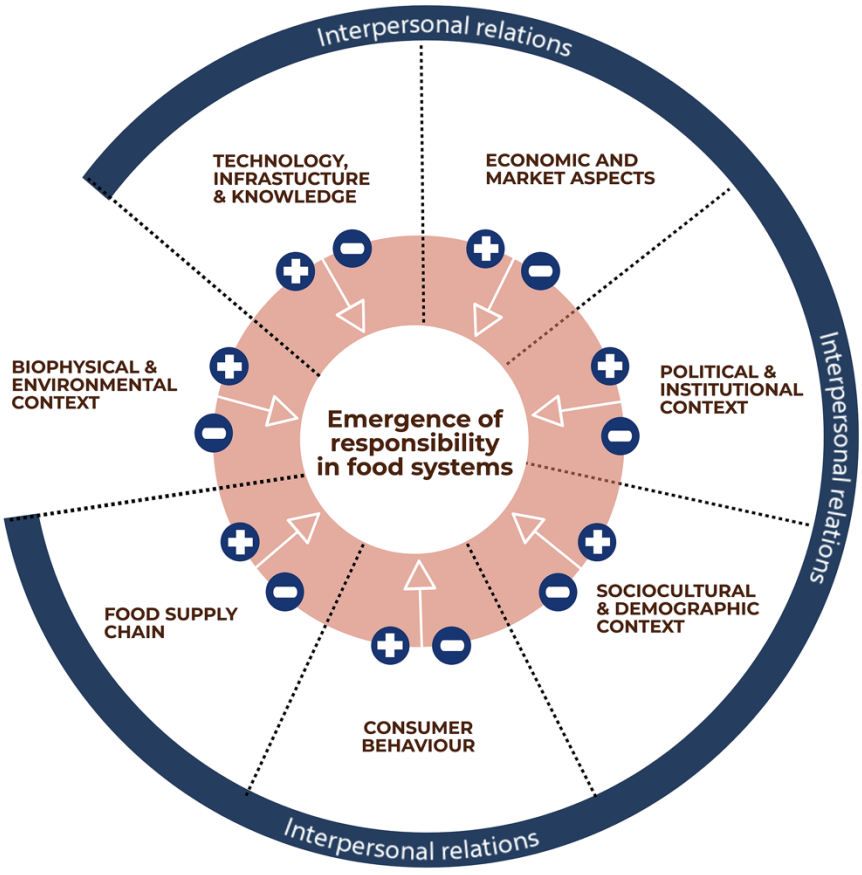
findings add to this literature by empirically showing in a single study the dual role of political and institutional context in the emergence of responsibility in food systems.

Fifth, in addition to the observations of Crosta et al. (2020), Shnayder et al. (2016) and Steiner et al. (2020) about the enabling role of societal awareness and favorable consumer behaviour, our study stresses how, even though public opinion has evolved positively, the lack of awareness, consensus, trust, and financial means restrains the integration of responsibility in food systems. As our participants pointed out, changing consumer behaviour is a challenge, especially when there is an economic trade-off involved or when changes in consumers' routines are required (Bruce and Som Castellano, 2017).

Sixth, our study emphasizes how current supply chain dynamics constrain the emergence of responsibility. This complements research on the constraining role of incompatible resources in the implementation of responsible innovation (Covello and Iatridis, 2021). Our findings regarding the enabling role of collaboration among actors to fill supply chain gaps also add to previous studies showing the contribution of networks comprised of individuals and organizations in the integration of responsibility characteristics (Dias et al., 2017; McKitterick et al., 2016; Steiner et al., 2020).

Finally, our findings indicate that interpersonal relations are an important mediation mechanism in most of the contextual elements analyzed because they help transform constrainers into enablers in a deliberate way. For Latour (1996), "every context is composed of individuals who do or do not decide to connect the fate of a project with the fate of the small or large ambitions they represent" (p. 137). Likewise, our findings underscore that context is composed of actors who, by exercising their agency, can make it favorable or hostile to the emergence of responsibility in food systems.

Figure 11. (Figure 2 from paper 2) The mediating role of interpersonal relations over the contextual dimensions that both contribute to and constrain the emergence of responsibility in food systems



From: Prepared by the authors

Another contribution of our study is to provide a model (Figure 2) that illustrates the mediating role of interpersonal relations over six of the seven contextual dimensions. This model draws attention to why food systems transformation requires the design of favorable institutional environments aiming to pursue a common goal. For instance, while public policies that support the recovery of ecosystems can make the biophysical context less hostile to responsible food practices, it is also necessary to simultaneously address other contextual elements to more fully enable the emergence of responsible practices and organizations. In addition, the model highlights the risk of letting current contextual dimensions further undermine the development of responsible food systems if these dimensions mainly serve to reinforce the path established

over the years by dominant food system practices. Overall, our model can inform both research and policy that promote the design of institutional environments (HLPE, 2019) that deliberately create protective niches (Lehoux et al., 2019) to spur "innovative systemic changes" and make food systems a "powerful driving force" towards achieving the Sustainable Development Goals (FAO, IFAD, UNICEF, WFP and WHO, 2021).

Policy implications

Food systems transition is "a powerful lever to enhance social justice, ecosystems restoration and protection, human health and well-being across the globe" (Caron et al., 2021, p. 2). Such a transition cannot gain traction without a clear comprehension of the contextual elements affecting the emergence of responsible innovation. Our research can inform policymakers about ways to engage contextual dimensions to favour the emergence of responsibility. This can be achieved through financing programs that support the integration of responsibility characteristics or policies that fully value the social, economic, and environmental advantages of the food products from responsible organizations. Regulations aiming to either reduce or economically account for the negative biophysical and environmental consequences of the dominant food system could increase institutional alignment with responsible food production. Also, research programs to promote the development of technology, infrastructure and knowledge focused on the needs of responsibility-oriented organizations and practices could help turn these constraining contextual elements into enablers. Additionally, promoting social awareness and building consensus regarding responsible food practices, and reducing barriers that limit the production and access to such products, especially socioeconomic barriers, can make the context more favorable to the emergence of responsible innovation in food systems.

Further research

This study analyzed the contextual elements influencing the emergence of responsibility in food systems. Contextual elements established by the dominant food system have been shown to limit this process. This is expected since these elements tend to reinforce the *modus operandi* established in the past and reinforced by feedback loops and 'lock-ins' that keep the industrial

food system firmly in place (IPES-Food, 2016). Even though our study shows examples of contextual elements that contribute to the emergence of responsibility, scaling up this process and, therefore, promoting a deeper food systems transition will require the transformation of the entire innovation system (Herrero and et al., 2020; Stahl, 2019; Steiner et al., 2020).

An important topic to be addressed in further research is to understand how to bypass locked-in constraining contextual elements. The literature on path dependence can inform such analyses. It describes a lock-in as "the entry of a system into a trapping region" (David, 2001, p. 10), or a "hard-to-escape situation" (Vergne and Durand, 2010, p. 743). Path-dependent systems may lead to "places everyone would wish to have been able to avoid" (David, 2001, p. 10). Though it's always possible to "reopen the lock" (Beyer, 2010, p. 195), this requires some external force that alters the underlying structures and the coordination of interests (David, 2001). The IPES-Food report stresses that breaking current lock-ins requires strengthening emerging opportunities to empower multiple 'agents of change' (IPES-Food, 2016). Further research could thus examine how breaking out of the locked-in path may result from contextual actions taking into account the potential of responsible food system innovations to address current societal challenges (Vanloqueren and Baret, 2009).

While understanding the role of context in the emergence of responsibility-oriented organizations and practices is key to research on food systems transition, attention should also be paid to the context of appropriation of novel practices (Lehoux et al., 2019). Further research could tap on our findings to analyze how the categories we fleshed out shape the institutionalization of responsible innovation in food systems. Building on Figure 2, scholars could clarify how the various contextual elements may work in opposition or in synergy in food systems transition. Lastly, comparative analyses within and across countries remain an important area for further research.

Limitations of the study

The case study is an empirical research method that allows studying a phenomenon in-depth and in its real context (Yin, 2018). It is, therefore, well suited to achieve the purpose of this research. However, case study research has pitfalls that can reduce the scientific rigour and credibility of

the approach (Crowe et al., 2011). To increase rigour, we selected numerous and highly knowledgeable informants with diverse perspectives of the phenomena and invited them to validate emerging findings (Eisenhardt and Graebner, 2007). The coding strategy was developed and refined by the two coauthors and other research team members criticized our findings and shared many insights that helped to increase the internal validity of the research.

Even though we followed rigorous methodological standards, our study is not without limitations. One important limitation lies with the lack of consensus regarding what responsible innovation in food systems is and what it is not. Our data collection was thus structured by adapting a framework from the health domain, which may have led us to miss relevant organizations. Another limitation is linked to the large number of organizations in each case. Though this can be seen as a strength that increases the robustness of the findings, we could not describe case-specific dynamics due to the large volume of data.

Conclusion

In this study, we opened the 'black box' of how contexts shape the emergence of responsible innovation in food systems by detailing their multiple underlying categories and their dual influence. Our study articulated into a whole what has remained so far, a series of disparate observations about the role of context in food systems transition. Beyond showing that contextual dimensions inherited from the dominant food system limit a transition towards a more responsible food system, the model derived from this study can inform research on why food systems transformation requires building institutional environments that protect responsible organizations and practices. Our study provides empirical flesh to the argument that responsible innovation should not be conceptualized as resulting from the virtuous motivations, efforts, and ability of individuals because the whole food system is involved. Thus, we stress the importance of creating a more favorable context of emergence. To conclude, our study reinforces the power of actor's agency to deliberately shape contextual elements. Henceforth, practices aimed at addressing food-related societal challenges can produce contextual elements more suitable to the emergence of responsible innovations and, therefore, favourable to food systems transition.

Funding

The first author holds a Ph.D. training grant from the Fonds de la recherche du Québec — Société et culture (FRQ-SC; #292266) and is supported by the In Fieri research program, which is funded by the Canadian Institutes of Health Research (CIHR; #FDN-143294). Our research center, the CReSP, is. The publication of this paper was partly financed by the Centre de recherche en santé publique (CReSP), which is supported by the Fonds de la recherche du Québec — Santé (FRQ-S)

Acknowledgments

We are grateful to the interviewees from Québec and São Paulo who generously shared their experiences and made room in their schedule to contribute to this study. This article stems from a Ph.D. project conducted within the In Fieri research program (www.infieri.umontreal.ca) on Responsible Innovation in Health led by Pascale Lehoux. We would like to thank members of our research team who provided us with insightful comments: Catherine Hébert, Hudson Silva, Hassane Alami, Lysanne Rivard and Robson Rocha de Oliveira. A special thanks goes to Lysanne Rivard, who proofread the revised version of this paper.

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Supplementary Material

Additional evidence of contextual contributors and constrainers

Biophysical and environmental context

Organization	Excerpt	+	-
QC-3	After that, what we said to each other within the team, we said "we should have help" because we thought of [confidential organization name] which is a company that is very focused on the environment and all that, except that [confidential organization name] is organic. They work a lot with organic products. So, it was like... "if you want to work with us, you should add organic to your list". Okay... okay, so we said, 'why not? Let's try it, let's see' […].	X	
QC-3	Well, it's to continue to increase our local and organic purchases and this year, what we started to do, the hospital... well, we are not extraordinary, the government asked all the institutions to have a sustainable development committee, so this year, our objective is to either compost, or to recover residual materials, or to get what we call a dehydrator and to put all our food scraps in it and to generate a powder, so the goal is to reduce the food waste So that's our goal for the next year in addition to our local and organic purchases of course.	X	
QC-4	QC_4 just released its sustainability plan or they're working on a sustainability plan, and it should be published within the next couple of months. It's in the final approval phases. And this is the university's first sustainability plan. […]. And what they cover in the food stream is local sustainable purchasing, urban agriculture is another one, reporting is really important, food insecurity as well. So, yes, there's purchasing as one aspect and then the other is to encourage growing food on campus. And so, there are different student groups like campus potager, and you also have a greenhouse on this building over here. And it's to be able to support them and make sure that they have... to work with facilities so that they don't lose their access to the grounds.	X	
QC-4	Yeah, so back to the sustainability plan and the food stream. One thing that is exciting is that we have a target of that only 28% of the food that we buy – this would be the Aramark food that we buy - would be animal-based food. So, we're saying that the cheese, the milk, the meat, I guess honey as well, that that could only constitute 28% of all of our purchasing.	X	
QC-6	Bees are dying because of several factors, pesticides. In Québec now, we have many fields, we have monoculture. That is to say that all the fields are made of corn, soybeans, there are more cows; before, there was a lot of grazing by cows, which meant that there were many flowers. But now they've kind of eliminated that, it's just corn, soybeans, because that's what pays the most for a farmer, I think, now. And the problem with those monocultures is that it diminishes the floral resource. So, there's less diversity of flowers. A bee, to be healthy, must have between 12 and 15 different kinds of pollen in its diet. So, when you have bees and there are only corn fields around and all these fields are treated with Rand-up to remove weeds, you're actually destroying the floral diversity, so it causes the bees to have less pollen sources and they can get sick, they get weakened.		X
QC-6	There are certified organic beekeepers, but I don't believe in them because the regulations in Québec don't work with the path that a bee takes. They do this 3 km, a bee can do 5 km. So, basically, even if you are certified organic, if you are in my region in any		X

	case, if you are in the South Shore of Montreal, it is impossible that for 5 km, everyone is organic. But maybe in Gaspésie, in Lanaudière, where it is larger, it is perhaps true because the bee is in 5 km and there is nothing, it is wood, it is larger, it is vaster, but for me, I do not believe in it. [..]. In any case, the land I bought, my neighbors directly next to me grow [wheat 1:02:18] and soybeans.		
QC-6	You know, in Québec, I think they import a lot of honey from Argentina, Brazil. It's because they have seasons all year round. The advantage of the South is that it is summer, all the time, so there are flowers all the time, the bees work all the time. That's kind of our limitation.		X
QC-7	So, there is that element. Well, all the catastrophic environmental news [laughs] works in our favor in the end. Of course, every time we hear about the environment and climate change, every time we have a meeting, the city has a meeting about the climate and what to do in the city, and everyone keeps talking about urban agriculture. But it's not just that, there's transportation, there's waste, there's plastic, there's factories, there's... urban agriculture, I don't know, it comes to people's minds right away, in terms of environmental issues.	X	
QC-11	It's hard Bio, it has big challenges. One of the challenges we have here in the south, because we are in the south of Québec, it's hot. […]. With climate change, there are many new insects. New diseases that settle and that before were not there. […]. There are a lot of bugs that come from the south. They wake up in Georgia in March. They come up, they come up, they come up. But now they wake up earlier in Georgia. They end up here. They used to get here, and winter would come, and it was over. They didn't have time to settle down and do their damage. Also, all the imports and exports have brought us a lot of insects that weren't here before. That's classic in the agricultural world. The hardest thing to deal with in organic are the insects.		X
QC-11	The old guys that I learned from; they didn't irrigate. They had an irrigation system, and it was like, “ah, it's no use”. But now, in May, you need to have the irrigation system ready to fire. Ready to fire water because you can go into a drought for 30 days anytime during the summer. And we have 120 days of growth. If you have 30 days where you don't have water, you lose a third of what could grow. It won’t work.		X
QC-15	That's... there's the whole question... there would be a lot of it, but the question of access to water also in the management of water in the environments. Yes, in the context of climate change, we know that it's going to be a big issue for cities to manage all the water from [runoff 54:21], but also in the agricultural environment, we know that there is a lot of contamination of the groundwater are [54:26] because of the issue of pesticides.		X
SP-2	A very interesting thing that happens is that, nowadays, companies have big budgets for this social-environmental area, but they have few people to carry out these projects. So, in this case they outsource it to organizations that are serious enough to do it. Then they give the money and then do the supervision of the project. (SP-2)	X	
SP-7	Because, in fact, the main structural problem that the world will have in the next 50 years is topsoil loss. So, we strongly believe in the power of regenerative agriculture as something that will give resilience for humanity to face all the problems that will come in the next 50 years. So, we have this inspiration of this technology that Ernst systematized, but that no one has yet managed to structure an economically viable model. And that is called ‘bubble’ (laughs).	X	
SP-9	SP_9 was founded in 1995, then very influenced by Rio 92, and the concept of sustainable development, very influenced by the serious cycle of deforestation that took place in the	X	

	late 80's and early 90's. There is a whole debate about the conservation of tropical forests in the world, and very influenced by the foundation of the FSC, which is the forest certification system. There is a whole debate about the conservation of tropical forests in the world, and very influenced by the foundation of the FSC, which is the forest certification system, which was seen as something very innovative for the forest sector.		
SP-9	So, to oversimplify, I believe that the great difficulty is that the forest is still worth more if cut down than standing. Planting forests is more a cost than a benefit.		X
SP-13	Before talking about that, but talking about this, I'd like to mention another benefit that the policy brings to the rural environment, which is the issue of the purchase of organic products by the São Paulo City Hall. People start to get interested, for financial reasons, because organic products pay 30% more and they start to make the transition in the rural environment. [...]. Brazil is a country that is very dependent on agrotoxics, and here I am ecologically speaking. The properties are totally in ecological unbalance because of the massive use for 70 years, which is more or less the time that we used pesticides massively in Brazil. The transition has a cost, when you leave the conventional system and enter the agroecological system, production drops. It is necessary to have a financial stimulus, so 30% more.		

Technology, infrastructure, and knowledge

Organization	Excerpt	+	-
QC-1	Look at the scandal involving the agronomist who was fired from the Department of Agriculture, […] fired because he revealed that the Grain and Cereal Research Centre was being infiltrated by the industry […]. While everyone says: we must stop, we must reduce, we must decrease, we can see that in the places where decisions should be made to change, the industry has infiltrated and continues to intoxicate the environment.		X
QC-3	Calculating all the percentages, with our ordering software, it's not... you have to compare things, go and look up a lot of things by hand, because the software doesn't give you the whole…. […]. The software is common to the whole health network. We told the company our improvements, but you know...it takes time. This is technological […]		X
QC-3	Basically, the technicians, we had two choices, it was to have several phone lines that you answered simultaneously or a central one, so we are like a medical clinic. So, the patients all call the same number, and the technicians take them one by one. […]. So, we needed that technology. We had to create the computer software with [confidential organization name], which is our plan management company, [….]. We had to build it with them.	X	
QC-3	We also met a lot our supplier of software of treatment of menus... Because it's all well and good to want to do all that, but if we can't manage it, it won't work. So, we really had to have a close relationship with them to develop the application, so that it would meet our needs.	X	
QC-4	So, things that you're buying all the time you just put this on a short list so that you don't have to search for the product each time. And what I wanted to do was just on this list, look at it and just put Québec products on it, fair trade products on it. […]. We would just tell the buyer “Hey, go onto the short list and look”. […]. And then that way they are like “oh, I'm just going to buy these tomatoes”. Because they just want to do whatever they want to, ordering is annoying, so whatever the quickest way of ordering is the better. […]. So, if you leave off products that you don't want them to use, they won't buy them. And it doesn't matter who is doing the ordering. You're creating a priority list.	X	

QC-4	But that's the problem with traceability on the product side. It's just when their inventory systems aren't accurate enough to track the food. And then when we're dealing with processed foods that have multiple ingredients, it's the same thing. Like they're saying, "oh, we get our wheat here, here, here. We don't know about certain countries." Meat too, it can come from any...they just give you the name of a country. I mean, they don't even know beyond that.		X
QC-5	Also, the fact of giving a voice to institutions. It's like...precisely when you give the example of Sainte-Justine, then you give the example of many other institutions. It gives even more. Because when we called different institutions to promote the Aliments du Québec recognition program, they said: How did Sainte-Justine do it? How did so-and-so do it? Then when they learned that someone similar to them had done it...they would immediately say: "Oh, I can do it, I can talk about it...". So, video vignettes highlighting champion approaches that also really helped him...we did portraits...broadcast on social media. So, it's a set of different and diversified strategies to address everyone.	X	
QC-5	I think that it is on both sides in the sense that the institutions need more means to be able to supply themselves with these commodities which are sometimes more expensive. Then the producers, they sometimes need means to be able to really supply this market which is different from the institutional market. And sometimes, as I say, this can be done financially, but it can also be done through a support program, in different processing infrastructures, for example […]. The new Canadian Fund basically wants to have, for example, a distribution center where all the producers can send their products to be distributed... and then there is a first transformation. So, it can also be a technical support, in quotation marks.	X	
QC-5	When you walk through the grocery stores, in all the fruits and vegetables, it is indicated where it comes from. But for the institutional, there is not. So, someone gets an order list, and they see "carrots". Then, sometimes, it's not the distributor's bad intention, it's that they're going to look for what's the best price available right now. So, if it's the Québec carrot, it's the Québec carrot, and if it's another one...then for him… a distributor told me "[…] I can't tell you if the carrot comes from Turkey or Québec, it will have the same code in my system all year long".		X
QC-5	Yes, in fact...well at the local level, we decided to go with the ultimate definition of Aliments du Québec because... Aliments du Québec and Aliments Préparés au Québec, because it's really a definition that 1) was clear and established and 2) that more and more in the background has a recognized brand, so for an identification system for distributors it's something that is easy and accessible.	X	
QC-5	Why? I think it's really to have more local food. To really achieve a healthy, local, eco-responsible diet. I think that we can see it as well, 1) with the health level, with the new Canadian food guide, that we need to change some of our habits to be able to rebalance our plate. Then there is also the "Eat Lancet" report. We also see that our consumption, as we have at the moment, is not sustainable.	X	
QC-6	I felt that I didn't have enough knowledge yet because I had a lot of questions. I didn't have anyone left, I had finished my little training, so there was no one left who could help me answer my questions. And then I started to search on the Internet. I discovered that there was a new course […] which was "management and operation of a beekeeping business", and it was offered at a distance. […]. I really went to get all the information I needed to understand and manage the hives.	X	

QC-6	And when I finished my courses, I wanted to work with an experienced beekeeper first, someone who had been doing this for several years before I started myself. Then I found a beekeeper in Verschave, which was not far [...]. Then, when I showed up the first day to work with him, he told me he wanted to retire. [...]. It's been four years now since we've taken over and this gentleman is our mentor. [...]. So, if I have any questions, he is always there to help us, to encourage us.	X	
QC-7	Another challenge that we have, well it's all the challenges that are related to the city. It's accessibility, sometimes to access the roofs you must go through small stairs, through ladders, so to transport sometimes bags of compost and all that, it's not easy.		X
QC-8	[…] and it doesn't necessarily apply to all sites. Because you have to have the people who want to grow them. You must have an area... depending on the project. […] for a market gardener to make a living from it, you need larger areas. […]. The small surface does not make it possible to generate enough production for it to be economically viable for a farmer.		X
QC-8	Vegetable production requires a surface area that is quite large, and a system that is a little heavier than the traditional system. We are currently developing these models of rooftop farms. It takes a series of equipment, ideally an elevator to go on the roof. It takes a base that is still... important.		X
QC-9	There are many, many implicit issues that need to be better known. People, they have to know each other, they have to understand what they want. They have to anticipate. You know, changing a product takes time, sometimes it can go fast, but sometimes it can take a long time. You need to have a new machine to pack, because in the institution, often it's bulk or it's large formats. If they don't have that, they have to buy a new machine if they really want to. But will the investment be profitable in the long term? Will they be able to get regular contracts with institutions? There are a lot of unknowns. […]. This whole dynamic is extremely complex.		X
QC-10	It is a tool. […] it comes with the software […], it comes with a constitution, it comes with a whole structure in the background. […]. In any case, it's like a whole structure and a very rigid framework, but which basically allows to distribute governance and to better distribute decision-making power, to better empower the employees in the organization and to make the organization much more agile as well because it's a system that is constantly adapting.	X	
QC-12	We call on the expertise that already exists. For example, during the strategic planning process, we have a working group on food security [...] and the first thing was to really look at the literature, the research that has been done, the evidence. [...]. But it helps to... we were able to reach a consensus on: what is the problem? So, it gives us like terms of definition, like for work, to go forward.	X	
QC-14	And then there were a lot of losses, because at the time there was no cold room, the markets were not electrified, so in fact we used a cold room, but it was very far from our markets. So, when I arrived, […] my first thought was to say, "well how could we do to have less losses, to facilitate logistics and to improve a little our economy, our economic survival strategy for the market?" […]. So, we connected this market to electricity, we installed a cold room... and we enlarged it a little bit and this allowed us to do several things; first, to facilitate logistics, we saved two hours of logistics per market, which was a lot. It allowed us to reduce the losses of fruits and vegetables, we went from maybe 20% of losses to 5% of losses.	X	

QC-15	I think that the term "Nurturing Cities" has also come a long way since then, we are certainly not the only ones to have mentioned it. I think it was a good start for the cities to say, "we are going to act directly on this".	X	
SP-2	In São Paulo there is a great demand for organic food, everybody wants it. Many start-ups have emerged with this proposal of "I make an organic basket and deliver it at home". The idea is very good, but there is still a lot against it, because... here in São Paulo what really hurts this idea is the transportation issue, which is very expensive. […]. So, this is still a very big impediment.		X
SP-3	We produce today what people talk about a lot, which is regenerative production, which are productive systems that are the agro forestry, they are like the Indians did, lived, produced. In fact, it is a technology that our Indians already had and that today is becoming more fashionable. It is a production in which you do not depend on external inputs. You don't need a poison company to produce, you don't need a multinational company to buy seeds, […], you don't need chemical fertilizers.	X	
SP-4	We started like that, and, today, the vegetable garden has come down off the roof. We do roofs, we started doing just roofs, but the complexity of doing roofs is so...it's difficult. [...] The buildings are not prepared for this, the vegetable garden gets very wet, it is a 100% humid environment, you have to have a very well done waterproofing on the slab so that there are no leaks and infiltrations. [...] There is the challenge of the wind which is not very good for the vegetable garden. [...]. The soil profile ends up being compromised too, we can do it, but we can't grow all the species. Tubers, cassava, sweet potatoes, we can't because there is no space for the roots to grow down.		X
SP-4	When I went to ask my boss for my resignation he said "look, I am doing a completion work from a course I am doing in social business, which is urban gardens, why don't you take this work of mine and create a company?" [...]. Then I took this project [...] and turned the garden into a classroom to talk about food. This in 2014, which coincidentally was the year that the Food Guide for the Brazilian Population was released. So, I took hold of the guide, used it as the basis of all our work […].	X	
SP-4	I had good help. [...]. X is a great guy, he is incredible, he is a guy that gave me all the base, all the security I needed [...]. To be an entrepreneur is very hard, we don't think we are capable, [...], so to have someone who says, "you are capable, come here and I will teach you, you will do this here because you are capable", is fundamental for things to happen, so I don't even consider myself that I was very brave, I just had a very good support network.	X	
SP-5	Imagine, a public procurement notice, that comes out in the official journal of the municipality of Pedro de Toledo, the person doesn't even know where Pedro de Toledo is, let alone what they are going to buy. We set up a system, a robot in fact, that monitors all the purchase calls that come out in the state of São Paulo and makes them available in this panel here. […]. "I want to buy here from the city hall of Pedro de Toledo". What is she going to buy? "Pineapple, pumpkin, zucchini, these quantities and these values". So that the producer can be interested. If he is interested, he goes here and clicks, and the public notice is ready for him. […]. The producer starts to identify what he can sell and where.	X	
SP-6	What gets a little bit sticky in the financials is the lack of registration of the farmers. We're talking about needs, right? So, when you sit down with farmers in a CSA to talk to them like, "how much do you generally spend on electricity per month?" For example. He		X

	doesn't know. "What do you spend on seeds per month?" He doesn't know. Because […] he doesn't have time to manage.		
SP-6	[...] SP-6 Brasil created training courses, because people contacted us a lot, wanting to know a lot of things. We started to catalog these questions. [...]. We started to structure all this and set up a course to be able to help. It is not that we wanted to create a course, but it was necessary because, instead of us attending people individually, we said "ah, let's create something where people come, and we can spread this seed". And it worked out very well.	X	
SP-7	I think for me the starting pillar is the experience of regenerative agriculture. I don't know if you have heard of Ernst Götsch. I took a course with him in 2008. Our vegetable garden there on the farm that I set up with my sister is an agroforestry garden, with rows of trees every 12 meters, because we deeply believe in the power of regenerative agriculture.	X	
SP-7	Another very strong inspiration we have is the CSA, which is this technology in agriculture... I think it's an adaptation of the CSA plus an inspiration in terms of business that we have, which is the Riverford farm which is a farm in England […]. So, I put that together with a lot of the basis of Yunus' theory. So, when you look at, for example, Jaipur Rugs, which is a case of carpet weavers, we are doing a Jaipur Rugs of fresh food.	X	
SP-8	What also helped me, which is important to point out, is that the model I chose is an incredible model, it is a model that I believe that the food of the future, the food that will make sense for the planet and for people, will come in many forms, but one of them is the CSA, for sure, I have no doubt.	X	
SP-8	I used to see, for example, that there were no organic chickpeas in Brazil and one thing that helps me a lot is that I have a lot of traveling baggage and I used to see the United States a lot, where everything is organic, […] and I used to think: "Why don't we have them here? We grow so many soybeans; can't we grow chickpeas? […] until I researched an Embrapa project that has a seed, with studies, that would work better here in Brazil and then I contacted the Embrapa person […]. I said I needed this organic chickpea because it was a step I needed to take, and he said he would send it to me.	X	
SP-8	Yes, and here in my region there is a lot of sugarcane and soy, so many of them had no experience with horticulture. This was also a challenge because we needed to train them. And how to train these employees? This was a big challenge. I trained myself a lot, […] to be able to help them […].		X
SP-8	And I, over the years, I always talked a lot with people, and I ended up meeting people who helped me a lot in this trajectory, and still help me. One of them is an agronomist, who is called X, he is an agronomist that has more than 30 years of experience in organic, biodynamic, [...] and he was able to come and give a consultancy for us for a very affordable price.	X	
SP-9	There is a whole debate about the conservation of tropical forests in the world, and very influenced by the foundation of the FSC, which is the forest certification system, which was seen as something very innovative for the forest sector. A solution that would generate capacity, differentiate companies, producers. In short, there is a set of things that could catalyze changes in the entire forest sector and from this have a very clear vision of the economic component of sustainability as a fundamental pillar for the socio-environmental agenda […].	X	
SP-10	SP_10 was born from the idea of two people, […] that had taken a permaculture course, and when they came back from the course, they came back much more sensitized to the	X	

	question of food, but mainly thinking of things they could do to create a place for commercialization.		
SP-10	Infrastructure, I believe it is the one that was most idealized because we really thought that we could open with little investment in infrastructure, and in fact the less you invest in infrastructure, the more you pay with work. In general, you need to work much harder, to demand much more from the people who work, when you don't have a good infrastructure for these people to work in, and especially when you don't have management technology or even social technology for these people to work better.		X
SP-10	When you hire a management service, […], an internal management system, an inventory system […] what is available on the market is always with the same parameter: you buy for X, sell for X plus profit, and then you take your margin from there, regardless of which margin it is, and nobody needs to know how much is X, nor how much is the profit, nor how much is the tax, nor how much is anything. Basically, what happens is that we would need to have specific software engineering for us, […] showing who the producer is, showing what you are paying, how much you are paying in taxes, how much you are paying in contribution. All this is still very incipient.		X
SP-11	SP_11 also works a lot on what I told you about education through business. So, we develop the whole productive base, giving training and teaching them things they didn't know. […]. We can instruct our producers within the concepts of Mokiti Okada's natural agriculture. So, […] he receives a fantastic increment without paying anything for it. Just by working for SP_11, he already receives all this technology, which will be his.	X	
SP-11	The first, that the production of organics in Brazil, the agricultural equipment companies do not see organic as a consumer market for large tractors, agricultural machinery, harvesters. So, they are machines prepared for fertilizer and agrochemicals, for conventional soils. But these machines are very heavy, and they compact and kill the organic soil. So, for example, one of the biggest challenges we have is to produce organic grain, corn, and soybeans, without using herbicides and without having the agricultural implements for organic production.		X
SP-14	There is no possibility of adopting the package proposed by SP_14 without converting from what was transgenic or conventional to the organic system, because this is one of the first principles that we consider as a tool to regenerate. One of the things SP_14 does is precisely to give subsidies and technical support to this person that has never had contact with organic certification, doesn't know what can or cannot be used within the organic culture, doesn't know the necessary documentation, that is, it's a new world for this person.	X	
SP-14	We look at the main points and make the following relation: the person already produces a lot, so he knows a lot about the specific crop, like corn, for example. So, when we propose a package of activities to be done to address this issue of regeneration, we couple it with a huge knowledge that the person already has on how to produce, and then one ends up complementing the other.	X	
SP-15	I will give an example to explain: When we put all the requests in the spreadsheet and form a huge request, each group is already trying to contemplate all the groups, according to the offers they have for them to have a similar income. This is subjective, a platform doesn't do this for us. We have a comparison of income, for example, the X group has 7 women farmers, each farmer is delivering an average of R$ 200.00, and a group with two women is delivering more, so let's take from this group of two and move to the X. We have this freedom, we call it "redistribution", which is the principle of the solidarity		X

	economy. There is no platform that can do this. These are our operational limits, which we can't handle.		
SP-15	The notebook was a systematization proposed by the Women's Group of the National Agroecology Network. It has been going on for a long time. […]. It is a simple 4-column notebook with: consumed, exchanged, sold, and donated. They were taking notes, and this brought about several reflections, on how the production of the women farmers is biodiverse and how women have a part in the sustainability of life, in the production, in (1:34:45) of food for nourishment.	X	

Economic and market aspects

Organization	Excerpt	+	-
QC-1	The big picture of large companies that are becoming more and more concentrated, that are buying each other, the Metros of this world, the Provigos. In the background, there are three or four of these banners, but there are not that many of them. There is a monopoly, certainly at that level.		X
QC-1	We went looking for financing from the Caisse Desjardins. So, they have a fund called "the 100 million fund" and there were criteria, we qualified, we obtained $ 50,000 with them for the implementation of the social insertion pathway which helped us, […] to be able to integrate the people in social insertion.	X	
QC-2	So, for example, in the marketing, all the retailers, for example the people who are at the Jean-Talon Market, who buy their vegetables at the Central Market, which are imported vegetables, whatever, they don't really know where they come from […]. So, we end up being next to another kiosk to offer products from small local organic farms that get together to share the costs of a kiosk at the Jean-Talon Market, we find ourselves competing against people who simply take their truck, go buy really cheap vegetables at the market right next door and resell them at the Jean-Talon Market, making a profit on that, so that's the competition that we consider difficult, because the people who consume are not aware of that difference.		X
QC-2	So we, I would say... the people who... the new adherents to community supported agriculture are very attracted to this type of marketing that is very flexible, user friendly, very efficient, maybe even a little bit cheaper than us, but what they don't realize by doing business with [confidential organization name] is that they are... maybe they're doing it to encourage, or participate in a certain movement, but in fact, they're encouraging someone who's doing buy/sell; they're not encouraging farmers.		X
QC-2	It's really a funding issue. So, hospitals have, for example, dollar-per-plate or dollar-per-patient-per-day targets or... they have fixed budgets tied to their food service, so right now, we're trying to meet their price, and they're trying to meet ours. But the reality is that they're spending more money than they have and we're undercutting them on our products.		X
QC-3	So, we kept a farmer and this summer, to help him finance himself, we allowed him to offer organic baskets to the hospital employees. [...]. So, he has 50 families who will take their organic baskets here at the hospital.	X	
QC-3	Let's say I go and meet someone who does the same job as me at another hospital and I say, "Look, it would be fun if we bought local, it would be fun." They look at me... "No. I can't because I don't have the money.		X

QC-3	When you want to have eggs from Québec, you have to ask [confidential organization name]: "Is it possible to have eggs from Québec? He will say, "Maybe...". That's always the barrier. […]. If they bring in the eggs for us, when we ask for the […] products, we have to find other allies: Do you want these eggs too? That way we can convince Sysco. There is always the price. Ontario eggs are cheaper than Québec eggs.		X
QC-3	Even if it's a nickel difference, at the amount you pay, people don't want to pay that nickel. Often, in projects, they are not willing to take that risk. Everyone scrapes for money. When you ask [confidential organization name] it's often: "It's not possible".		X
QC-4	The difficulty of working with these is that they do have lists of suppliers, preferred suppliers that they want to work with, and they select these preferred suppliers because they can get rebates from them. […]. So, it's just cheaper foods, which makes it more difficult to move away from those because…it's just cheap.		X
QC-4	But normally, we're not spending a huge amount of money on these items. And so that makes them more willing to take it on, right? So, if it did have tens of thousands of dollars of purchasing value, then [confidential organization name] might be less likely to make the switch. But if we're talking like a thousand here and thousand there, then they'd be willing to do it.	X	
QC-5	[the price] it's still different, it's still a major barrier for institutions that have access to much smaller budgets.		X
QC-5	But the issue of price remains an important barrier...because even fruits and vegetables, sometimes in the "fresh" and then in the direct supply in Bio, the difference of price is less big, but if we take the difference of price for the dairy products or the meat, we are not there. Sometimes it's just a matter of prioritizing what's feasible.		X
QC-7	Well, it's true that it's... it's like any new... like any new... how can I put it... market that develops, it's a market. So, it's certain that afterwards there will be people who go into that market with certain values and others with other values. So that's it, and that's where it can have influences on the way of doing things, on the way of distributing and... but it remains that we're in a capitalist market, so it's certain that people... let's cite [confidential organization name] for example, which will make baskets of vegetables that will serve drop-off points in Québec City, right next to the drop-off points of the local farms here, and which will compete directly with them with a system that is mind-boggling, you can change your basket the day before.... So, well, what it does is that consumers are mixed up in this and then they become skeptical and put everything in the same basket and after that "ah the baskets, it's nonsense" so... […].		X
QC-9	The irony of all this is that, you know, we want to see more local purchases in the institutional environment. But, at the same time, the main constraint we are up against is the budget that other ministries grant to these institutions. So, it's difficult. We don't have a governmental strategy either; it's one ministry, […], that wants to push in that direction for the moment. […]. Because at the health level, I mean, they have to work with budgets that are very very very tight. And, you know, buying local, sometimes it's a little bit more expensive.		X
QC-11	I went to an old people's center, an elementary school that bought a little bit, but it wasn't very good because it's always a question of price. They can't put the money in. I kind of gave that up and did other things.		X
QC-11	If you talk to the big guys, the big producers, they're all about export, always. That's the goal. [...]. It's better in terms of price, it's bigger markets.		X

QC-11	To give you an idea, at the beginning of the season, we had done some forecasted orders. I said, “these are the vegetables I have available during the season”. What are you going to order? They took the list and they said: we're going to order this. If I take this amount of vegetables and sell it in my baskets, I get $32,000. I take this quantity and I sell it to grocery stores or restaurants […], I sell it at 72% of my retail price, which means that I will sell it at about $22,000. If I sell it to Sainte-Justine, I sell it at $18 mil. The same quantity. For them, this $18,000 represents an increase of 20% of their normal price that they would pay to the buyer, to their wholesaler. I know that they have done some of that. We made an effort. If we go back to our co-op goals, that's not my goal. If I'm going to do my vegetables like this, I have to hire Mexicans at minimum wage and work like machines, 60 hours a week.		X
QC-12	On the other hand, there is also a large portion of the population that cannot afford to make the food choices that they should. I'm not saying they would want to. But even if they wanted to, it would be a first step and then you need to have the means. So, we see that there is still a very large part of the population that is either food insecure or not, but many who live in disadvantaged neighborhoods and that they, the food offer they have around them, is the offer that mainly responds, that is mainly focused on the cheapest products possible. [...]. This part of the population is not mobilized or also it does not often have the means to influence what offer they have, or what is the offer of the industry near them.		X
QC-15	We may have reached another stage where we say to ourselves “how can the industry be involved [...]?” They are essential people, but [...] they do not have the same obligations from a government perspective. [...]. They don't see that this is their mission, public health, for example.		X
SP-2	There are two types of interest. One is the grantor companies, which have the land, so they have an interest that we occupy this land. So, they finance it so that there is no irregular occupation of these lands. The other is that they finance because they have an interest like this... many companies have this area of social and environmental responsibility, so sometimes they outsource projects that they had to do with us.	X	
SP-3	[…] because then the system always pushes you to compete. We learn in school to compete. It is always competition. There is a standard there because we have to compete and those who reach it are the good ones and those who don't reach it are the excluded ones, the bad ones. In the cooperative model in Brazil, it was no different […].		X
SP-3	Food follows this concept of standard. The standard of the banana, it has to be big and shiny. This is an imposed standard. […] We understand […] the content is actually in the way the fruit was produced, how it was made, what was applied to the fruit... we understand this as quality standard. This is content. But anyway, we are still excluded from the conventional market […] because there is no standard.		X
SP-3	But it is also difficult to get it into the small farmer's head. Because the small producer is daily harassed by the poison companies, by the technical agencies, always with the same methodology “Ah, buy this poison here, that you will be rich, drive a truck like that big producer that is throwing this product here”. So, it is more or less this logic that we have to break. It's always this strong-arm wrestling.		X
SP-3	Here we have some large banana producers. They are families that came from abroad with this Fordist vision, of high productivity. They came here and in a certain way exploited the natives, the small producers. They went on exploiting, exploiting, until they made the		X

	small producer sell his farm, and then he went to work as an employee for this big producer. This happens all over Brazil and it is no different here.		
SP-3	The small farmer had a very hard time for a long period, because of the model that was installed in Brazil, of scale and productivity, a Fordist model of production. […]. So, the small caiçara producers here were being left behind, they were being exploited, they had to sell their farms, they had to leave […].		X
SP-5	I only see a way for the small producer [...] in a cooperative or in a big agro system, but alone he tends to disappear. Because of the market itself. Agriculture is rigid in this sense. The economy of scale pushes people out naturally.		X
SP-6	I think that if you talk about a competitor, the competitor is the traditional market because people are much more comfortable with what happens on a daily basis because you can choose, in quotes, people think they choose, but they don't really choose. You can choose what you want to buy, you can choose where you want to buy it, you eat what you want, at the time you want. In the CSA, we are chosen by the food, you do not choose what will come this week, it is what is harvested this week […]		X
SP-6	Those who deal with this directly every day are the men and women farmers, who over the years have suffered great pressure to stop doing this work, especially with mechanization and the attraction that the cities have to take people there.		X
SP-7	So, today we have 20 people in the company, we were able to raise some money from angel investment. It was cool. We are in a Venture Capital trajectory. If you raise some money, validate your product, get more demand, raise more money, start to scale, then raise more money... it is a trajectory that is not conventional, in the sense of a traditional company, which gives you some freedoms, but imposes other challenges on you as well.	X	
SP-8	I saw, for example, that there were no organic chickpeas in Brazil, and one thing that helps me a lot is that I have a lot of travel baggage and I used to see the United States a lot, where everything is organic, and I believe that in Canada it must be similar too, everything from Maple Syrup to chickpeas, and I used to think "Why don't we have them here?"	X	
SP-9	There is an international demand for sugar and ethanol without slave labor, without child labor, without deforestation. Orange juice with less pesticides, oranges that do not come from irresponsible practices. So, this is demanded from the companies [...].	X	
SP-9	On the other hand, we have a force that is the external market, which demands more and more compliance with these laws. The agreement between Mercosul and the European Union, if it comes into effect, demands that we be more responsible, more sustainable.	X	
SP-10	[...]but renting something in São Paulo is very expensive and the degree of guarantee required is surreal. From the financial point of view, if you are not an heir, it will be almost impossible to rent something. The land issue was very important.		X
SP-11	We have many producers in the Pantanal, for example, who, as they have a source of income, which is the sale of the organic beef that is produced in the Pantanal, they don't need to kill wild animals, smuggle plant species in order to survive or do any illicit things. So, we also have the preservation of the suitability of the social inclusion of our producers.	X	
SP-11	If you walk up to a person and say, "do you want to stop producing GMOs?" They will say "no". They will say "I want to produce transgenic because it has a good program, it has a good yield, it gives good profit". But, when you say "I have an animal here that doesn't eat transgenic and I would like to buy corn and pay you 10% more for this corn, because it is not transgenic. Do you accept?" [...]. You gave them an alternative of producing non-transgenic corn.	X	

SP-11	As long as agriculture is so dependent and at the mercy of a vision that is perhaps excessively mercantile, people keep selling, wanting to use more... this is an induction that industry makes. It induces a system to use what it produces. [...]. If we think that the issues of health and feeding the human being are guided by mercantile aspects... purely mercantile, we are going to make a mistake, as we are already doing. It's going to extrapolate.		X
SP-12	We started to see, from the moment we connected with small producers, that this is their dream. They want to see their product on the consumer's table, and they also don't see that it makes much sense, or in fact they are hostages of this traditional retail model that squeezes him, pays him with a hundred and few days, 90 days, but he needs this because he needs to sell his product.		X
SP-13	People start to get interested, for financial reasons, because organic pays 30% more, and they start to make the transition in the rural environment. [...]. The transition has a cost, when you leave the conventional system and enter the agroecological system, production drops. There needs to be a financial stimulus, so 30 % more.	X	
SP-13	The third challenge that we are experiencing now [...] is with respect to understanding the product of family farming. Seasonality. So, it's not a product that is available all year round. Visual quality, it's a product that sometimes is not as beautiful on the outside as the agribusiness product. The banana from the small farmer has a little dot here, another one there, because he doesn't discard the painted banana, like the big farmer does. [...]. Then you have a difficulty for people to understand this difference, for the public managers and even for the target public, the consumer.		X

Political and institutional context

Organization	Excerpt	+	-
QC-1	Afterwards, what you have to understand is that it's not directly in the answer to the question, but [...] the big story is that we have to find funding that allows us to survive. For years and years and years and years, the government gives us a little bit and then: "ah well, your project is finished, present me another one". So, the collective kitchens have lasted a good ten years, but everywhere in Québec, it's not just us, because there is the grouping of collective kitchens that have also lost funding. So, less resources, less support, etc.		X
QC-1	I don't know if you know anything about Québec's laws, but normally, ministries have to give a percentage of their budget to community organizations, funds for their mission. So, my mission is food security. […]. It's a law that's been in place since 2011, if I remember correctly. Maybe even before that in 2001...and it's a constant negotiation.	X	
QC-1	There is a MAPAQ program […] called solidarity gardens, and they are looking for an actor, a company, an organization, whatever, that would produce fruits and vegetables on at least one hectare of land and that would give 75% of its production to a food security organization, a food bank or an organization like QC_1, and that would introduce into this garden people who are far from the labor market, therefore in integration. This is my project. That's exactly what I wanted, to set up my project of "producing and sharing abundance". This fund will help me do that. […]. So that would allow us to consistently put the insertion program in place. It would allow us to give to the food bank. It would allow us to feed our collective kitchens, our workshops.	X	

QC-1	Here, we are talking about social economy, and we realize the incoherence of the system. For 30 years, the Québec government has been telling organizations “Develop your self-financing, find money, make money". On the other hand, when you sign agreements with them, "oh no, you can't make money with that". […]. How are you going to sustain your business? "So, you're telling me to give it all away and at the same time be able to continue my activity? That's really the incoherence of the system.		X
QC-2	I'm an organic certification inspector myself, so I've done close to 200 farm inspections, and I understand what's going on in the industry, which is that new vertical farm complexes or university research facilities or people who are already established in the greenhouse industry would love to have the organic designation, it gives them a premium on the shelf. […]. But something major, it's the presence of soil and the life in the soil, the health of the soil, the ecosystems and all that, hydroponic production doesn't encourage that. [...]. There are big players, big lobbyists who are against us in this, in the consultation tables we don't really know what's going on, it's in Ottawa ... it's very difficult to have a say in this, so we're afraid that the people with the biggest wallets will have the biggest say in this.		X
QC-3	That's the term at [confidential organization name]: “the lowest bidder price; the cheapest; the cheapest one that fits your description”. […]. That's how supply works. Apart from that, there are procurement rules that, if you don't exceed a certain amount, you can get out of a contract. That's what we did with the eggs. Since it did not exceed X amount, we can get out of the contract and buy our eggs with another supplier. This is in the hospital's procurement rules.	X	
QC-3	Otherwise, at present, our department head is motivated, but if not, when we get another department head. Our previous GM [General Manager] was also motivated, but now he's gone […]. […] the people who are at the head, they are the ones who decide too. We are interested in the project, we continue. But, if at some point, our head of department changes and we have another one and that person is all about savings, the product will not last in time. That's always the case too.		X
QC-3	[...] the government has asked all institutions to set up a sustainable development committee, so this year, our objective is to either compost, or to recover residual materials, or to get what we call a dehydrator and put all our food scraps in it and to generate a powder, so the goal is to reduce food waste. So that's our goal for the next year in addition to our local and organic purchases of course.	X	
QC-3	Well, that's it, you know, already there, we had also introduced the food policy, so that, you know, anything fried, French fries, we didn't have that anymore, all the fried products, chicken croquettes, then rolls and all that, we didn't have that anymore either. […] the Ministry, I think it was in 2009, came out with a framework for the implementation of food policies in health care institutions.	X	
QC-4	There was in Ontario at some point, it was called Local Food Plus. And so, with this certification, it was in between organic and just conventional. It recognized producers that were taking the steps in the right direction. So, because organic beef is so expensive, because to find organic feed is really expensive. And so, you know the cow producers were saying “can we buy conventional feed? But we will follow these other practices that respect the organic certification”. And that was a big controversy, but that's just...it's to encourage producers to take the steps, but also in light of current realities in the industry, right? There are certain areas that are way too expensive. And so that certification was	X	

	around, I don't know, five, seven years, and it was coming to Québec as well. But then it lost its funding. And that was it.		
QC-5	In Québec, there is a law on...for retailers, so grocery stores, to indicate the origin of fruits and vegetables. When you walk through the grocery stores, in all the fruits and vegetables, it is indicated where it comes from. But for the institutional, there is not. So, someone gets an order list, and they see "carrots". Then, sometimes, it's not the distributor's bad intention, it's that they're going to look for what's the best price available right now. So, if it's the Québec carrot, it's the Québec carrot, and if it's another one...then for him… a distributor told me "[…] I can't tell you if the carrot comes from Turkey or Québec, it will have the same code in my system all year long" […].		X
QC-5	Then, it's really, I would say the other issue, we see it many times... it's at the level of "legal", but it's really to understand, through the calls for tenders, then the products under contract, etc... It's the flexibility in the background that makes it possible for some, not all, but purchasing groups to negotiate a contract for a given product. So, some institutions don't have all the leeway to say: "I'll buy like this, this, this". Purchasing groups were also set up to group together and have economies of scale, so, in quotes, the logic is "good", but it can sometimes lead to certain barriers.		X
QC-7	So that's why some cities are starting to require new businesses to have green roofs and things like that. So that's going to encourage, because that's why an [confidential organization name] was built with a farm on the rooftop. It's because they forced them. They said "well, you have no choice, you must make a green roof" and they said "well, as long as to make a green roof, we have a grocery store, we will make food and we will sell it underneath".	X	
QC-7	So, QC_7 started in 2009 with the Lauberivière rooftop garden. In fact, the founders managed to get a three-year grant to start this rooftop garden. But they didn't have any training in agronomy, they liked gardening but that's all. And they were entrepreneurs, though. They were very go-getters.	X	
QC-7	So, we will look for subsidies when we try to develop a new project, so for example […] we went to look for a subsidy from the Ministry of Agriculture that they had released at that time. They opened a window at a given time for 15 days; for 15 days they said, "well there is a subsidy for the NPO". Usually […], it's always for farmers, which is logical, but for a while they opened a small window for NPOs working in urban agriculture because for them, it made sense in relation to local agriculture and all that. So, we jumped in, and we got the grant, and we were able to develop our training program because of that.	X	
QC-8	Yes, that's a good point. This is the mayor of the borough of Saint-Laurent, […] he has this vision, but it's not common to everyone in the city. He is the one who was in charge of sustainable development in the former administration when his party was managing the city. He has done a lot of things for the documentation, consultation reports... he has put in place a policy where the buildings of the City of Montreal, the new constructions of the city, must have a green roof.	X	
QC-8	There have been certain things, as much in the government of Québec as in Canada. [...] There is a regulation, we do not know what will be put forward, if it will be applied systematically, but which obliges at least the new constructions to have a structure which is ready to have a green roof. [...]. It's already interesting. Small steps, quietly.	X	
QC-9	Let's say, there is money that is given to the ministry so that it can carry out certain missions. This money comes from the political sphere. […]. These missions are oriented for the largest possible public. Then, after that, they are translated into financial aid	X	

	programs. It is the programs that allow... we say that they are standardized, they are established according to a framework, then this framework, it is accepted by everybody, by different people in the ministry, but also in the government. Then, these frameworks, they want to try to stimulate as many initiatives as possible.		
QC-9	But, sometimes, these new initiatives that arrive, we need to find a way in the framework that is established, because we had not thought. Those who create the framework do not think about everything. […]. These initiatives will try to last over time. Then, perhaps, once they reach a certain consensual level, let's say, it will be integrated into the financing framework. Then, eventually, they will be able to be supported by the ministry, or by government agencies. This creates a gap between the emergence, let's say over time, of these initiatives and the ability to adapt.		X
QC-9	Political parties and societal changes may be moving faster than cultural changes within the public service organization itself. These are people who […] have their own network; they have their own way of thinking.		X
QC-9	Then, you know, the subsidiaries, let's say […] all the financing of agricultural insurance. This guides agriculture in Québec, the old models that are perpetuated. I don't care if they are good or bad. That's the way it is. There are people in the regions who are also there to advise these businesses. There is a lot of effort put into this. But you know, there are people who work for the organic sector. […]. But it's emerging. The big base is based on what has the department been doing for a long time.		X
QC-9	If we just talk about access to fruits and vegetables for people who are in poverty. Just this year, we had a first attempt, a program, to make solidarity gardens. That is to say, to have an agricultural production that is destined to food banks, to make people in social reintegration work. This is the first time that money has been put into this type of project. […]. This is a very recent development in the history of the department.	X	
QC-9	There is also the irony that, you know, we want to see more local purchases in the institutional environment. But, at the same time, the main constraint we are up against is the budget that other ministries grant to these institutions. So, it's difficult. We don't have a governmental strategy either […]. Because at the health level, I mean, they have to work with budgets that are very very very tight. And, you know, buying local, sometimes it's a little bit more expensive.		X
QC-12	But...there was a mobilization that was led by the CRE, the Regional Council of Elected Officials, a body that no longer exists, but that made a mobilization […]. Then what came out of that was that they wanted to have a network of people who work in food in Montreal. […]. So, then there were public consultations on the creation of a regional consultation body on food. During this time, the QC_12 was created as a network.	X	
QC-12	Then, in the broader sense, there are also free trade agreements that have been signed that threaten supply management. And that's something that's going to have an impact. I think we're starting to see it already. Which is more foreign products coming in, for example cheeses and all that. And that's just going to. I think it's just going to continue because once there's an opportunity, it's like...it's the beginning of the end.		X
QC-12	But what's going to change, like the quality of the products, is the regulations. Like... because a consumer, they don't even know how much sugar, salt, and fat is in their product. Not many people read nutrition labels. Even if the information is available. At the same time, there are regulations that are changing at the federal level. So, there will be Front of package labelling. This will make these ingredients more obvious to the consumer. So that's one thing that could make consumers make different choices that	X	

	will have an influence on the industry because they will see that “oh, that's half the salt consumption for the day, maybe I'll pass”.		
QC-14	So, it's certain that sometimes we have products that we would like to market more easily, products with meat for example, that require a lot of complicated regulations, especially for producers. Of course, there are products we would like to sell, for example... but that's really for more economic issues, but maybe cider or sometimes beer from microbreweries, but there too, that requires specific permits that cost a lot of money and we don't necessarily have the means or the capacity.		X
QC-15	But all kidding aside, it's quite a challenge to imagine that we're really going to work in a systemic way because it implies many, many changes in our ways, in our reflexes. Each department has its own way of working […]. When we talk to people, it's "no, no, we're an economic department, we develop, we do the economy". Yes, but if you want to act in a systemic way, your actions must necessarily be concerted with others. […]. Convergence is not automatic between the objectives.		X
QC-15	Yes, what I said is that it starts with the two most recent examples, the health prevention policy and the bio-food policy of Québec, which claim to be governmental policies, carried out in collaboration with the different ministries. But, for example, the Ministry of Transport, they are still extremely difficult actors to rally around. […]. So, we are not at all, we are not yet in a societal vision to act in a systemic way, but there are some ministers who are much too active, under the leadership of the Ministry of Health. […]. I think they've taken it seriously, but they also don't have the capacity to rally all the departments around their health objectives. Everyone is pursuing their own objectives and they have large portfolios that are not yet at the table.		X
QC-15	Even the Biofood policy launched in 2018 is Feeding Québec, feeding our world, something like that. It is claimed that we are refocusing on feeding the Québec population in a healthy way. But when you look in detail, there are huge credits that are allocated to double exports, the same. […]. But you know, it's understandable on the one hand, because the population of Québec will not be able to support all this industry alone, but we see that from the point of view of discourse, we are going to put forward what people like in a perspective, in the current context, a context where people are looking for more of that. In reality, it remains to be demonstrated that the effort is greater on this side.		X
SP-1	I think that what makes it difficult is what they are trying to change and put a legislation that helps the company that wants to donate food. Because they say that you cannot donate and companies are afraid to donate, there are some organizations that say “no, you can donate, the law does not say that you cannot...the company will not be punished if someone gets sick”. But, as this is not clear in the legislation, many are afraid to donate and throw it in the trash.		X
SP-1	So, it is not approved, there is no legal framework that says, “you can donate, there is no problem”. So, there is this issue, and each one does it in a different way. Each one does it depending on what it considers important.		X
SP-2	SP_2 started […] as a public program of the city government. […]. If I am not mistaken, they got this project from somewhere, if I am not mistaken from FAO – Food and Agriculture Organization - and they started this project at the time of Mayor Marta Suplicy's government, this was in 2003 and 2004. When the elections were over, the government changed and they did not want to continue the program, so we decided to	X	

	do this privately with the people who worked there. It went from a public program to a private program […].		
SP-2	The classic, most basic issue is always the question of funding itself. When SP_2 started, we got a lot of sponsorship from large state companies and international foundations, especially from 2008 to 2010, which was a time of great economic growth in Brazil. So, there was a lot of money left over to do these actions and these projects. Many city governments participated. A lot of money came from the state at that time. [...]	X	
SP-3	I myself, I had to go somewhere else with my family, to be able to work, because here there were no more conditions, there was no way to survive from the property. I think that afterwards, in the period of 2008, there started to be public policies for small producers. So today I was able to return to the property and become a producer again.	X	
SP-3	We had a very difficult problem here in our municipality. As I said, we have two state ecological parks here. So, what does the state do? It looks at the map, marks a line and says, "this one belongs to the state now". And nobody else can touch it, because it is state property, and it disregards the native peoples that have been living there for a long time. So, these native caiçara people […] became criminals. […]. So, it caused a very strong socio-environmental problem.		X
SP-3	This comes from PNAE, the National School Meals Program. It was this way, where we managed to make a very big leap in scale, in volume, in trade. And so, it gave us great visibility here as well, because until then it was something surreal, something impossible, small producers delivering for school meals in a city of São Paulo. This was an achievement.	X	
SP-4	So, I took this project, which was already based on a vegetable garden, and turned it into a classroom to talk about food. This in 2014, which coincidentally was the year that the Food Guide for the Brazilian Population was released. So, I held tight on the guide, used it as the basis of all our work […]. Then I targeted these workshops to where I had already entered, which were the companies.	X	
SP-5	On the other hand, we see that the civil servant is very alienated, in the sense of being subjected to alienation, not that they are alienated, to the question of public policies. I am speaking as a civil servant […]. We receive public policy guidelines that are often full of intentions and very few tools to make them feasible. So, this is my perception. Many times, we end up... changing secretaries, changing directors, and we are left wondering "well, what will come this time?" […]. We are living this not so strongly in the state of São Paulo, but in the federal government, we are seeing this every day.		X
SP-5	[…] because if the secretary changes, it can also change. It's something like this... How can I put it? We have to give as much as possible of those things that we really consider important at that moment, because we might not have any more (laughs). Unfortunately. Whereas the more or better, I don't know how to qualify it, the more structured, the more efficient, if it is threatened, the more there will be a reaction... against.		X
SP-9	It may be too much, but today our biggest challenge and barrier is the Brazilian government. It is the environmental and social setbacks that go against everything we have been building in the last 25 years. […]. Both, on the issue of the executive and the national congress, all the changes in the law, regulations, both labor and environmental. It is the biggest problem for retrogression.		X
SP-9	The big issue is that we end up working with a very reactive agenda rather than a proactive one. We spend an enormous amount of time reacting to proposed changes that could lead to setbacks. We don't stop the ants' work. We do it on the ground. These		X

	productive chain jobs keep running. […]. Things are advancing, but this environment that we have demands a lot. There are threats to indigenous lands. The legal framework may compromise all the work we do, regardless of the successes and achievements in local, localized, small things.		
SP-9	One vector is the maintenance of the status quo, of cane, in short of these sectors, with the context of the loosening of the Environmental Labor Legislation for pesticides, they can start having more impact, or at least reverse a trajectory of decreasing impacts. The pessimistic trend is that deregulation will make the environmental and social impact of these large crops and commodities even greater, and they will stop dealing with their liabilities.		X
SP-9	PNAE is the National School Meals Program and PAA is the Food Purchase Program. These are two federal programs, which guarantee the purchase of products from family farms and organic agriculture. The government practically cut the budget of these programs. They are almost dying. This weakens them a lot. There are many farmers in the state of São Paulo who sell their agroecological products to the city halls. […]. There is a whole network of virtuosity and innovation that is very threatened by this context of legislation retrocession.		X
SP-9	We participated in the soy moratorium. This is a whole articulation for traders not to buy soy from deforestation in the Amazon. We have sponsors that support our time to make an impact on the soy moratorium. We get resources from sponsors to support us in advocating for the Brazilian Forest Code.	X	
SP-11	First, everything that you do, which is different from what exists, needs to have adequate legislation to legislate on you, to audit you. As SP_11 always does something that does not exist, sometimes it takes three to five years to get the Ministry of Agriculture, or the Ministry of Health, or the Ministry of Environment, to have conditions to audit the product that you launched.		X
SP-11	The second governmental problem is that SP_11 today spends more than R$ 500 thousand reais/year in certification processes. […]. Besides paying the certifier, it requires a series of processes, protocols.		X
SP-11	If I am saying that I don't use pesticides, why do I have to hire a certifier to say that I don't use them, when a company that uses pesticides is not even responsible for the residue that is there? For more than ten years Anvisa has reported an excess of pesticide residues in plants. It comes out every year. He doesn't need an analysis of the product to sell, like this “there is no residue, so you can sell it”. But this increases the cost of the organic product, which makes it even more difficult to sell.		X
SP-11	The second barrier, as people became more...from the consumer's point of view, was the institutional issue. For example, for years and years we couldn't write that on the label. The Ministry of Agriculture would not authorize us to write about these differentials on the label. […]. And as all this is a big lobby, there are political influences and everything else, so the Brazilian industry itself is very strong in this sector. It is powerful. It also protected itself. Of course, this was never made explicit, but walking through the meanders of everything, going back and forth trying to approve this, to approve that, we were able to observe this lobby that was going on and that held us back for a long time.		X
SP-11	We were literally changing our own conceptions of nutrition, of animal welfare. At that time, we didn't talk about animal welfare. But we, as we had the guideline of the philosophy of natural agriculture, where there are very interesting principles that Mokiti Okada wrote, for example, saying that all beings are endowed with spirit and feelings.	X	

	This kind of conception, at the time, or even today for some, will seem very spiritualistic, very... intangible, not practical, a lot of philosophy, a lot of poetry, all very beautiful but nothing very practical. That was the great challenge.		
SP-13	The federal law 1947, which is roughly called the PNAE law, has in its article 14 a determination that at least 30% of all federal resources passed to states and municipalities has to be applied in purchases directly from family farmers for the school feeding program. São Paulo, for example, receives today about R$ 130,000,000 from the Federal Government. From these, 30%, which is about R$ 40,000,000 has to be acquired directly from the family farmer. […]. Different from a conventional bidding process, we are not going to buy the cheapest food. […]. Priority is given first and foremost to what? The family farmer of the purchasing municipality itself. There you already have a whole character of construction of a new agrifood system very well defined.	X	
SP-13	The second criterion of this policy is the fact of being an agrarian reform settler or not, which is also another criterion related to the target audience in question. In theory, a settler is a greater applicant for a public policy like this institutional purchase than a non-settler because the settler has a whole gap, in terms of rural development in relation to the other, because he spent time fighting for that land, somehow, either by occupation processes, like the landless movement, or by processes of waiting for INCRA's settlement, which is very slow in Brazil. […]. The third criterion, […] let's suppose, two cooperatives from agrarian reform settlements in the capital city of São Paulo. What is the next criterion? If one is organic and the other is not. The one that is organic will win, because this is the policy fomenting organic production.	X	
SP-13	Based on this criterion, the São Paulo City Hall, starting from a very old civil society demand, built a main policy of progressive insertion of organic food, which is the municipal law 16.140 of 2015. This law says that throughout the years from 2016 to 2026 the city government should continuously acquire a percentage of organic food under the total school meals budget […], so that by 2026 all school meals in the capital will be organic. This is what the policy says.	X	
SP-13	What we observed was that, we noticed, especially in the farmers in Vale do Ribeira, that there was an increase of people entering the organic and agroecological production system, because of the municipal policy. Answering your second question, […] knowing that where there was an association in Miracatu, which is a town in Vale do Ribeira that had no organic producers, no association, and that today there are 10, who started the transition, and we heard from the president of this cooperative that the reason was the municipal policy, I think it is a sign. It may not be an indicator, but it is a signal.	X	
SP-13	The second aspect is the capacity of the public power to understand the difference between buying from family farmers and a conventional bidding process where you look for the lowest price. […]. We even had public calls, which is the procedure for buying from family farmers, cancelled by the legal department because they understood that “no, you cannot buy beans for R$ 5.00 from family farmers, when you can buy them for R$ 3.00 in the bidding process. This will make a difference of R$ 2,000,000 to the public coffer”.		X
SP-13	The city hall itself, as a buyer, doesn't relax the rules to buy from family farmers. It takes the same rule that it applies to JBS and applies it to buy from a small cooperative, the same notice. There are some subtle differences, but roughly speaking it is the same edict. […]. In terms of quality control, delivery times, notification, penalties for non-compliance. We have some situations where family farming cooperatives have R$ 500,000.00 in fines		X

	that were applied over the years, and they have to pay this. […]. So, I think this is a very big challenge. To bring […] the bureaucratic structure of the city hall to the reality of family agriculture. It is a challenge that we are living very strongly at this moment.		
SP-13	Starting with the conservative political scenario. The second day in office of the Bolsonaro government, he extinguished CONSEA, and invested against it. Then he didn't succeed, and then he finally succeeded, but he has already arrived on top of the main pillar of the social participation structure in the food security theme. This conservative scenario is very serious. We are not returning to the hunger map for nothing, it is not just a matter of discourse. It is a veiled dismantling of the structures themselves.		X
SP-15	When I arrived at SP-15 they had a program that was a public policy of rural extension, […], which was still the remnants of the Dilma government going on. […] this public policy of public technical assistance, it was calls for proposals that the government opened up for companies and organizations that would do this follow-up work with women farmers.	X	

Sociocultural and demographic context

Organization	Excerpt	+	-
QC-1	At the beginning, it was a concerted effort by people in the community, mainly women, who said to themselves "what can we do in our community, in terms of health...in terms of development?" [...]. And so, about fifteen years ago, a few people decided to analyze the needs of the community and then they decided that they needed to work on food education to help people eat healthily. It was then...and still is a challenge.	X	
QC-1	The other challenges...well, it's true that QC_1 is an organization that was created by people who are not from the area. These are people who came from elsewhere [...]. We arrived in the milieu about fifteen years ago, it is a milieu that is still relatively conservative. [...]. And there are other organizations. [...]. And then, [...] the girls who set up QC_1 went to the people who were in charge of the food bank and the people at the food bank were saying, "who are you people?" I don't know what happened exactly, maybe the food bank felt threatened.		X
QC-1	But in parallel to that, there is a whole blossoming of projects for years and things that are taking over because people, citizens who are a little bit aware, want something else, among other things, less packaging, more fresh products, more simple products, more organic products.	X	
QC-2	That is to say, we realize that in the general population, all the issues related to food, agriculture or even the environment in general are almost exclusively a matter for the youngest, or people who have been lucky enough to be sensitized to these issues early in their lives because we find ourselves with an older clientele that has a hard time understanding our values or our objectives and that statistically adheres less to our project.		X
QC-8	I think that there is a will to go further in environment, faster, but that, on the political side, it does not necessarily follow. We see that there are many people who take the initiative by themselves, "I want my green roof". There are strong environmental convictions, but they are not necessarily represented socially.	X	
QC-9	But there is also the aspect that... sometimes it will put in place new social norms that have the capacity... we have seen it in health, all the healthy food, [...] it starts to change too. People are concerned about this. And then, what we're seeing more and more is the whole eco-responsible aspect. [...]. Buying food that is eco-responsible.	X	

QC-9	I think that through all of this, in all of this change, the discourse of buying local, which is also intertwined with eco-responsible healthy food, is inserted. We feel that healthy, eco-responsible, local food is now the fashionable thing to do, if you will. We had discussions with nutritionists and more and more they integrate eco-responsible in their discourse.	X	
QC-14	So, in fact it is a market that was created in 2011, [...] following a citizen's initiative, a request from citizens [...].	X	
QC-14	In fact, we are targeting the food deserts in the borough, i.e., the areas where the residents who live in these sectors do not have a fresh fruit and vegetable shop nearby, and in fact, this comes from the will of the citizens.	X	
SP-2	From 2013 to now, added the crisis issue, but also a new generation of people came of age, in my perception. So, these people who are the XY generation from their 20s to their 30s, they see this issue of food in a very different way than people from the 90s or early 2000s. They want a better and healthier diet. [...]. People want to buy, because they understand that it no longer makes sense for you to be consuming food that comes from 300 or 400 km away.	X	
SP-2	People are seeing this urban agriculture structure as a consumption option. They are also seeing it as a sustainability option, that they want to consume food that has been produced nearby and that does not have pesticides, which is a super issue that people take very seriously nowadays. In the past, people knew that food was full of pesticides, but there was not this perception of how bad it is, as nowadays there is. Because young people are more concerned about these issues.	X	
SP-3	The caiçara culture is a mixture of the native indigenous people that lived in the region with the Portuguese who arrived here, the Europeans, along with the Africans. So, we have this mixture that is the caiçara culture. The caiçara doesn't want to accumulate. So, for him, he caught a little fish for dinner, it's already good, he's going to stay in peace. Different from the Europeans, the Asians, who come in a model of explore, explore, explore, and accumulate. […] The caiçara avoids friction, so he was easily exploited. Instead of getting into a fight over land or something, he prefers to leave rather than get into an argument.		X
SP-3	These other, more normal cooperatives, they come from a very strong, business culture, from the Fordist production model. So, they can't, no matter how hard they try, no matter how hard they try, they still can't install this culture in the local producers. So, now in Sete barras and Eldorado, where [confidential organization name] is, which is a quilombola cooperative, a quilombola community, this culture of the regenerative production model is more inserted within the culture of the local institution. So, this makes it much easier for producers who have worked their whole lives in the conventional model to migrate to an alternative or regenerative model.	X	
SP-6	The initial challenge in any place that is going to start is to find people willing to start. Because we hear a lot of phrases like, "ah, this works in Germany, Brazilians want to take advantage of everything, this won't work", and that's how it was in the beginning. It was necessary to have some crazy people who wanted to start […]. When it arrived in Bauru, for example, people said: "No! This will work at Demetre in Botucatu" […]. More recently, I was in Bahia and people said: "No, this works in São Paulo".		X
SP-11	Being a pioneer is a huge challenge. You do something that is practically ahead of time. This issue of antibiotics, people had no idea. Society in general, no matter how well educated it was, had no idea of the complexity and the impact of it. [...]. That was the big difficulty I would say. First, to deal with the low acceptance of the product, because for		X

	the general public this was not a differential. And when it was, it was a differential for the worse. They didn't understand.		
SP-13	Well, as I said, this is a demand from São Paulo's civil society in the 90s. [...]. They are people that, I joke, with all due respect, are dinosaurs of São Paulo's civil society, that they have been in this fight since the 80s. […] every administration that started, they would go to the City Council, they would put pressure so that a law could be built […].	X	
SP-13	The second aspect is the capacity of the public power to understand the difference between buying from family farmers and a conventional bidding process where you look for the lowest price. [...]. We have even had public calls, which is the procedure for buying from family farmers, cancelled by legal counsel because they understood that "no, you will not buy beans for R$ 5.00 from family farmers when you can buy them for R$ 3.00 in the bidding process. [...]. Getting the managers down their horses regarding the school feeding policy and family farming was very difficult, but we managed [...] because the civil society came and said: "are you kidding me? [...]. "It is not that way, it is a federal law, you need to respect it". [...]. One day they accepted it.	X	
SP-13	Civil society was greatly strengthened in 2015 by the re-establishment of the municipal institutional food security council. [...]. The pressure is of the most diverse, going into the structures even. [...]. You have since these fewer formal things, to the construction of formal documents, articulation with the press [...]. There are very articulated people that make up these collectives. [...]. When the subject is food, it touches on very basic things of the human being. Social participation has a fundamental role.	X	

Consumer behaviour and diets

Organization	Excerpt	+	-
QC-1	And then there's the other side of the breathlessness effect. Calling each other, getting together, deciding what to eat, going shopping, getting together and cooking, dividing people. After a few years, they lose a little bit of faith, I would say the "sacred fire" anyway (laughs).		X
QC-2	So, we realize that if we don't get into people's heads beforehand, there's not much that will follow afterwards. People have to believe in it, because from an economic point of view, we end up offering things that are more expensive for which the added value is not necessarily understood by the majority of the population.		X
QC-3	When they renewed their agreement with the concession, they asked for a lot of sustainable development... they asked for a lot of sustainable development considerations that this concession is committed to. They did a lot of research. That's private. She can ask them, because if it's not X concession, she'll ask the other one. [...]. The next time, I will also be on the committee, and I will come up with criteria to ask for and we will try.	X	
QC-4	And we have been able to push on certain initiatives to get them to buy from local suppliers. It does take a while, but there are ways to move around it. So, we just had to do is, you have to be an approved distributor, and whenever there's a smaller local distributor that Aramark will work with, we'll talk with them and say: "can you bring on these products?". And so that will be our way around it.	X	
QC-4	What I'm trying to work on is just like to get all the universities to really start tracking their purchasing, because I'm hoping with that, that, together we're able to identify the gaps in the food system and also collectively put pressure on the distributors or on the	X	

	producers to be able to help us do our job better. […] if we were able to collectively say: “these are the things that are want”. […]. It's much more of an impact than us doing it individually.		
QC-4	Yeah, it's gotta be pressure from the students. I wasn't here when that happened, but there was… Yeah, it was pressure. […] They're like pushing the conversation. […]. There is like, you know, 1% or less very vocal small group of students that push that conversation and then administrators listen to those students. And then you start to see also other universities doing it.	X	
QC-4	But the students love it, that's the problem, is that we think like: “oh, the students want sustainability”. […]. But they also want their Lucky Charms. You know, like these cereals. We tried to make a totally vegetarian food service location and there were complaints. So, we switched it to start to include meat. And then it's like how much is of the role of the food service to tell the students, like a mommy role of what they should be eating, you know?		X
QC-5	I would say that it came as much...it's also the students who are asking for this. It's also important to feel that, because they are the consumers, the clients, so it allows us to change the practices of a food service.	X	
QC-7	And in 2013, the National Assembly called the founders to say "well, we would be interested in developing a front garden" and... at first, they thought it was a joke, because the organization was really small at the time [...]. And then it really put the organization on the map, when we realized that, it was... more than 100,000 visitors per year, the visibility there... TV shows in the United States, everywhere, it's great!	X	
QC-10	But that's how it started, so three roommates who were tired of paying too much for over-packaged organic food, so they wanted to order in larger quantities...to get better prices and then create less waste for themselves, for their own home. Then they said, “while we're at it, we'll create a buying group and then we'll invite people we know to order with us”. [...]. And the response was great [...], it grew very, very fast.	X	
QC-10	[…] then we realized that there were people who came to place an order, two orders and did not return afterwards. So, we tried to understand why, and we are trying to work on that. We also know that one of the main obstacles for people is the time it takes. Because it takes a certain amount of time to pack an order.		X
QC-11	I deal with a lot of restaurants and the person who counts in the restaurant is not the owner of the restaurant, but the chef. He's the one who orders, he's the one who cooks. If he wants your products, he will buy them.	X	
QC-12	There is also an awareness among chefs and restaurant owners. Then, slowly, the offer in restaurants, there is more and more organic and local. [...]. This comes from requests from chefs themselves to have access to fresh products. So, slowly, that allows... they have a power of influence that is as much at the level of decision-makers as it is with the population.	X	
SP-2	From 2013 to now, added the crisis issue, but also a new generation of people came of age, in my perception. So, these people who are the XY generation from their 20s to their 30s, they see this issue of food in a very different way than people from the 90s or early 2000s. They want a better and healthier diet. […]. People want to buy, because they understand that it no longer makes sense to consume food that comes from 300 or 400 km away. (SP-2)	X	
SP-2	There is a consumer perception because he wants this kind of food. At the same time, this consumer is deciding where he is going to make this purchase and where he is going	X	

	to spend his money. So, he is going to buy food, he wants to know “who is he giving this money to?” To Pão de Açúcar? Is he giving it to a company that uses local labor, manages the land well, doesn't use pesticides, generates jobs and income for the periphery? This consumption option is more interesting to him. [...]. From the moment that this generates a demand for consumption, there will be organizations like ours, [...] that will want to supply this type of consumer.		
SP-3	There are many native fruits that grow in the middle of the forest, which are from here, adapted. We have unlearned to eat these foods.		X
SP-4	I think that it has improved a lot, I think that the chefs are playing a very important role here in disseminating these food causes, to talk a lot about the concern with the producer, the origin of the food, from the garden to the plate, this movement did not exist five years ago, you know! So, at least in our wonderful bubble, it has improved a lot, but it starts like this, it starts in the bubble and then spreads.	X	
SP-6	All the parents that participate in this school, in some way or another, are looking for this. And in this search, a person from the school learned that... in Botucatu, […] there was a German who was living there, and he brought an idea from Germany, called CSA, through which people could buy food cheaper. So, the story came to me. Even in a distorted way, because that is not the main objective. […]. At the time, this mother, who learned about this activity in Botucatu, asked if this German […] could come to our school to talk to the interested parents, to explain what this was and how we could also participate […] maybe by creating a CSA.	X	
SP-6	But for consumers, because they are used to the big markets, etc., people ended up disconnected from this question of the rhythms of the earth, of knowing that you should eat what the earth is giving you at the moment and not eat everything you want to eat, because we have the mistaken idea that everything is always available, but in fact it is not like that, the earth has a wisdom and she gives us the correct food for that particular time of the year, for the needs we have at that time.		X
SP-6	People today don't have time to prepare their own food. A lot of people stop participating complaining about this. They say "look, we think everything that comes is wonderful, but we don't have time to cook at home, we have to keep sanitizing everything that comes, separating it, washing it, and with the rush of our daily lives, we prefer to have lunch somewhere where the food is ready".		X
SP-8	People criticize the quality of a product sometimes, without having known about it, without wanting to know before criticizing. And I believe that the CSA helps a lot in this. You will understand better that maybe at this time the tangerine will not be as good as it would be at another time, but it is good inside, you can eat it and you will see that it is good.		X
SP-12	In our consumer's mind, good food is expensive. Eating well in Brazil is expensive. Eating well in Brazil is not practical. It is easier to eat industrialized food than fresh food in their perception.		X

Food Supply Chain

Organization	Excerpt	+	-
QC-1	After the difficulties in carrying out the activities, we changed cooks, we have a cook that, finally, the food that she made was not as good as that. We lost half of our clientele before		X

	we realized it. At the same time, we have a shortage of kitchen staff. So, it's completely difficult to find someone to replace her.		
QC-3	Sometimes we find suppliers, but they don't have the size we want. If we want to have a small cheese, because the cheese we have comes from Ontario. We would like to have a cheese from Québec. But, sometimes, there's a big block and we have to cut it. If we cut it, it means that it is an employee who cuts it. You have to wrap it as well. That's a lot of time. The cheese already costs more, you have to pay the person who cuts it, you have to pay the packaging. It's a lot. We want to find a cheese from Québec that will be more expensive, but that will be in the format we want. But that's not what we have.		X
QC-3	Even to [confidential organization name] we asked at the beginning if it was possible to have because they have on their website a whole description of the product and there were small icons marked "local". But local for them is Canada. We asked them, because often it's easy to get information. But, for them, no. It was too resource intensive.		X
QC-3	Last year, [confidential organization name] found us farms that agreed to sell us organic and local vegetables. I would say that it was a big challenge, because 1) it costs more, so we had to negotiate with them and 2) well, they had never worked with public institutions, so the structure, the days of orders, all that was not easy [...]. We threw away vegetables unfortunately because we didn't store them well, [...] there were things we didn't know about how to store and process organic vegetables.		X
QC-3	[...] unfortunately, I won't be able to do this alone; I need other hospitals. I am at that stage. [...]. So, anything I can do that allows other hospitals to get on board will allow me to buy organic later on. Because it takes a lot of people to buy this. Because the more people we have, the less it will cost. We're not there yet.	X	
QC-3	After that, what we said to each other within the team, we said "we should have help" because we thought of [confidential organization name] which is a company that is very focused on the environment and all that, except that [confidential organization name] is organic. They work a lot with organic products. So, it was like... "if you want to work with us, you should add organic to your list". Okay... okay, so we said “why not? We'll try it, we'll see”.	X	
QC-4	But it is a multinational food service corporation. The difficulty of working with these is that they do have lists of suppliers preferred suppliers that they want to work with, and they select these preferred suppliers because they can get rebates from them. […]. Like all these different kinds of international companies […]. Folks that you don't necessarily want to be buying your food from is the ones that they have the best deals. So, it's just cheaper foods, which makes it more difficult to move away from those because…it's just cheap.		X
QC-4	The other thing that's difficult with [confidential organization name] is that you have to make menu items that are corporate approved. So, you have a list of all these dishes, and you just select from this database. […]. And so, when you look at the plant-based items, the vegetarian items in this database for [confidential organization name], it's just like tofu, tofu, tofu, tofu, tofu. And we're moving beyond that, you know? […].		X
QC-4	We don't hire our own food service. What we have, we control [confidential organization name] through contracts. […]. And in these contracts, you just lay out what you want. So, we say that we want 75% local fruits and vegetables in the summer, 50% local fruits and vegetables in the fall and 25% in the winter. And then they have to report and present what their numbers are three times a year. So […] the contract is key to being able to push any of the sustainability items.	X	

QC-4	And so, it'll put anyone from the hospitals to the *garderies* to the distributors at the same table to try to increase the links between them. […]. So, through that, just "how we can make each other's work easier and how we don't recreate the wheel each time, right?" So, if you're researching all these different suppliers and you have that, you will then share that with me so that I don't have to do that. And then "how can we avoid working with the Krafts of the world?"	X	
QC-4	Nobody knows where the food is coming from. [confidential organization name] gives us these monthly reports about where food is coming from. But [confidential organization name] doesn't just buy from the growers, they buy from other distributors as well. That's true for all distributors, right? They like to play the market is what they say. […]. So, that when they get the report, they will just be putting the name of other distributors on there. And then when I say "well, can you start putting the farmers on there?" And they said "well, it doesn't work because the way we receive food". We say "okay, we need 10 pallets of strawberries this week", so tell their buyers "We need 10 pallets" and then they'll go and figure out where to buy it. And then they receive it, the product, and they receive it all under one code. […]. And it's a bit complicated, but the point is that you can't trace it back to the supplier, that it has all merged under one number.		X
QC-5	The other is really the logistics aspect as well, because for a direct supply, we see it, among others, with [confidential institution name], when we deal directly with producers. But it is certain that for the producer it is also demanding, they need to invest themselves, they sell, and they have to do it regularly every week. So, it requires an adjustment. You don't go through a supplier or a distributor who just...he has a warehouse, and all the products are there. So, it's really at the level of logistical investment. But again, the more these projects increase, the more the barriers can eventually fall.		X
QC-5	[...] especially a farm, maybe a smaller scale local, local organic vegetable farm, their carrots are washed, but they're not pre-peeled. Often, they need a first...in the institutional they need a first processing. [...] as in berries - because we produce a lot of berries in Québec - that you also say, "we can freeze", but often the institutions don't have space to store it frozen [...]. So, it's really...that's what we come back to, we always go around in circles (laughs).		X
QC-7	Well, we... that makes me think that the challenges we also have are in terms of our inputs and in terms of... we try to be as ecological as possible in our ways of operating, but we still consume a lot of plastic. [...]. We are always trying to improve in this area.		X
QC-8	We produce, we put it down, and it's all sold, there are no losses. In the food circuit, there is a lot of advantages in doing that, I still don't understand. All the indicators point out that it is positive, their customers seem to be ready for it. They expect more. We produce what we can produce. But if they open to other vegetable growers in the area, who are doing some of the same things we're doing, that would be popular, you know? It's really supply management challenges based on kind of arbitrary criteria that they set for themselves like "oh no, we can't do that". But, if you don't do it, you don't know that.		X
QC-9	You know, there's an important aspect to this, it's nice to have all this will, but sometimes there are companies that are not interested in the institutional environment. Companies that have business strategies that target the retail sector, the retail network [...]. It is a market that is specific to certain types of companies for certain types of products. [...]. There are many criteria. Sometimes there are institutions that are looking for products, and they don't mind paying for them. But they just aren't able to find it.		X

QC-10	It depends like this, for sure our dream is to do direct trade, but to find the balance to be fair for everyone right now we can't pay the plane tickets for that, unfortunately. [...]. We still do business with, for example, [confidential organization name] who are large distributors. Then, often it's more difficult to get all the detailed information, traceability, and all that...how many kilometers it has traveled, all the products that have been used in the production chain, the culture of the company. Sometimes it's hard to know "who produced it".		X
QC-11	We're three producers in Atwater, renting a booth together. We have a vendor there. We bring our vegetables. I have priority for tomatoes, peppers, zucchini, for example. The other producer has priority for lettuce, tomato and so on... It's a collective marketing. […]. If I don't have a product one week, the other producer brings it.	X	
QC-11	Now you're saying, "But why are you doing it?" We do it because they still order good quantities. We have targeted products in this list and the price is still right. We can do it. [...]. In addition, with [confidential organization name], they helped us to open a drop-off point in the institution. That makes the move worthwhile. [...]. If I don't make a profit when I put boxes on the pallet and then leave, "hmm". But if I make a small profit when I put the boxes on the pallet for the kitchen, and at the same time I deliver baskets, then I make a decent profit. Then you say "OK, it's good enough!" It's the same route, the same delivery person. So, it's worth it.	X	
QC-13	We have only one product that we have problems with. It's seafood products. Now, this is an interesting subject for... more for Montreal than for Québec. But in Montreal we are far from the sea […]. And the supply of marine products is relatively low. There, we do not have good products.		X
QC-14	So, if people don't want to bother, they go during the day to a wholesaler, and they buy from the wholesaler who has bought from the producers. But we will buy directly from the producers. [...]. But it's very complicated in terms of logistics of operation, it's very complicated, so what we've been doing for three years now, four years, is that in fact we've created a mutual [...] of supply with four [...] solidarity markets. [...]. These four markets [...] share the cost of a human resource and share the cost of a truck.	X	
QC-15	[...] there is a lot of fear, a lot of concern like "we're not going to change the system, the system works". [...]. We hear a lot about pesticides in the public sphere, [...], but when we talk to the producers themselves or their representatives, for them it is an essential work tool. Then, they are afraid that we will demand zero pesticides overnight […].		X
SP-1	The big partners are the food donors. [...] Without them we wouldn't have the work.	X	
SP-2	One of the big issues with pesticides and preservatives being necessary is because of the distance you have between the production zone and the consumption zone. In our case, as we produce within the city, this is not a problem for us. It is not an issue. So, we end up producing organics.	X	
SP-3	That is when we got to the [confidential organization name] cooperative, we were able to access large markets. In this case, school feeding in São Paulo is a great example. […]. Every time we said, "we are small producers, we need to deliver for school feeding, there is a law". The answer was always "oh no, the small producer can't be on time, he can't have logistics, he can't have organization, he can't have a lot of things". […]. When we got together in a central office, with 14 institutions, today there are 1,200 families of small producers making claims. So, politically it is different. And then we got going, with a lot of social organization, social technology, we managed to deliver it to the school meals in São Paulo since 2014.	X	

SP-4	It's no use me talking about organic agriculture, me being here at the tip saying, “eat organic”, and the organic chain not being well established. I need someone to accompany the organic producers so that they get organized for logistics to work until the big centers, but then I need more organic producers, I need another institution, which helps the conventional one to become organic to convince this guy […].		X
SP-5	I won't remember from when all this legislation is, but it is not recent. [...]. What happens is that it identified that, that the public notices were “empty”. I don't know if you are familiar with this term. It is a common term; I don't know if it is technical. It is because it is not enough to make the public notices, the proposals have to be analyzed, and people have to fit all the documentation in order to make the sale. So, what used to happen is that there were many calls for bid that either no one showed up or the people who did show up were not qualified in the legislation to be able to attend the sale. [...]. So, where is the flaw? The gap is in the producer's attendance.		X
SP-6	What gets a little bit sticky in the financials is the lack of registration of the farmers. We're talking about needs, right, so when you sit down with farmers in a CSA to talk to them like, "how much do you generally spend on electricity per month?" For example. He doesn't know. "How much do you spend on seeds per month?" He doesn't know. Because [...] he doesn't have time to manage.		X
SP-7	I think that maybe the main challenge is to put to work a complex system that doesn't exist yet. You compare the complexity of the current food chain, it is much more complex than the SP_7 chain, but it is already working, it is already there. It was being built over hundreds of years. So, it is very challenging to build a chain from scratch.		X
SP-11	The creator of SP_11 [...] arrived one fine day here in Brazil, he was one of the precursors of the Messianic Church here in Brazil, and he said, “this situation is difficult, because we say: 'eat organic food'. But there is no place to buy it”. This was in 1994.		X
SP-11	We form associations and business bodies through cooperatives, through trade associations. So, you can organize the producer market. You don't leave one person working alone. You gather three, four, and set up an association or a cooperative, and SP_11 usually encourages buying from cooperatives.	X	
SP-11	[...] the inputs companies do not see organic as a consumer market for large tractors, agricultural machinery, harvesters. So, they are machines prepared for fertilizer and agrochemicals, for conventional soils. But these machines are very heavy, and they compact and kill the organic soil. [...]. And then you see a big growth gap in the organic Brazilian grain sector: the lack of bio-input production technology and the lack of agricultural implements.		X
SP-12	Organic is still a challenge for the country. Logistics is a challenge within our business. [...]. It is very difficult to find fruits, vegetables, and greens in a region with which we can supply a basket composition, through that nutritional balance we talk about.		X
SP-13	There is another thing that was a little bit what I studied in my master's degree, which is how this process strengthens the social organization of farmers in the field, strengthens the cooperative, the association, why? To sell to the public authorities everyone has to be together because the volume is big, so it is not possible to do it individually, each one taking care of himself/herself.	X	
SP-13	First: the logistical challenge. How to make these people who were used to selling to middlemen start selling to public authorities, with all the technical demands and even more the transportation within the city? It is one thing to put the product at the farm gate, but it is another thing to make it reach 700 schools, as is the case.		X

SP-14	Yes, it does, because in the end there are a thousand hectares of production in the area SP_14 operates, so there has already been a stage of unlocking the chain of grain production, which has even allowed the expansion of [confidential organization name] itself for the production of organic eggs, because what limited the expansion of poultry production was the fact that there was no organic food for these birds, and now the fact that there is. It is the differentiation between feed and food.	X	
SP-14	But we see this as a way to kick-start large organic production projects, to go beyond the scale of local production and small production [...] I think SP_14 is helping to make a chain possible, because it is producing a large volume of grains. For example, beans, there is a company that already buys beans from SP_14 and is going to open an organic line using SP_14 beans. Oats, the same thing. [...]. Allowing large companies to start organic lines tends to exponentially increase the interest of producers because if there is demand, they have someone to produce for.	X	
SP-15	When we started to sell to the institutes, we started to sell to greengrocers. That limited our life a lot. [...]. The purchase from […] was very small, 350 kilos. When we decided to certify in a network [...] to guarantee a bigger freight [...] it was another degree of freedom because [...] we started to offer in the network groups.	X	

Interpersonal relations

Organization	Excerpt	+	-
QC-1	At the beginning, it was a concerted effort by people in the community, mainly women, who said to themselves "what can we do in our community, in terms of health...in terms of development? [...]. So, Saint André is quite dynamic and there are several organizations, several community groups... consultation tables, so people talk to each other. About fifteen years ago, a few people decided to analyze the needs of the community and then they decided that they needed to work on food education to help people eat healthily.	X	
QC-1	The other challenges...well, for sure QC_1 is an organization that was created by people who are not native to the place. These are people who came from elsewhere [...]. We arrived in the field about fifteen years ago, and it's a relatively conservative field. [...]. A lot of very nice people, but who don't necessarily have the same vision of the world as us. And there are other organizations. [...]. And then, when QC_1 was created as a result of this consultation, the girls who set up QC_1 went to see the people who were in charge of the food bank and the people from the food bank said: "who are you?" I don't know what happened exactly, maybe the bank felt threatened.		X
QC-3	I don't know, I think it's...it must be the resistance to change again...Then to change a culture, outright, of an entire facility, I think that may have been the most...the hardest, because we had to put a lot of energy into meeting a lot of people, communicating what room service was, trying to convince people that it was going to be wonderful.		X
QC-3	It's nice to say that there is someone who dreams about something, but it takes people around who believe in the same project and who want to move it forward. So, I would say that I am very lucky because my buyer [...] is very motivated [...]. But personally, I was able to sell it to the organization because my role was to tell the general manager "We want to go there, what do you think?"	X	
QC-3	So, the nursing staff was worried when room service came. They were worried that the patient wouldn't eat; that the patient would forget to order, that the nurse wouldn't know		X

	about it. That's for the nursing staff. We managed to reassure them anyway, we established rules, checkpoints that allowed them to make sure of that. Our service, our employees, it was quite a change for them. [...]. I would tell you to the point that...it's been difficult. We can't deny it.		
QC-3	So, we kept a farmer and this summer, to help him finance himself, we allowed him to offer organic baskets to the hospital employees. [...]. So, he has 50 families who will take their organic baskets here at the hospital.	X	
QC-3	I'll give you an example, at the level of the purchasing group, I was trying to bring about changes, so I convinced them; out of 10 hospitals, four have made the change for - it's not much - it's tuna cans. I asked, I said, "Why don't we put in a bid through our purchasing group to get sustainable tuna?"	X	
QC-3	Last year, [confidential organization name] found us farms that agreed to sell us organic and local vegetables. I would say that it was a big challenge, because 1) it costs more, so we had to negotiate with them and 2) well, they had never worked with public institutions, so the structure, the days of orders, all that was not easy, which meant that at the end of the summer, we met, and we were able to talk to each other because they had irritants, but we also had some irritants.	X	
QC-3	We also met a lot our supplier of software of treatment of menus... Because it's all well and good to want to do all that, but if we can't manage it, it won't work. So, we really had to have a close relationship with them to develop the application, so that it would meet our needs. And then, you know, constantly there, I would come back to them with "oh yes, but in such and such a case, how am I going to manage it in room services?" "What can we develop or what can you program, you, on your side, so that it can meet our need?"	X	
QC-3	What was also a big concern for the nurses was the patients who weren't eating. […]. So that was also one of the reasons why... 'oh I don't like the fact that it's the food service that goes to the patient'. So […] we took that concern and we said "well, we have to do something to try to... to temporize that". So, we went back to the software provider to know "well, is there a way […] where we could, I don't know, print a report three times a day that says... that lists 'OK, well which patient hasn't ordered their lunch yet? Which patient hasn't ordered dinner yet? Dinner? Same thing'". So, that's been scheduled.	X	
QC-4	And we have been able to push on certain initiatives to get them to buy from local suppliers. It does take a while, but there are ways to move around it. So, we just had to do is, you have to be an approved distributor, and whenever there's a smaller local distributor […], we'll talk with them and say: "can you bring on these products?". And so that will be our way around it. But normally, we're not spending a huge amount of money on these items. And so that makes them more willing to take it on, right?	X	
QC-4	What I'm trying to work on is just like to get all the universities to really start tracking their purchasing, because I'm hoping with that, that together we're able to identify the gaps in the food system and also collectively put pressure on the distributors or on the producers to be able to help us do our job better. […] if we were able to collectively say: "these are the things that are want". […]. It's much more of an impact than us doing it individually.	X	
QC-5	Then sometimes it's several people who make the decision. That's why awareness...why it's important and why we need to do it. It's important because you have to get all these people to say, "Okay. Yes, this is important". [...]. It's really about teamwork.	X	
QC-9	If we think about listening to public servants versus our ability to do things, I think that there is a discrepancy that is created. Because there are a lot of people who agree with		X

	the new directions, the new types of projects or the new ways of doing things. But sometimes it's the acceptance within the department, the sensitization of our bosses, things like that that we have to convince. We have to make it part of the discourse to be able to support this new way of seeing things. And then we have to convince them that this translates into assistance programs.		
QC-11	If the kitchen of a restaurant or institution wants this, but the boss doesn't, it won't work either. But if the owner wants it and the cook doesn't, it won't work. This is a mistake that sometimes farmers embark on projects like this, that the owner wants, but the cook doesn't want. So, the cook is in charge...it's not a good relationship. It's not a good blur. It doesn't have a quantity that is given, it doesn't have an exchange. It's not vigorous as a marriage. You have to have a good relationship with the kitchen. With the knife and the cutting board. If they love you, you'll pass on a lot of vegetables. That's the key.	X	
QC-14	Well, we realized that it was really a challenge, the supply, and that it was really complicated, and we wanted to keep the direct relationship with the producer. And we realized that several markets had this desire, so we said to ourselves "well instead of each market using a truck, using a human resource, it would be easier to share, and it would cost less, and it would be less energy spent".	X	
SP-1	For example, we would like to work with supermarkets to do sustainability actions with this public, but for this we need resources, we need partnerships [...]. For example, a supermarket chain that […] are willing to do something new. We wanted to do training in the supermarket, to reduce waste in the stores and then we have to convince them to enter the stores and make them open their doors to us, because they are still afraid to open them.		X
SP-3	After a long time, because then the system always pushes you to compete. We learn in school to compete. It is always competition. There is a standard there because we have to compete and those who reach it are the good ones and those who don't reach it are the excluded ones, the bad ones. In the cooperative model in Brazil, it was no different. The cooperatives competed among themselves, and still do in some cases. What happens is that we realized that where there is a lot of competition, in fact, nobody stands out. […]. And that was when we stopped competing and started to sit down more, to have collective meetings and coordinate interests, in this vision of cooperating.	X	
SP-6	[…] all the parents that participate in this school, in some way or another, are looking for this. And in this search, a person from the school learned that... in Botucatu, in the interior of São Paulo […] there was a German who was living there, and he brought an idea from Germany, called CSA, through which people could buy food cheaper. So, the story came to me. Even in a distorted way, because that is not the main objective. But that is what came to us. At the time, this mother […] asked if this German […] could come to our school to talk to the interested parents, to explain what this was […]. And so, it happened. One day a meeting was scheduled, and he came.	X	
SP-11	So, we were also building there all the research structure on the chicken issue. Experimental farms. There, it was cool because nobody pressured me to say “Gee, but you don't want to use antibiotics, but you are causing such problems”. Because in the beginning the production was bad, right? There, it was a place of carte blanche to do everything that needed to be done.	X	
SP-12	We started to see, from the moment we connected with small producers, that this is their dream. They want to see their product on the consumer's table, and they also don't see that it makes much sense, or in fact they are hostages of this traditional retail model that	X	

	squeezes him, pays him with a hundred and few days, 90 days, but he needs this because he needs to sell his product.		
SP-14	We promote a chain that currently is not so large and consolidated, which is the organic production chain, taking the risk together and understanding that there are limitations on both sides, but trying to integrate as much as possible so that the potential of each party is expressed in this partnership. [...]. According to each situation, a different kind of partnership is built, some with more interaction, others with less [...]. It is a very integrated thing.	X	
SP-15	When we went there with the land and agroecology policy, you get there thinking that "ah, the land, agroecology, technical assistance, everyone will want it". But Vale do Ribeira is a place that is already a little worn out, you know? A lot of projects go there. There are few people who believe in what you are saying, because a lot of people have already arrived there and said a lot of things and left. This thing of building trust with the women farmers and also listening to them at this moment [...].		X

Article 3: The contribution of Responsible Innovation to food systems transition: Results from a multiple case study

Statut de publication: Soumis à la revue Environmental Innovation and Societal Transitions

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Abstract

The transition from a food system based on the intensive use of agrochemicals, monoculture, and long supply chains to a food system based on the principles of responsible innovation is key to achieving food security in a context of pandemics and climate change. Nevertheless, the contribution brought by organizations and practices oriented towards Responsible Innovation in Food System (RIFS) to food systems transition has not been fully explored by scholars. This study aims to fill this research gap. We conducted a multiple case study on 30 RIFS-oriented organizations and practices in the province of Québec (Canada) and the state of São Paulo (Brazil). The results show that RIFS contribute to transform food production by promoting a diversity of agricultural practices that seek ethical, social, and environmental impacts. Furthermore, it transforms food distribution through the integration of commercialization practices that bring producers and consumers closer together. Our results also show how RIFS contributes to the articulation of the individual and the institutional demand for food produced following the principles of responsible innovation. Finally, our results indicate that RIFS promotes systemic changes through building resilience against the dominant food system and transforming government discourse and action. By analysing the role of responsible innovation in food systems transition in an emergent and an established economy, this study offers an important empirically informed conceptual basis to further research on ways to achieve food security in a sustainable way.

Introduction

A transition towards food systems that fulfill food security and are, at the same time, fair and equitable to workers and beneficial to the environment is urgently needed, especially in face of the multiple impacts of climate change (Fanzo et al., 2022). The SARS-CoV-2 pandemic and the war in Ukraine indeed exposed the vulnerabilities of the current dominant food system (IPES-Food, 2020). This system, largely dependent on agrochemicals and long supply chains, was consolidated during the industrial revolution. Today, the social and environmental negative externalities of conventional food production, processing, distribution and consumption are recognized for their impact on food security (IPES-Food, 2016). Food production alone accounts for 30% of global greenhouse gas emissions, threatening local ecosystems and contributing to climate change (Willet and et al, 2019). Furthermore, consolidated market dynamics increase inequalities, as small-scale farmers and organizations can hardly resist in a context dominated by powerful multinationals (IPES-Food, 2016). The failures of the dominant food system, exposed through the rise of food insecurity around the world, takes us further away from achieving the Sustainable Development Goals (SDGs), and not only SDG 2 “zero hunger” (FAO, IFAD, UNICEF, WFP and WHO, 2022; UN, 2015).

Even though scholars have been calling for the transformation of the food system since the 1990s, our understanding of the ability to drive a transition is limited. Slater et al. (2022) analyzed 41 expert reports on ways to achieve healthy and sustainable food systems and found a “disconnect” between their “stated purpose” and their recommendations’ potential to achieve real transformation. Most recommendations consisted in incremental “adjustments” rather than a profound paradigm shift. One of the reasons is the complexity of achieving the “institutional change” the transitioning from a conventional to an alternative and emergent food system requires (Ingram, 2015; Rouleau, 2022). Complexity is exacerbated by the “self-reinforcing” nature of the established conventional practices in the food system (Conti et al., 2021). The systematic review of Conti et al. (2021) concluded that promoting changes in the different components of the food system at the “same temporal scale” could help to “unlock” such path-dependency. Nevertheless, studies showing how to transform in a coherent way the different

parts of the food system were lacking. As achieving SDG2 requires a “radical transformation” (Willet and et al, 2019), this is the first research gap the present study addresses.

The second research gap lies with the lack of understanding of the kinds of innovations a transition towards more responsible food systems requires, that is, systems capable of achieving food security in a sustainable way (Maluf et al., 2022). Innovative organizations in food systems are booming, especially following an increased consumer interest for sustainability and the “digital turn” in agriculture (Klerkx and Rose, 2020). However, for El Bilali (2019), the role such emerging innovations play in sustainable transitions is still a marginal research topic as organizations are usually considered “part of the problem” rather than “an important actor in the solution.” A Responsible Research and Innovation (RRI) approach can help to fill this gap because it seeks to actively support “the societal uptake of innovations” (Asveld et al., 2015). Rather than solely protecting “society against unwanted consequences, RRI aims to address societal challenges” through the use of innovative sociotechnical solutions (Asveld et al., 2015). RRI calls on stakeholders to consider the ethical, social, and environmental aspects of innovations, not only to aim for economically profitable innovations, but also for more sustainable, socially desirable and ethically acceptable innovations (von Schomberg, 2013). According to Khan et al. (2016), an RRI approach is essential to that tackle food security issues and climate change. Such initiatives present diverse characteristics that can be either entirely innovative (e.g., vertical farms) or present some form of continuity with aspects of the past in an innovative way (e.g., urban agriculture). Although RRI-oriented organizations and practices in food systems could contribute to transform institutionalized food practices, the application of RRI to food research is still emerging and has focused on mature economies (Blok et al., 2018; Khan et al., 2016; Lubello et al., 2016).

To address these two research gaps, this study aims to generate a better understanding of the contribution of responsible innovation to food systems transition in an emerging (São Paulo State, Brazil) and a mature economy (Québec, Canada). Below, we summarize the RRI literature in food research and present a working definition of Responsible Innovation in Food Systems (RIFS). We then describe how our qualitative multiple case study methodology addresses, in these two regions, the following research questions: 1) How do RIFS-oriented organizations and

practices transform the food supply? 2) How do they transform the food demand? And 3) How do they contribute to system-level transition? Our findings show that RIFS transforms food production by integrating production practices that aim to deliver positive social and environmental impact. RIFS transforms food distribution through transparent commercialization practices that bring producers and consumers closer together. In addition, the integration of responsibility principles changes the demand at the individual and the institutional levels, while contributing to system-level transition in the food system. Our discussion summarizes the contributions of our study to current scholarship and how it can inform research on the transition towards more responsible food systems.

Responsible innovation in food systems

The application of RRI to food research has increased rapidly in the past few years. While our literature review did not identify a consensual definition of responsible innovation that is specific to food systems (or to food systems transition), we gathered and organized key elements from these studies to derive a working definition of RIFS. These elements are summarized in Table 1 and organized following the framework used by Silva et al. (Silva et al., 2018) to define Responsible Innovation in Health (RIH), which results from a systematic work to adapt RRI to the specificities of the health sector: What is responsible innovation? Who should be involved? When? And to what ends?

Tableau 15. (Table 1 from paper 3) How the literature on RRI in food research informs our working definition of Responsible Innovation in Food Systems (RIFS)

What is responsible innovation in food systems	• A process that includes the four RRI dimensions—inclusiveness, anticipation, reflexivity, and responsiveness— in agricultural technology development (McCampbell et al., 2022); • An innovation pathway that integrates the four RRI dimensions - anticipation, inclusiveness, reflexivity and responsiveness - to develop agricultural technology (Devkota et al., 2020). • A solution, such as a Climate Smart Agriculture innovation (Long and Blok, 2018); • An approach to innovation that favors citizen-science engagement and gathers the perspectives of multiple value propositions (Pant, 2019).
Who should be involved	• All supply chain actors, including farmers and consumers (Purwins and Schulze-Ehlers, 2018);

	• A broad range of stakeholders, such as engineers, natural scientists, social scientists, policymakers, development practitioners, entrepreneurs, and end-users (Devkota et al., 2020) • Different stakeholders, including especially citizens, scientists, industries, and the government (Pant, 2019).
When	• In the whole food system, which includes "the entire range of actors […] involved in the production, aggregation, processing, distribution, consumption, and disposal (loss or waste) of food products that originate from agriculture (including livestock), forestry, fisheries, and food industries, and the broader economic, societal, and natural environments in which they are embedded" (von Braun et al., 2021).
To what ends	**Specific ends:** • To develop animal welfare interventions (Purwins and Schulze-Ehlers, 2018); • To improve ethics in food practices (Gremmen et al., 2019); • To develop technologies adapted to lands cultivated by small-scale farmers (Pant, 2019); • To develop innovations that are responsive to the needs of small-scale farmers cultivating on hillside terraces, "conserving the existing diversity of crops and agroforestry species on-farm" (Devkota et al., 2020) • To develop technologies that are gender-sensitive (that do not reinforce traditional gender roles) (Devkota et al., 2020); **General ends:** • To generate transformational solutions (Pant, 2019); • To develop innovations that deliver shared benefits (Bronson, 2019); • To take into account the contextual realities from which innovations emerge (McCampbell et al., 2022); • To promote food equity (Bronson, 2019); • To address food security challenges (Khan et al., 2016); **Integrated ends:** • To integrate concerns for local and indigenous knowledge, intellectual property management, and animal welfare in innovation development (Pant, 2019); • To integrate concerns for environmental issues, social responsibility, animal health, animal welfare, and traditional cultures in technology development (Dalziel et al., 2018); • To address food security and climate change (Khan et al., 2016); • To produce food in a productive and efficient way while reducing greenhouse gases or adapting to climate change impacts (Long and Blok, 2018).

Our review indicates that most researchers approach these questions by relying on the four RRI procedural dimensions of Stilgoe et al. (2013) that refer to the innovation development processes: anticipation, reflexivity, inclusivity, and responsiveness. *Anticipation* asks, 'what if…?' questions, such as "what is known, what is likely, what is plausible and what is possible." *Inclusion* refers to the deliberate engagement of different stakeholders, including the public. *Reflexivity* means "holding a mirror up to one's own activities" as well as "being aware of the limits of knowledge and being mindful that a particular framing of an issue may not be universally held." Finally, *responsiveness* concerns the "capacity to adapt, change goals, shape or direction" of an innovation trajectory (Stilgoe et al., 2013).

Applying such a RRI framework to food systems implies for Gremmen et al. (2019) providing "a new impulse to strengthen animal, agricultural, and food ethics" (see Table 1). For Purwins and Schulze-Ehlers (2018), it calls for the participation of all supply chain actors (including farmers and consumers) in the development of animal welfare programs. For Dalziel et al. (2018), responsible innovation characteristics include taking into consideration environmental concerns, social responsibility, animal health, animal welfare and traditional cultures. The authors argue, though, that responsible innovation is a "costly process" that can be justified only if "consumers are willing to pay for" it. For Long and Blok (2018), Climate Smart Agriculture technology is a "*de facto*" responsible innovation as it contributes to a "more productive or efficient food production whilst simultaneously reducing greenhouse gases or adapting to climate impacts" (Long and Blok, 2018).

McCampbell et al. (2022) analysed the development of a digital tool to support banana disease management in Rwanda. Such technology is considered a responsible innovation by the authors. Their findings show, nonetheless, that power relations and digital capacity "negatively affect user inclusivity." Even though there is much optimism about the "transformative capacity" of digital technology, the context in which it is deployed hinders the implementation of RRI, resulting in "potentially irresponsible digital technologies." They conclude that responsible innovators need to be aware of the "complex realities" in which innovations emerge (McCampbell et al., 2022).

Pant (2019) compared different models of innovation development and concluded that the integration of different stakeholders' perspectives (i.e., inclusiveness) at an early stage is aligned with the principles of RRI. For the author, an innovation model that brings together the university, the industry, the government, and the civil society opens space for "citizen-science engagement" that enable transformative solutions development. Examples of innovation generated through this model include technologies more adapted to lands cultivated by smallholder farmers as well as the consideration of local and indigenous knowledge, animal welfare, and intellectual property management in innovation processes (Pant, 2019).

Within a similar train of thoughts, Bronson (2019) interviewed North American designers of agricultural big datasets and platforms and found that they hold a "narrow" set of values that result in the development of innovations that are "predominantly serving a few powerful food system actors." For instance, maps created within such big data platforms "are made meaningful only if one adheres to a rigid conventional farming strategy," which pushes for even more standardization of the environment. Also, "the concentration of data expertise has the potential to further inequity between farmers and agribusinesses." They thus argue for a RRI framework that can ensure the design of innovations that deliver "widely shared" benefits (Bronson, 2019).

Devkota et al. (2020) examined Nepal's first Agriculture Mechanization Promotion Policy using the RRI framework. According to the authors, such analysis is necessary to promote a "reorientation" to responsible "innovation pathways." They found that, although this policy is "a step forward," it promotes agricultural innovation that favors larger farmers, notably commercial farmers to the detriment of small farms and, more specifically, women farmers (Devkota et al., 2020).

Overall, the current literature indicates that scholars consider the integration of RRI in food production and consumption innovation "processes" (e.g., the engagement of stakeholders), emphasize "products" (e.g., machines adapted to small farmers or women), and/or underscore "organizational" issues (e.g., property rights management). This three-dimensional approach echoes with the RIH framework, which "brings to the fore" the products and processes of RIH, but also "the organizations that develop innovations and make them available to end-users"

(Silva et al., 2018). Our literature review also points to specific RIH attributes such as the ability to deliver eco-responsible solutions, reduce inequalities, or provide more value to society by adopting stakeholder-centered business models. Therefore, based on the elements summarized in Table 1, the following working definition of Responsible Innovation in Food Systems (RIFS) is used to guide our study:

"RIFS is a collaborative and contextualized approach to innovation occurring at any stage of the food system (from production to consumption) that integrates multiple stakeholders' concerns regarding the ethical, social, and environmental impacts of such activities and with the aim to address food security challenges in a sustainable way".

The literature also underscores that RIFS should carefully consider the health and wellbeing of those who need and consume food and of those who produce, process, and distribute food (farmers, agricultural and fisheries workers, food processing and distribution employees) as well as the context in which these practices take place.[12]

Methodology

Study design

We adopted a multiple case study design to examine similar RIFS-oriented organizations and practices in the province of Québec (Canada) and the state of São Paulo (Brazil). A case study is an empirical research method that makes it possible to study a phenomenon in depth and in its real-life context (Yin, 2018). We applied a purposive sampling to deliberately select information-rich cases, which "are those from which we can learn a great deal about the central issues under consideration" (Patton, 2002). Both regions have experienced the emergence of a diversity of innovations in their food systems. Québec is the second largest Canadian province, accounting for about 20% of the country's Gross Domestic Product (GDP) (Statistics Canada, 2023). The province is recognized for its rural agricultural activity and witnesses the emergence of innovations in food organizations and practices that can change the dynamics of the food system.

[12] As shown in the food systems framework developed by the High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017)

An example is *Aliments du Québec*, a non-for-profit organization that developed a brand for food produced or processed in the province (Aliments du Québec, 2022). São Paulo is the most economically developed state in Brazil, accounting for about 30% of the country's GDP (IBGE, 2020). It is an important innovation and research hub in South America, besides being a large food producer and distributor responding to both its domestic and international demand (Saes et al., 2019).

Data collection

The case selection process took place in early 2019, thus before the literature linking RRI to food systems we described above emerged. We used RIH responsibility attributes (Silva et al., 2018) to identify alternative and/or innovative food organizations and practices (e.g., initiatives, programs, certification labels) that showed responsibility features. These attributes draw attention to: Business model; Eco-responsibility; Ethical, legal, and social issues; Frugality; Inclusiveness; Inequalities; and Responsiveness. The diversification criteria included the organization's role in the food system and the level of its activities. Following Brisebois (2017), organizations could perform one or more of the following roles: Processing and Preparation; Distribution; Institutional consumption; Information, Training, and Certification; Connection and Exchange; and Public power and Advocacy. Three levels of activities were distinguished: "micro" for those unfolding within a city; "meso" for those unfolding in more than one city; and "macro" those unfolding across the state or the province.

We aimed to recruit 15 organisations in each region, operating at all three levels. In Québec, the selection of participants and the interviews took place between July and November 2019. A total of 20 organizations were invited, 5 did not respond to the invitation, and 15 agreed to participate. In São Paulo, the recruitment and interviews took place between February and October 2020. In total, 25 organizations received an invitation, 2 declined, 8 did not respond, and 15 agreed to participate. We conducted 34 semi-structured interviews in total. Using multiple sources of data allows for triangulation of data, which contributes to a more robust analysis (Yin, 2018). Therefore, our dataset consists of semi-structured interviews, fieldnotes, and public documents. The description of the sample is presented in Supplementary Material.

Data analysis

We used the qualitative data analysis software Dedoose™ to code interview transcripts, fieldnotes, and documents. Our coding strategy followed an iterative deductive-inductive process. The coding scheme was developed by the authors and refined through discussions with other research team members. The initial codes captured the participants' views on the way their innovation contributes to transform the food system. First, we tried to analytically separate the data following the micro, meso, or macro level of activities (as described in Table 2). However, this strategy did not work well because our data showed that some initiatives contributed to transform the food system in ways that were not limited to their level of activities. Thus, to achieve our study's goal, we recoded all the data to better highlight transformations that affected, within and across each region, different food systems components. We then performed first order and second order data analysis, as recommended by Gioia et al. (2013). This strategy enabled a greater number of inductive codes to emerge throughout the recodification process and generated a better across-case understanding of our data. This led to identify how RIFS-oriented organizations and practices in both regions transform the food supply, the food demand, and the food system as a whole. Below, these findings are illustrated with participant quotes (translated from French to English or from Portuguese to English when needed). We use uppercase letters to designate the region and the participant, and numbers to designate the organization (e.g., SP-1A for participant A in organization 1 in São Paulo).

Results

The results are presented following our three research questions. Firstly, we explain how RIFS-oriented organizations and practices transform food supply, including examples from the production and distribution steps. Secondly, we describe how RIFS-oriented practices transform the demand at the individual and institutional levels. Thirdly, we show the system-level transitioning challenges our participants faced, including the institutionalization of RIFS-oriented practices in governmental discourses and action as well as the need to resist 'capture' from the dominant food system and bring actors to work together in a systemic way.

Transforming food supply

Firstly, responsible innovation transforms food supply through the integration of practices that aim to deliver positive environmental or social impacts such as improving the ecosystems or creating jobs in the outskirts. Secondly, it transforms food supply by integrating transparent commercialization practices that contributes to the resilience of small-scale farmers.

Seeking to improve social and environmental impacts through a diversity of production models

RIFS-oriented food production includes heterogeneous initiatives that go from urban agriculture and family farming to large-scale grain production that integrates regenerative practices. Anchored in the pillars of animal ethics, social, and environmental impacts, such initiatives transform the production practices in food systems in both regions.

In São Paulo, SP-8 produces organic fruits and vegetables that are sold through the Community Supported Agriculture (CSA) model. When its activities started, it was challenging to find and train workers as "there is a lot of sugarcane and soybean" in the region (SP-8A). To overcome this challenge, SP-8A "exchanged" with more experienced farmers who shared their knowledge in organic horticulture. The environmental impacts of agricultural practices is at the heart of SP-14's mission, that sought to make things "work a little better," instead of being a "disturbance" in nature (SP-14A). Their activities go beyond organic production and look at how large-scale grain producers "can regenerate while [they] produce" (SP-14A). They created a "technology package" with agricultural practices that are applied on large scale grain production and enable the regeneration of the ecosystem. They also developed a series of indicators to measure regeneration: "carbon sequestration, increased biodiversity, and water use" (SP-14A).

SP-11 promotes a "paradigm shift" in food systems, which are presently "dependent" of an "excessively mercantile vision" that guides "human health and food issues" solely through a "commercial" lens. They pioneered chicken raising without antibiotics and with the integration of animal welfare practices such as density control and better lighting conditions (SP-11B). Whenever conventional poultry farmers want to engage in SP-11's activities, they must change their practices because SP-11 received the first "antibiotic-free certification," which influenced other organizations to implement similar practices (SP-11B).

SP-2 aims to improve its environmental impact, with the implementation of urban farms in unused areas for organic food production in the outskirts of São Paulo. However, its main goal is to generate social impact by creating jobs in noncentral areas. For SP-2A, “the more local jobs you create, the better it is for the city.” Furthermore, in the outskirts men usually go to work while women stay at home with the children. Thus, the opportunity to have a job “next to their house” contributes to women’s financial autonomy.

In Québec, when QC-8’s founders were called to instal a green roof on the top of a large grocery store, their idea was to create an urban agriculture project. Such a project had its challenges, but “a lot of advantages” as they just “walked 45 steps” down from the roof to deliver the vegetables. Besides promoting short circuit production, it contributes to the reduction of “heat islands” in the city and improves rainwater retention, both of which will become “more and more critical over time” (QC-8A). QC-7A manages and installs urban agriculture projects to transform people’s relation with food. Hence, its role has “a lot to do with raising people’s awareness, getting them more interested […] in local food” production (QC-7A).

QC-11 is a cooperative that aims to “produce healthy food for the community,” “create stable and comfortable jobs” while “respecting the environment.” When QC-11 started its activities, farmers in the conventional agriculture “looked” at them like “really? You are not going to use herbicides? Are you really going to grow tomatoes like that?” But then they saw it worked, that “the fields are growing” and said: “Go! Go ahead young people!” (QC-11A). Furthermore, as QC-11 is in a municipality where the supply of organic food was limited, its presence improved the availability of organic vegetables for the community.

Adopting transparent commercialization practices that increase consumers’ awareness of food supply

Our participants engaged in commercialization practices that transform the relation between producers and consumers, bringing them closer together. Such innovative practices aim to reduce the number of intermediaries in the food chain, contribute to small-scale farmers’ resilience, and enable consumers to buy food produced responsibly.

After successfully implementing the CSA model in a city in São Paulo, SP-6 members created "training courses" to spread it through Brazil. For SP-6A, CSA enables consumers to "get out of this culture of buying" and contributes to the "financing" of agricultural production. In exchange, consumers receive what the farmers cultivate in weekly baskets. It improves farmers' resilience as they have the certainty that their production will be sold: "while you're sowing, you're already seeing who it will be going to" (SP-6A). SP-10 also supports family farmers as it a is non-profit association that markets organic food products bought mostly from cooperatives of small farmers and family farmers (SP-10A). When one enters in the marketplace, "the biggest sign" says 'this is not a supermarket.' The price showed to consumers is the price paid to the farmers. Then, at the checkout, consumers are invited to give a voluntary contribution to maintain the organization's activities.

SP-9 aims to build sustainable supply chains. The organization makes "connections" between "traditional communities" and food industries that will buy their production (SP-9A). SP-15 helps women farmers residents of quilombos from the Vale do Ribeira to sell their products to consumer groups. In addition, the organization aims to take these women out of "invisibility" by valuing their "knowledge and work." Whenever these quilombola women were asked whether they were farmers, they would answer "Oh, I help my husband" (SP-15A). When SP-15 members probed further their needs, they replied: "You don't need to come here to teach us how to grow food. We've been doing agroecology and agroforestry for 15-20 years. […]. We need to sell." Therefore, SP-15 connected the farmers with a network of "conscious consumer groups" and helped them to organize the products they wanted to offer, at what price, and the logistics involved (SP-15A). The distribution principles prioritize self-consumption and exchange: none of the women farmers "sells free-range chicken to buy chicken in the supermarket" rather they first "consume it, then exchange it with the neighbor, then try to sell it at the city fair. If it doesn't work, [they] send it to São Paulo" (SP-15A).

In Québec, QC-14 transforms commercialization practices with the goal to improve food security. It implements fixed and mobile food marketplaces to make "quality fresh fruits and vegetables accessible […] economically, physically and culturally" in 'food deserts' (QC-14A), which are areas with poor access to healthy and affordable food or low-income areas (Beaulac et al., 2009).

Besides marketing fruits and vegetables “cheaper than elsewhere,” they also provide “solidarity baskets” through partnerships with community organizations that can donate fruits and vegetables. QC-14’s activities also “support local agriculture” since two of its premises are to “act in short circuit” and buy “directly from the producers” (QC-14A).

QC-10 aims to eliminate “as much as possible” intermediaries in the food chain to enable consumers to “get closer” to the producers. The main activity of QC-10 is to manage buying groups for organic food products in bulk, enabling “a more humane way of obtaining food supplies.” The connection of consumers with food products is conducted at different levels and not only through the product *per se*. As explained by QC-10A, they are called “participants” because “when you order from QC-10, you have to participate,” which includes “picking up your order, waiting in line […], and being involved as a volunteer” (QC-10A).

Overall, our findings indicate that RIFS promotes changes in the current supply logics of the food system. Besides transforming food supply through their own practices, RIFS-oriented actors promote changes in the surrounding environment, which also brings consumers closer to producers.

Transforming the demand at the individual and institutional levels

The integration of responsibility principles first directly transform the demand at the individual level and then at the institutional level (public organizations such as schools, hospitals, and universities).

In São Paulo, SP-4 aims to “change eating habits” of consumers through the democratization of nutritional information. Through partnerships with companies, they build urban gardens and offer workshops inspired by the Brazilian food guide that cover “the entire food cycle”: “From how to set up a garden and take care of it […], to how to make full use [of the products] in the kitchen, cooking techniques, lunch box […] and compost” (SP-4A). In the label reading workshop, SP-4A takes “all the mixed food [groups]” and teaches people ways “to separate them into *in natura*, minimally processed, processed, and ultra-processed” (SP-4A).

For SP-13A, the implementation of policies that require institutions to purchase local and organic food from family farmers transformed school meals in São Paulo city. It enabled schools to buy food products that are "less polluting" and have "less [negative] environmental impacts":

> When we buy banana from a middleman [a conventional food distributor], it could come from Panama, from Santa Catarina, from the north of Minas Gerais […], we don't know the origin of the food […]. When we buy from Vale do Ribeira, we know that this food comes from a maximum distance of 300 kilometers, and we know from whom it is coming (SP-13A).

Furthermore, this purchasing model shows "respect for eating habits" of the students because "when you buy locally, you're buying the food that the child eats at home, which is part of their food culture" (SP-13A).

In Québec, the nutrition staff of QC-3, which is an hospital-based program, got excited when they saw what hospitals "elsewhere" were doing. For QC-3A it was a striking and transformative discovery: "There are hospitals that have built hives. They make their own honey […] they make their own tofu. […]. So, when you see what other people are doing, you say to yourself 'well, I don't do much after all'" (QC-3A). They thus decided to increase in their hospital's food service the share of locally produced food products and eventually organic products too: "We wondered why we bought it from elsewhere. Why it came from Ontario […] or from China?" (QC-3C). When they began the project, they realized that "it's not that simple" because the hospital must follow supply contractual rules and buy most of its food from a food distributor (QC-3C). Nevertheless, they were able to respect these rules while buying more local products: "if we don't exceed such an amount, we can get out of our contract" with the food distributor (QC-3C). As the initiative unfolded, they worked to "become a lever" and convince other hospitals to join them "to bring about change" in food distributors' practices (QC-3C). Such a system-level action could make it easier to change food distributors' practices and increase even more the share of local products.

QC-4 deployed efforts to transform food practices in a university. In the university's "sustainability plan" there is a chapter dedicated only to the food service. It aims for a maximum of "28% of the food" to be "animal-based food" (QC-4A) and another target is to buy more local food products. For QC-4A, "it does take a while" to get the University's food provider to buy from

local suppliers, but “there are ways to move around.” Whenever “there’s a smaller local distributor […] we’ll talk with them and say, ‘can you bring on these products?’” The contracts with the company providing the food service are thus “key” for them to “push” on the integration of sustainable practices. In these contracts, “you just lay out what you want” (e.g., “75% local fruits and vegetables in the summer, 50% local fruits and vegetables in the fall, and 25% in the winter”) and then the company has “to report and present its metrics three times a year” (QC-4A).

In sum, our findings indicate that at the individual level the demand is transformed through increasing consumers’ knowledge and awareness about food. At the institutional level, policies and contracts are key to promote the required changes in food purchasing in public organizations.

Contributing to system-level transition

Participants pointed out the diverse ways through which they resist being ‘captured’ by the dominant food system and how system-level transformations in food systems require convergence among actors to achieve a common goal.

Resisting ‘capture’ from the dominant food system

In São Paulo, SP-3A explained that small farmers from the Valle do Ribeira have to continually resist their integration in conventional agriculture. They get “harassed on a daily basis” by companies arguing that if they use their products they will “get rich and ride a truck” like conventional producers. Nevertheless, SP-3 has achieved “good results” thanks to public policies and “social capital,” which include consumers, alternative food markets, researchers, etc. (SP-3A).

To resist dominant food system dynamics, SP-15 “choses” to offer to consumers from the network the food products that women farmers from the Valle do Ribeira produce without interference in the women’s production planning. SP-15A observed that “the market changes peoples culture a lot” and end up dictating what farmers should produce. They thus work to build resilience to counter such reversed relationship. As a result, there is a diversity of products

offered: “if you were to look at the bananas they have today, they still have pacovan, nanica da serra, some traditional varieties” (SP-15A).

In Québec, the emergence of responsible organizations and practices is mounting and “shakes things up” (QC-9B). As they grow in numbers and size, such initiatives find resistance from lobby groups who “don’t want things to change” (QC-9B). Actors participating in this emerging movement acknowledge the need to resist being ‘captured’ by the conventional food system. For instance, QC-2 was “militating” against the possibility to use the organic certification in hydroponic agriculture. According to QC-2A, while principles of “soil health and ecosystems health” are at the heart of organic certification, hydroponics systems are “independent of the health of the soil and of the health of the […] ecosystems.” QC-7A gave the example of a real estate group who wants to buy 200 hectares of “agricultural land” to develop “a large real estate complex” that would include an urban agriculture project to deliver “a thousand baskets.” Such a level of competition would be “difficult for small farmers” (QC-7A).

Institutionalizing responsible food practices

A transition in the food system may only happen if multiple actors align their efforts to achieve a common goal. Our participants highlighted food practices that are gaining recognition by governmental bodies, but rallying different and, sometimes, opposing actors towards system-level change remains challenging.

Even though Brazil witnessed in the last years a governmental setback concerning institutional purchasing from family farmers and organic products, the positive impacts of such policies are already recognized by governmental bodies in São Paulo. For SP-5A, purchasing policies that favor family farmers in school meals are “activation money” that “makes development possible” for this “target audience.” SP-13A pointed out that even if it were leftist parties that “went to the fight” in public debates about this policy, a point of no return has been achieved: the policy is not a “partisan issue” anymore (i.e., belonging to the left or right) and this was fundamental to resist political divergences (SP-13A). For SP-13A, unlike a “conventional bidding process” that aims to buy “the cheapest food,” a family farmer food purchasing policy aims for “social, environmental, and sustainable” impacts. In addition, the financial incentive that is likely to be offered for organic

products raised an increased interest of farmers in transitioning to organic: within this policy, organic products are bought at 30% more than conventional ones. Besides the positive impacts on the production, purchases from family farmers are also great from a nutrition perspective, due to the "diversity of the food offered" (SP-13A).

In Québec, system-level change remains an open debate. As aptly put by QC-15A the term food system is "misused": for a food system to exist, "there must be a form of steering, of orientation, not just […] an agglomeration of actions of disparate actors whose result is a system. A system must also be organized according to a goal. And for the moment, I don't believe that the goal of the system is the health of the population" (QC-15A). Nevertheless, there has been some progress according to other participants. Québec farmers who produce organic food find support at QC-2, which gathers growers across the province to promote "ecological local agriculture." According to QC-2A, the organization impulses a movement across the province as it gives farmers a "sense of belonging to something bigger" rather than "being alone in one's corner," and this is important in an economic environment where farmers are often "left to fend for themselves." Getting food system actors to converge "in a systemic way" and, therefore, bringing the transition to another level is "quite a challenge" since it implies "many changes" in established behavioural "reflexes" (QC-15A). To stop food system actors working in "silos", QC-12A was organizing a meeting for actors working in the same direction to "come together" and "find ways to collaborate" (QC-12A).

While municipalities are "extremely solicited for a lot of different dossiers," QC-15 was trying to show how their "sustainable development objectives" could be supported by promoting a sustainable food system (QC-15A). Despite some gains, "there's still resistance" because municipalities "have a lot of other things to work on" (QC-15A). For QC-9A, the emergence of RIFS is basically "a questioning of our current food system." This critical standpoint implies a "culture change" in governmental bodies, which have always focused on "the industrial model." Presently, there is a timing "gap" between the growing emergence of responsible initiatives and the government's ability to support them. Such initiatives will "try to last" and "maybe" after reaching a "certain level of consensus," these initiatives will be supported by the government (QC-9A).

As explained by QC-9B, the government can either be an “accelerator” of change or a “wall” that slows down the transition. When the strategy to buy local food in institutions started in Québec, it created an “upheaval” as there was not “much coming from the Ministry” (QC-9A). However, as this strategy advanced, the discourse about local food in institutions became “institutionalized” in the Ministry and the government “wanted it to move forward” (QC-9A). Hence, real societal and political will can materialize in different forms of policy interventions.

Overall, our findings indicate that achieving system-level transition requires resisting ‘capture’ by the dominant food system as well as creating a common goal for food system actors to enable the institutionalization of RIFS.

Discussion

Because the literature on responsible innovation in food system in still emerging, we developed a working definition of RIFS to support our study. Our findings then clarified how RIFS-oriented organizations and practices in Québec and São Paulo: 1) transform food production by integrating production practices that aim to deliver positive social and environmental impact; 2) transform food distribution through transparent commercialization practices that bring producers and consumers closer together and through responsibility principles that change the demand at the individual and the institutional levels; and 3) contribute to system-level transition by resisting to the dominant food system and seeking to align actors towards a common goal.

Our findings empirically confirmed key elements of our working definition of RIFS, which are summarized in Table 2. This definition brought forward the contextualized nature of innovation to achieve specific ends, such as improving ethics in animal raising (Purwins and Schulze-Ehlers, 2018), and the development of technologies that are gender-sensitive or adapted to small-scale farmers (Devkota et al., 2020; Pant, 2019). It also stressed general ends pursued by RIFS, such as food equity (Bronson, 2019), as well as integrated ends, such as addressing food security challenges in a context of climate change. While further research is needed to articulate a more solid definition, we discuss below how our findings improve current understanding of RIFS.

Tableau 16. (Table 2 from paper 3) A summary of the empirical findings supporting our working definition of Responsible Innovation in Food Systems (RIFS)

Responsibility elements	
	Ethical concerns • Adopting animal welfare practices (e.g., lighting and density control) • Taking traditional communities' needs in decision making about their own agricultural and commercialization practices into account **Engagement of stakeholders** • Engaging consumers in food commercialization practices • Collaborating with stakeholders sharing similar goals **Environmental concerns** • Integrating organic, agroecological or regenerative agricultural practices • Institutional purchasing of organic, local and/or from family farmers food products • Reducing institutional purchases of animal food products • Commercializing food from small farmers, family farmers and/or local farmers • Commercializing organic food products in-bulk • Fostering short-circuit in food supply chain **Organizational practices** • Creating jobs in the outskirts • Using business models based on non-profit organizations or cooperative • Pricing that varies according to consumers' capacity to pay **Health challenges** • Improving the availability of antibiotic-free food or organic food • Promoting healthier consumption habits and raising awareness about ultra-processed food • Production practices that favor food diversity **Food system challenges** • Antibiotic-free animal raising • Connecting growers to the market • Commercializing food products according to their availability (due to seasonality or geographic characteristics) and not according to the market demand • Improving the availability of fresh food in 'food deserts' • Raising consumers' awareness and knowledge about food choices

What elements of RIFS transform the food supply and demand

We identified six categories of responsibility elements characterizing RIFS's products, processes, and organizations (see Table 2). The first category is related to the integration of **ethical concerns** in food practices, such as animal welfare. Our participants took a leadership role in the integration of ethical concerns in animal raising practices that other actors were not taking into consideration. This is in line with Pant (2019) and Gremmen et al. (2019) who pointed out that animal welfare practices exemplify characteristics of responsible innovation in food systems.

The second category concerns the **engagement of stakeholders** in food system activities. Our participants emphasized the inclusion of producers in decisions regarding agricultural and commercialization practices or the engagement of consumers in commercialization practices. The literature stresses the engagement of stakeholders as an element of responsibility (Devkota et al., 2020; McCampbell et al., 2022; Purwins and Schulze-Ehlers, 2018). This is at the heart of the RRI scholarship since 'inclusivity' is one of the four processual dimensions of Stilgoe et al. (2013) framework and the RIH 'inclusiveness' attribute refers to the "degree of stakeholder engagement in the design, development and pilot stages of an innovation" (Silva et al., 2018).

The third category underscores **environmental concerns** in food practices. Our participants' practices aimed to reduce their negative environmental impacts through organic or agroecological food production, regenerative agriculture to improve ecosystems, and shorter supply chains. To reduce the environmental impacts of consumption practices, they integrated local products in institutional purchases and reduced institutional purchases of food with higher environmental impacts such as animal food products. These findings add to Dalziel et al. (2018) and Long and Blok (2018), for whom climate change and environmental concerns are key elements of responsibility in food systems, and align with the RIH 'eco-responsibility' attribute, which refers to "the reduction of negative environmental impacts along the innovation's lifecycle stages" (Silva et al., 2018).

The fourth category, **organizational practices,** integrates responsibility principles into economic activities such as creating jobs in the outskirts or selling organic products at prices adjusted to consumers' capacity to pay to generate social impact. Also, choosing a non-profit or cooperative

structure corresponds to the RIH 'business model' attribute, which examines "the propensity to provide more value to users, purchasers and society" (Silva et al., 2018). Our findings thus enrich the current literature, where only Pant (2019) referred to organizational characteristics, underscoring that innovating responsibly should involve proper intellectual property management.

The fifth category emphasizes **health challenges** associated to food production and consumption. Our participants' practices aimed to improve the availability of organic food and antibiotic-free animal products, both of which can help to deal with health issues, such as pesticides exposure and antibiotics' resistance (IPES-Food, 2017). Raising consumers' awareness and improving their knowledge on ways to make healthier food choices may also contribute to tackle ultra-processed food-related health problems such as chronic diseases. These findings thus supplement Khan et al. (2016) that was the only article in our review stressing that integrating health and food research is crucial to tackle food security challenges in a context of climate change.

The sixth category refers to **food systems challenges**. We found that the deliberate commercialization of local and fresh food in areas where food availability is compromised can contribute to reduce food security challenges in 'food deserts.' The connection between growers from more isolated communities and the market fosters resilience within these communities. Likewise, the commercialization of food products according to the farmers' planning and not to market demands mitigates the impacts of monoculture. These findings thus complement those of Dalziel et al. (2018) on consumers' willingness to pay for responsible food products and suggest that they can contribute to alleviate food system challenges.

Study limitations and strengths

Though we followed rigorous methodological standards, one limitation of this study lies with the lack of an agreed upon definition of RIFS that would have enabled us to use a set of formal criteria to constitute our sample. As a result, we may have missed relevant organizations. Another limitation is linked to the large volume of data a multiple case study typically generates. Though this increases the robustness of our across-case findings, we could not describe in greater detail the specific roles our respondents played in the food systems of Québec and São Paulo.

Among its strengths, our study organized the elements of responsibility addressed separately so far in the literature on RRI in food studies and brought to light health-promoting and organizational elements that had been overlooked. By empirically examining the 'ends' of RIFS, it clarified its contribution to food systems transition showing how it affects distinct parts of the food system such as production, distribution, and consumption. Beyond empirically substantiating our working definition of RIFS, our findings stressed that isolated actors engaged in RIFS are not enough to achieve a transition in food systems. The difficulty of getting system-level actors to converge towards a common goal hinders the institutionalization of RIFS and, consequently, a transition. Here, conceptualizing food systems from a "normative" perspective would help policymakers and other food system stakeholders to define a common direction such as achieving zero hunger, articulate "a set of objectives," and then "shape the system" towards these goals (von Braun et al., 2021). Hence, our study stresses the need for policies that support the emergence and institutionalization of RIFS (Sabio and Lehoux, 2022) and that can bring key actors to define what should be the 'responsiveness' of food systems, that is, their systemic ability "to provide dynamic solutions to existing and emerging challenges" (Silva et al., 2018).

Conclusions

A responsible innovation approach has the potential to be a powerful concept to guide policies towards innovation that contributes to food systems transition as well as food security. As research using a responsible innovation approach to food systems will gain in conceptual and empirical depth, many research areas deserve scholars' attention. For instance, further research on the relationship between food security and food system transitioning would be warranted. Our study showed many inspiring initiatives that are already contributing to build a more resilient food system based on the principles of responsibility. Our RIFS definition can help to better coordinate the work needed to collectively overcome transformational failures that constrain system-level change. Overall, RIFS results from actors who are "resisting and promoting social changes to address the grand challenges of our societies" (Rouleau, 2022) and they need contextualized-policy support for their activities to further emerge and scale, so they can lead to lasting systemic transformations (Sabio and Lehoux, 2022).

Acknowledgments

We would like to thank members of our research team who provided us with insightful comments: Hudson Silva, Lysanne Rivard and Robson Rocha de Oliveira.

Funding

The first author holds a PhD training grant from the *Fonds de la recherche du Québec — Société et culture* (FRQ-SC; #292266) and is supported by the In Fieri research program, which is funded by the Canadian Institutes of Health Research (CIHR; #FDN-143294). Our research center, the CReSP, is supported by the *Fonds de la recherche du Québec — Santé* (FRQ-S).

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Supplementary Material

Tableau 17. (Table S-1 from paper 3) Participants description

Case	Key roles in the food system	Level of activities	Innovation
QC_1	Processing/ Preparation	Meso	Preparation and delivery of meals to the elderly or people with reduced mobility; gleaning from local farms and using the products in a collective kitchen
QC_2	Connection/ Exchange	Macro	A network designed to improve access to resources and markets for local organic producers in the province, for example by linking producers and consumers
QC_3	Institutional consumption	Meso	Implementation of room food service; Integration and increase of local food purchases
QC_4	Institutional consumption	Micro	Development and implementation of a sustainability plan that promotes local and organic food procurement at a university
QC_5	Connection/ Exchange	Macro	Development of programs to increase the presence of local and organic foods in schools and health institutions
QC_6	Production	Meso	Production of seasonal local honey and partnership to supply part of the production directly to a health institution
QC_7	Production	Micro	Design, installation, and management of urban organic farms
QC_8	Production	Micro	Installation and management of gardens and urban agriculture projects, including an urban farm in the rooftop of a retail store
QC_9	Public power/ Advocacy	Macro	Development and implementation of programs that encourage institutions to purchase local food products
QC_10	Distribution	Meso	Group purchases of eco-responsible non-perishable food in bulk
QC_11	Production	Meso	Production of organic fruits and vegetables and partnership to sell directly to a health care facility
QC_12	Connection/ Exchange	Meso	Mobilizing local stakeholders and providing advice to decision-makers to ensure a stronger regional commitment to food issues.
QC_13	Processing/ Preparation	Micro	Preparation and delivery of meals prepared with local products to people with reduced mobility
QC_14	Distribution	Micro	Installation and management of mobile and fixed public markets to sell local fresh food in low-income or food desert areas
QC_15	Information/ Training/ Certification	Macro	Setting up awareness actions to support municipalities in strengthening their local food systems (conferences, strategic meetings, etc.)
SP_1	Distribution	Meso	“Urban harvest” project that collects fresh food and redistributes them to non-profit institutions
SP_2	Production	Meso	Implementation of frugal urban farms in low-income areas to create jobs and provide fresh produce in these areas
SP_3	Distribution	Meso	Gathering small farmers’ cooperatives to improve the marketing of their agricultural production and coordinate interests such as institutional food supply to school meals

Case	Key roles in the food system	Level of activities	Innovation
SP_4	Information/ Training/ Certification	Micro	Development of workshops to transform people's relationship with food, including programs on responsible food practices such as waste reduction and knowledge on the different levels of food processing.
SP_5	Public power/ Advocacy	Macro	Development and implementation of programs that encourage institutions to purchase local food; creation of an online platform that aggregates institutional tenders and sends them to local family farmers.
SP_6	Distribution	Macro	Promotion and implementation of the community supported agriculture model
SP_7	Processing/ Preparation	Micro	Lunch boxes made with locally produced organic food prepared by women from low-income areas; development of a Web App to connect the actors and sell the lunch boxes
SP_8	Production	Meso	Production of organic vegetables, tubers and grains which are marketed through the Community Supported Agriculture model
SP_9	Information/ Training/ Certification	Macro	Implementation of socio environmental certifications in agricultural products; Development of sustainable food supply chains based on the creation of links between producers and buyers.
SP_10	Distribution	Micro	Marketing of organic food products at prices that vary according to the capacity to pay
SP_11	Production	Meso	Production of agricultural inputs for sustainable agriculture; Production and processing of animal products without antibiotics and certified for animal welfare
SP_12	Distribution	Micro	Marketing of organic food products baskets through a network of independent entrepreneurs
SP_13	Institutional consumption	Meso	Development of school meals programs to increase supply from family farmers and organic agriculture, following federal and municipal laws; contribution to the development of a municipal law that preconizes the supply of organic food products to the school meals of the city of São Paulo.
SP_14	Production	Micro	Large scale regenerative organic agriculture with the use of agricultural systems that sequester carbon from the atmosphere and restore biodiversity
SP_15	Connection/ Exchange	Meso	Creation of an agroecological network of women farmers residents of quilombos based on the principles of solidarity economy

Note: QC stands for Québec and SP for São Paulo

Chapitre 5 – Discussion générale

Principaux résultats : retour sur les objectifs de recherche

Cette recherche doctorale cherchait à mieux comprendre la transition des systèmes alimentaires en l'examinant empiriquement dans le contexte d'une économie établie et dans celui d'une économie émergente : la province de Québec et l'État de São Paulo (Brésil). Pour ce faire, nous avons posé la théorie institutionnelle comme toile de fond afin de structurer la rencontre de nos objectifs. Cette théorie attire l'attention sur les pratiques institutionnalisées et permet d'analyser les dynamiques entre les innovations émergentes et le système alimentaire dominant. Le premier article de la thèse permet de comprendre les pratiques institutionnelles en place dans le système alimentaire dominant. Le deuxième article permet d'accroître cette compréhension par l'analyse des éléments contextuels qui contraignent et contribuent à l'émergence de l'innovation responsable dans les systèmes alimentaires du Québec et de São Paulo (leur environnement institutionnel). Finalement, le troisième article souligne la contribution de l'innovation responsable dans la transition vers des systèmes alimentaires plus favorables à la santé (le changement institutionnel).

Nous reprenons ci-dessous les trois objectifs spécifiques ayant guidé cette thèse afin de dégager les contributions des trois articles. Ces explications succinctes se veulent une synthèse des contributions discutées plus en détail dans chacun des articles.

Objectif 1 : Caractériser les systèmes alimentaires dans la province de Québec et l'État de São Paulo

Afin d'atteindre le premier objectif de cette thèse, nous avons mené une analyse secondaire de données socio-économiques sur la production, la transformation et la distribution des aliments dans la province de Québec et l'État de São Paulo. Le cadre conceptuel qui soutient cette étude est celui des régimes alimentaires. Ce cadre explore des aspects clés de la théorie institutionnelle et permet de mieux comprendre les dynamiques dominantes dans les deux systèmes alimentaires. Les résultats montrent, dans les deux régions analysées, la prépondérance économique des étapes de transformation et de distribution des aliments par rapport à la

production agricole. Cela est une caractéristique clé des systèmes alimentaires industrialisés. Nous avons également constaté une concentration sur certains produits et sur certaines activités industrielles, avec un accent particulier sur les chaînes d'approvisionnement orientées vers l'exportation. Chacun de ces systèmes alimentaires présente également des particularités. D'après les informations disponibles, alors que le système alimentaire du Québec reflète la logique des marchés intégrés à l'échelle mondiale, s'appuyant à la fois sur les exportations et les importations, le système alimentaire de São Paulo se caractérise comme étant un fournisseur international de produits alimentaires puisqu'il exporte beaucoup plus qu'il n'importe. La caractérisation de ces deux systèmes alimentaires a mis en évidence la manière dont ceux-ci sont abordés par les autorités publiques sur leur propre territoire : une activité économique. Cette perspective économique contraste avec une orientation vers le bien commun, nécessaire pour mettre de l'avant le rôle des systèmes alimentaires face aux grands défis sociétaux, comme la sécurité alimentaire et le changement climatique.

Objectif 2 : Clarifier comment les contraintes et les opportunités contextuelles affectent l'émergence de la responsabilité dans les systèmes alimentaires

Le deuxième article permet de répondre à cet objectif par le biais d'une analyse des données issues de 34 entrevues semi-structurées menées dans 30 organisations, soit 15 dans la province de Québec et 15 dans l'État de São Paulo. Nous avons analysé de manière empirique les différentes dimensions du contexte qui à la fois contribuent et limitent l'émergence d'organisations et de pratiques avec de caractéristiques d'innovation responsable dans ces deux systèmes alimentaires. L'analyse est appuyée par le cadre des systèmes alimentaires durables développé par le Groupe d'experts de haut niveau sur la sécurité alimentaire et la nutrition (HLPE, 2020). Celui fournit une vue d'ensemble sur des différentes composantes d'un système alimentaire, y compris ses principaux éléments contextuels. Les résultants articulent en un ensemble plus systématique et cohérent des éléments contextuels qui à la fois contribuent et limitent l'émergence de la responsabilité. Ces éléments sont l'environnement biophysique et environnemental; la technologie, l'infrastructure et les connaissances; les dynamiques économiques; le contexte politique et institutionnel; le contexte socioculturel et démographique; le comportement du consommateur et les régimes alimentaires; la chaîne d'approvisionnement

alimentaire; les relations interpersonnelles. Cette étude montre comment les dimensions contextuelles façonnées par le système alimentaire dominant freinent l'émergence d'organisations et de pratiques responsables. D'autre part, nos résultats font ressortir comment les dimensions contextuelles peuvent être modifiées de façon délibérée afin de soutenir l'émergence de l'innovation responsable. En conclusion, cet article démontre de façon empirique que l'émergence d'organisations et de pratiques responsables dans le système alimentaire requiert un contexte favorable, au-delà des efforts et des motivations des acteurs individuels.

Objectif 3 : Analyser les pratiques et les dimensions organisationnelles qui soutiennent la transition vers des systèmes alimentaires plus responsables

Le troisième article de la thèse permet de répondre à l'objectif 3 en générant une meilleure compréhension de la contribution des organisations et des pratiques qui intègrent des principes de responsabilité dans la transition des systèmes alimentaires. Pour ce faire, une étude de cas multiple a été menée en incluant 30 cas d'organisations et de pratiques alimentaires dans la province de Québec et dans l'État de São Paulo. Étant donné que la littérature sur l'innovation responsable dans le système alimentaire est encore émergente, nous avons élaboré une définition provisoire du concept de l'Innovation responsable dans les systèmes alimentaires (IRSA ou RIFS pour l'acronyme en anglais) pour soutenir l'étude. Cette définition met de l'avant la nature contextualisée de l'innovation ainsi que les préoccupations éthiques, sociales et environnementales des agriculteurs et des multiples parties prenantes. Les résultats de l'étude clarifient la façon dont les organisations et les pratiques axées sur l'IRSA transforment l'offre alimentaire, la demande alimentaire et contribuent à la transition à l'échelle systémique. Celles-ci transforment la production alimentaire en intégrant des pratiques de production qui visent à avoir un impact social et environnemental positif. Elles transforment la distribution alimentaire par des pratiques de commercialisation transparentes qui rapprochent les producteurs et les consommateurs et par des principes de responsabilité qui modifient la demande aux plans individuel et institutionnel. Enfin, elles contribuent à la transition en résistant aux dynamiques du système alimentaire dominant et en cherchant à aligner les acteurs vers un objectif commun. En analysant le rôle de l'innovation responsable dans la transition des systèmes alimentaires dans une économie émergente et une économie établie, cette étude offre une importante base

conceptuelle empirique pour les recherches futures sur les moyens d'atteindre la sécurité alimentaire de manière durable.

Contributions

Contributions à la recherche à l'interface entre la santé publique et les systèmes alimentaires

Au début de ce parcours doctoral, en 2016, l'engouement pour changer le système alimentaire était déjà en pleine croissance. Aujourd'hui, en 2023, la transition des systèmes alimentaires est considérée « urgente » pour relever les grands défis sociétaux comme le changement climatique et la sécurité alimentaire ainsi que pour rencontrer l'ensemble des Objectifs de Développement Durable (El Bilali, 2019; IPES-Food, 2016; Touzard, 2016; UN, 2015; Willet and et al, 2019). Cet engouement pour une transition provient de différentes disciplines comme le développement durable, la santé et l'agriculture car la transition des systèmes alimentaires est reliée à plusieurs autres « systèmes » (HLPE, 2020). Dans cette section de la discussion, nous présentons les contributions de cette thèse pour la recherche à l'interface entre la santé publique et les systèmes alimentaires.

La santé publique vise à « améliorer la santé de toute la population » (Last, 1998, traduction libre, p. 6). Selon Last (1998), « les activités de santé publique évoluent en fonction de l'évolution des technologies et des valeurs, mais les objectifs restent les mêmes : réduire le nombre de maladies, de décès prématurés, d'obstacles et de handicaps causés par les maladies dans la population » (traduction libre, p. 6). En fait, les plus grands contributeurs à la santé de la population sont les déterminants sociaux de la santé, incluant l'alimentation (Marmot, 2005). Non seulement l'alimentation joue un rôle important dans la santé publique, mais aussi toutes les activités appartenant au système alimentaire influencent la santé de façon directe par la consommation d'aliments accessibles et de qualité ou indirecte par leurs dimensions sociales, économiques et environnementales. Dans cette thèse, la sécurité alimentaire, plus particulièrement, est perçue comme résultant de la transition vers des systèmes alimentaires plus responsables.

En fait, en raison du caractère multidimensionnel de l'alimentation, il faut intervenir en amont et dans les différentes étapes du système alimentaire pour s'attaquer aux enjeux contemporains de santé. Cependant, la littérature indique qu'une approche systémique de l'alimentation semble encore en émergence dans les études en santé publique. Par exemple, les avancées scientifiques sur les nutriments au début du XX^{e} siècle ont largement façonné la compréhension sur le rôle des aliments dans la santé en limitant souvent les connaissances sur les liens complexes entre le système alimentaire et la santé (Mozaffarian et al., 2018). Les avancées dans la recherche sur les effets post-consommation des aliments sont évidemment pertinentes et ont largement contribué à améliorer la santé de la population, mais la santé publique doit également s'intéresser à la façon de transformer les systèmes alimentaires en amont.

La recherche sur les systèmes alimentaires, quant à elle, a beaucoup évolué dans les dernières années. Aujourd'hui, les principales thématiques dans cette littérature tournent autour du changement climatique, les maladies non transmissibles liées à l'alimentation, les migrations, la gouvernance mondiale, les systèmes alimentaires et les environnements alimentaires urbains (Fanzo, 2022). D'ailleurs, les pressions environnementales exercées par les systèmes alimentaires ont de plus en plus dominé l'agenda de la recherche dans ce domaine, en se concentrant sur les pratiques de production agricole et animale et sur les considérations de durabilité et de bien-être qui y sont liées (Fanzo et al., 2020). Dans un article de perspective intitulé *Une vision de la recherche pour les systèmes alimentaires dans les années 2020 : Défier le statu quo,* Fanzo et al. (2020), éditeurs de la revue Global Food Security à l'époque, ont souligné que la tendance « la plus bienvenue et vitale » dans la recherche sur la sécurité alimentaire et la nutrition est « le démantèlement des silos disciplinaires » (traduction libre, p. 5).

En fait, il y a de plus en plus d'efforts pour relier les différentes disciplines dans le but de promouvoir la santé de la population et de la planète de façon durable. Par exemple, le premier forum organisé par la Commission EAT Lancet a eu lieu en 2014 dans le but de promouvoir la recherche intégrant les champs de l'alimentation, de la santé et de la durabilité :

> « Il existe des forums sur l'alimentation, sur la santé et sur la durabilité - et maintenant, enfin, un forum qui intègre ces trois domaines d'une manière globalement efficace. » (EAT, 2013, traduction libre)

Les principaux rapports produits par des organismes de référence appellent pour une vision intégrée des systèmes alimentaires – ces organismes incluent le Groupe d'experts de haut niveau des Nations Unies sur la sécurité alimentaire et la nutrition (HLPE), la Commission EAT-Lancet, et l'Organisation des Nations unies pour l'alimentation et l'agriculture (FAO) en collaboration avec l'Organisation mondiale de la santé (OMS). Ces rapports mettent de l'avant la nécessité de transformer les systèmes alimentaires de manière holistique afin de lutter contre l'insécurité alimentaire sans transgresser les frontières vitales de la planète (Fanzo et al., 2020; FAO and WHO, 2019; HLPE, 2020; Willet and et al, 2019). Par exemple, la FAO et l'OMS se sont réunies pour faire une consultation internationale d'experts sur les régimes alimentaires sains et durables. Les deux organisations sont parvenues à un accord selon lequel les régimes alimentaires sains et durables visent à :

> « […] assurer une croissance et un développement optimaux de tous les individus et favoriser le fonctionnement et le bien-être physique, mental et social à tous les stades de la vie pour les générations actuelles et futures; contribuer à prévenir toutes les formes de malnutrition (c'est-à-dire la dénutrition, les carences en micronutriments, le surpoids et l'obésité); réduire le risque de maladies non transmissibles liées à l'alimentation; et favoriser la préservation de la biodiversité et de la santé planétaire » (FAO, WHO, 2019, traduction libre, p. 10).

Cette thèse contribue à ce créneau de recherche qui relie le système alimentaire et la santé publique par la génération de données qui soutiennent la transition vers des systèmes alimentaires plus favorables à la santé. En analysant l'émergence d'organisations et de pratiques alimentaires innovantes favorables à la santé et à l'environnement, cette thèse a généré des connaissances interdisciplinaires qui intègrent les forces de la recherche en santé publique à celles de la recherche sur les systèmes alimentaires. L'application de l'approche de l'innovation responsable en santé dans l'étude de la transition des systèmes alimentaires met en évidence cette interdisciplinarité. Selon Khan et al. (2016), ce type d'intégration est urgent pour informer les politiques et les pratiques et soutenir une production plus durable d'aliments sains et abordables dans un contexte de changement climatique. À mesure que le changement climatique continue de progresser, les « chocs » sur le marché alimentaire deviendront probablement plus

fréquents (The Lancet Planetary Health, 2022). Ainsi, il est ainsi nécessaire de développer des approches mieux coordonnées pour créer des systèmes alimentaires qui « minimisent les dommages environnementaux tout en luttant contre la faim dans le monde » (The Lancet Planetary Health, 2022, p. e455).

Dans leur étude, Khan et al. (2016) ont analysé la manière dont l'innovation est conçue par les bailleurs de fonds dans la recherche qui relie l'alimentation et la santé dans différents pays d'Europe. Les auteurs ont constaté que la manière dont les bailleurs de fonds encadrent l'innovation dans ce domaine de recherche était axée sur le développement de nouveaux produits alimentaires, ce qui est « plus conforme aux intérêts des entreprises qu'à ceux de la société dans son ensemble » (Khan et al., 2016, traduction libre, p. 86). Par ailleurs, ils ont trouvé que pour ces décideurs, l'amélioration de la santé publique est un effet collatéral de l'innovation menée par des intérêts économiques. Les auteurs concluent que cette perspective de l'innovation ne permettra pas « d'obtenir les impacts nécessaires » pour faire face aux enjeux de santé publique dans un contexte de changement climatique. L'innovation responsable devrait plutôt permettre une conceptualisation de l'innovation « qui transcende le progrès technologique et les impacts économiques » (Khan et al., 2016, traduction libre, p. 86). Comme nous avons montré dans la revue de littérature (chapitre 2), la recherche qui applique l'innovation responsable dans les études en alimentation est en émergence, mais n'a pas encore été abordée selon une perspective de santé publique. Cette thèse s'est d'abord ancrée dans le concept d'innovation responsable en santé pour guider la collecte de données primaires. Le cadre IRS a été utilisé pour structurer la sélection d'organisations et de pratiques qui offrent des alternatives au système alimentaire dominant et cherchent à contribuer au développement et à la mise en marché d'innovations pouvant éventuellement favoriser des systèmes de santé plus équitables et durables. Notre ancrage dans l'IRS fait en sorte que les innovations que nous avons sélectionnées dans le cadre de cette thèse sont susceptibles d'avoir un impact positif sur la santé. Par ailleurs, la définition de l'innovation responsable dans les systèmes alimentaires (IRSA) développée dans le troisième article met de l'avant le fait que la « santé et le bien-être » des consommateurs et des acteurs qui travaillent dans les différentes étapes du système alimentaire devraient être pris en compte dans l'IRSA. La santé publique n'est donc plus conceptualisée comme un effet collatéral de l'innovation,

mais au cœur de l'IRSA. Cette thèse contribue ainsi à ce champ de recherche à l'interface des systèmes alimentaires et de la santé publique par l'utilisation du concept d'innovation responsable dans une perspective de santé publique.

Pour conclure, même si les chercheurs de différentes disciplines sont unanimes quant au besoin de promouvoir une transition dans le système, la capacité à conduire une telle transition a été moins bien réussie jusqu'à maintenant. En analysant la transition des systèmes alimentaires dans deux économies différentes sous la perspective de l'innovation responsable, les efforts de recherche dans cette thèse se sont concentrés sur ce qui se passe en amont, c'est-à-dire, avant que les aliments soient mis à la disposition des consommateurs. Ainsi, cette thèse ajoute de nouvelles connaissances à ce créneau de recherche sur la transition qui se retrouve à l'interface de la recherche en santé publique et le système alimentaire.

Contributions conceptuelles

Lorsqu'on examine de manière transversale les trois articles qui composent cette thèse, il est possible de dresser ses contributions conceptuelles à la lumière de la théorie institutionnelle car celle-ci est plus englobante que les cadres théoriques mobilisés dans chacun des articles. Ces contributions sont expliquées dans cette section et s'articulent d'abord autour du changement institutionnel sous-jacent à la transition des systèmes alimentaires. Ensuite, nous attirons l'attention sur la socio matérialité du système alimentaire dominant et, enfin, sur le travail institutionnel généré par l'IRSA.

Leçons transversales aux trois articles : le changement institutionnel sous-jacent à la transition des systèmes alimentaires

Institutionnaliser c'est le processus par lequel les actions se répètent au fil du temps et en viennent à être perçues comme ayant des significations similaires au sein de la société (Berger and Luckmann, 1966). L'institutionnalisation résulte ainsi du « processus par lequel les individus acceptent une définition partagée de la réalité sociale » (Scott, 1987, traduction libre, p. 496). Plus simplement, ce processus renvoie à « comment sont les choses » et à « comment les choses doivent être faites » (Scott, 1987, traduction libre, p. 496). La théorie institutionnelle examine le

rôle des structures de significations et de symboles dans la constitution des structures organisationnelles (Rouleau, 2022). Dans sa troisième vague, la théorie institutionnelle « renouvelée » nous permet de regarder les institutions non plus comme inchangeables, mais dotées de la possibilité de changement (Rouleau, 2022). Le changement institutionnel est ainsi compris comme « la diffusion et l'adoption d'idées et de réponses organisationnelles hétérogènes aux pressions institutionnelles » (Rouleau, 2022, traduction libre, p. 24). Autrement dit, malgré les pressions institutionnelles, les organisations sont reconnues dans cette approche comme étant « des acteurs disposant d'un certain pouvoir discrétionnaire dans la manière de répondre aux demandes institutionnelles » (Rouleau, 2022, traduction libre, p. 23).

Dans cette thèse, le système alimentaire dominant est compris comme un système institutionnalisé. Ainsi, les pratiques conventionnelles qui caractérisent ce système se répètent et se renforcent au fil du temps. Le premier article de la thèse permet de voir cet effet. Dans cet article, nous avons analysé la structure des systèmes alimentaires du Québec et de São Paulo et les résultats indiquent que ces deux systèmes intègrent des caractéristiques similaires malgré le fait qu'ils appartiennent à des régions économiques différentes. Il s'agit de caractéristiques institutionnalisées spécifiques au régime alimentaire néolibéral qui est le système alimentaire dominant dans nos sociétés contemporaines mondialisées. Dans cet article, le cadre théorique des régimes alimentaires permet de comprendre que ces pratiques se répandent depuis le XIX^{e}, créant ainsi des mécanismes de rétroaction qui les renforcent et l'institutionnalisent (Beyer, 2010; Friedmann and McMichael, 1989).

La transition vers des systèmes alimentaires plus responsables peut être posée comme un changement institutionnel car elle résulte en de nouvelles « façons de faire » dans le système alimentaire. Dans l'article 1, les résultats montrent que, malgré les pressions du régime alimentaire néolibéral, il y a émergence de changements sous la forme d'organisations qui intègrent des principes de responsabilité. Les résultats de l'article 3, quant à eux, indiquent comment les pratiques émergentes transforment le système alimentaire et contribuent à la transition. Ainsi, l'analyse de la transition des systèmes alimentaires à la lumière de la théorie institutionnelle peut dégager des leçons pertinentes tant pour la théorie institutionnelle que pour la transition des systèmes alimentaires. Ci-dessous, nous revenons sur les résultats de la thèse à

la lumière de l'aspect socio-matériel du système alimentaire et discutons de son influence dans le changement institutionnel. Par la suite nous faisons ressortir le travail institutionnel créé par l'IRSA et comment cela contribue à la transition des systèmes alimentaires.

La socio matérialité et le changement institutionnel dans le système alimentaire

La théorie institutionnelle renouvelée prend en compte la capacité des individus à changer les « règles du jeu » (Tracey et al., 2011), mais, en se concentrant sur l'aspect social, elle laisse de côté d'autres éléments qui peuvent contribuer aux changements institutionnels comme la matérialité (Rouleau, 2007). La matérialité, c'est-à-dire le caractère physique des pratiques, des organisations et de l'environnement naturel et bâti, est « intrinsèque aux activités et relations quotidiennes » (Orlikowski and Scott, 2008, tradution libre, p. 455). Les aspects matériels sont donc constitutifs d'activités et d'identités et le « social » et le « matériel » sont inséparables (Orlikowski, et Scott 2008). Alors que les institutions sont ancrées dans le monde matériel, les représentations socio matérielles par lesquelles les acteurs créent, stabilisent et reproduisent les compréhensions et les significations qui influencent les processus institutionnels demeurent peu étudiées (Jones et al., 2017).

Cette thèse contribue à faire avancer ce type de connaissances. Dans l'article 2, nous avons analysé les dimensions contextuelles sous-jacentes à l'émergence de ces organisations et pratiques axés sur l'innovation responsable. Les résultats de l'article 2 montrent empiriquement que les dimensions contextuelles façonnées par le système dominant freinent l'émergence d'organisations et de pratiques responsables. En analysant ces dimensions à la lumière de la socio matérialité, il est possible de mieux comprendre les aspects socio matériaux du système alimentaire institutionnalisé et de dégager des leçons sur le changement institutionnel.

Nous avons vu que les dynamiques économiques du système dominant limitent l'émergence de pratiques responsables (ou le changement institutionnel). Par exemple, les pratiques des distributeurs d'aliments qui n'affichent pas l'origine des produits disponibles rendent difficile la mise en place de l'achat local par les institutions du Québec. Ces pratiques sociales sont aussi matérielles lorsque l'information affichée se limite au nom du produit et n'inclut pas sa région d'origine (c.-à-d. un aspect matériel qui compte dans une transition responsable). Les politiques

d'achat qui visent à fournir les aliments les moins chers pour les institutions sont des pratiques sociales qui se matérialisent dans les aliments achetés par les institutions. Ces aspects sont donc socio matériaux et limitent l'intégration de pratiques plus responsables comme l'achat local ou l'achat d'aliments biologiques par les institutions.

À São Paulo, les participants de l'étude nous ont expliqué que le gouvernement d'extrême droite de Jair Bolsonaro (2018-2022) a provoqué un démantèlement de la participation sociétale dans la mise en place de politiques publiques pour lutter contre l'insécurité alimentaire. Ces aspects sociaux se manifestent de façon matérielle lorsque l'insécurité alimentaire augmente et que les personnes n'arrivent pas à combler ce besoin fondamental (Fontoura, 2021; Rede PenSSAN, 2022). Par ailleurs, l'ancrage dans le monde matériel est aussi perçu par les effets négatifs sur l'environnement car les modifications fiscales ont engendré l'augmentation de la déforestation au Brésil pendant le gouvernement Bolsonaro (Stuart-Smith et al., 2021). Les participants ont d'ailleurs souligné que les écosystèmes endommagés par les pratiques du système dominant représentent un frein à l'intégration de pratiques plus responsables comme l'agriculture biologique ou l'agroécologie. Au Québec, les participants ont mentionné que la monoculture largement dépendante de pesticides est un frein pour la production de miel local, notamment le miel biologique, puisque les abeilles se déplacent à la recherche de fleurs pour polliniser et cela met en danger l'appellation biologique.

L'infrastructure et la technologie adaptées aux pratiques du système dominant mettent de l'avant des aspects matériels du système alimentaire institutionnalisé qui renforcent les pratiques socialement établies. Par exemple, les machines pour la production agricole adaptées aux pratiques dominantes limitent la mise en place de l'agriculture biologique, car ces équipements sont plus adaptés aux larges monocultures cultivées avec des pesticides. Ou encore, les difficultés de trouver des logiciels pour gérer des modèles d'affaires plus responsables (par exemple, pour offrir un prix variable selon la capacité de payer) limite la mise en place de ces pratiques.

Les pratiques du système dominant se matérialisent dans la production d'aliments standardisés, c'est-à-dire avec des aspects physiques (forme, taille, couleur, etc.) toujours similaires. Les participants ont souligné que les produits issus de fermiers de famille souvent ne conviennent pas visuellement aux exigences du marché (par exemple, la banane présente des taches ou la

tangerine n'est pas suffisamment « belle »). Les membres d'un hôpital nous ont raconté qu'il est parfois difficile de trouver des produits locaux ou biologiques dans le format nécessaire et que cela peut freiner l'intégration de ces pratiques (par exemple, si le fromage est vendu en « grand bloc » et qu'il faut le couper ou si les carottes ne sont pas minimalement transformées).

Ces exemples tirés de l'article 2 contribuent à mieux comprendre que le système alimentaire institutionnalisé est composé d'aspects sociaux ancrés dans le monde matériel. Alors que l'article 1 a « signalé » la présence de l'innovation responsable à l'intérieur du système alimentaire institutionnalisé, l'article 2 a généré une meilleure compréhension de la façon dont les dimensions contextuelles peuvent être modifiées de façon délibérée afin de soutenir son émergence et ainsi contribuer au changement institutionnel. À São Paulo, l'achat de produits de fermiers de famille par les institutions est le résultat de la pression sociétale. Au Québec, les participants ont expliqué que l'achat d'aliments locaux dans les institutions a été une initiative sociétale qui a gagné du terrain au sein du ministère de l'Agriculture au fur et à mesure. L'avancement des connaissances sur les systèmes alimentaires plus responsables, prenant la forme, par exemple, de formations adaptées, de définitions et de recommandations reconnues comme les Guides alimentaires respectifs aux deux régions, semble avoir contribué à l'émergence de l'IRSA dans ces deux régions. Par ailleurs, nous avons observé que les relations interpersonnelles peuvent transformer les dimensions contextuelles qui limitent l'émergence de l'IRSA en des dimensions qui plutôt y contribuent. L'article 2 a mis en lumière des exemples empiriques comme la coordination d'intérêts, l'engagement de parties prenantes clés pour la mise en place des initiatives et le développement de la confiance entre les acteurs.

Du point de vue de la socio matérialité, les aspects sociaux pourraient sembler spécifiquement pertinents pour le changement institutionnel. Toutefois, la transition nécessite aussi des aspects matériaux afin d'institutionnaliser de nouvelles façons de faire. Par exemple, les participants ont expliqué comment un simple cahier pour enregistrer les données de la production et de la commercialisation a contribué à la mise en place d'un réseau pour faciliter la commercialisation des produits par des femmes agricultrices résidantes dans des quilombos (à São Paulo). La mise à disposition de ressources financières par des programmes de financement publics a également favorisé l'émergence d'organisations intégrant des pratiques plus responsables au Québec. La

matérialité du changement institutionnel dans le système alimentaire s'observe aussi dans la nature même des aliments rendus disponibles par ces organisations (aliments biologiques, de saison ou locaux). L'institutionnalisation d'un système alimentaire axé sur l'IRSA est donc éminemment ancrée dans le monde matériel et a des impacts tangibles sur les écosystèmes et sur la sécurité alimentaire.

Le travail institutionnel crée par l'IRSA

Dans l'article 1 et l'article 2, nous montrons la présence d'organisations et de pratiques qui intègrent des principes de responsabilité, et ce, malgré les dynamiques institutionnelles en place ou encore, tel que l'article 3 le souligne, en réaction contre elles. Dans l'article 3, nous montrons principalement comment ces initiatives contribuent à la transition des systèmes alimentaires. Ce mouvement à l'intérieur du système dominant peut être compris comme du « travail institutionnel », défini comme étant « l'action intentionnelle des individus et des organisations visant à créer, maintenir et perturber les institutions » (Lawrence and Suddaby, 2006, traduction libre, p. 215). Le travail institutionnel est susceptible de promouvoir des transformations qui culminent dans un changement institutionnel, soit la transition examinée dans cette thèse.

Ainsi, en s'appuyant sur le travail de Lawrence et Suddaby (2006), il est possible de cerner comment l'IRSA crée différents types de travail institutionnel qui contribuent à la transition des systèmes alimentaires. Ci-dessous, nous soulignons quatre différents types de travail institutionnel : le changement des normes et des croyances; la modification des systèmes de signification; le développement de nouvelles règles; et la résistance à la capture par le système alimentaire dominant.

Premièrement, l'IRSA **modifie les normes et les croyances** du système alimentaire. Par exemple, lorsque les agricultrices résidant dans les quilombos s'identifient comme des agricultrices et non plus *seulement* comme des « épouses d'agriculteurs », une nouvelle « identité » est créée et partagée au sein de la communauté. L'IRSA modifie également les « associations normatives » liées aux pratiques alimentaires. Par exemple, bien que l'intégration de l'agriculture biologique ne semblât pas réaliste aux yeux des agriculteurs conventionnels, ceux-ci ont fini par être convaincus de la faisabilité de ces pratiques agricoles au fur et à mesure que celles-ci généraient

des résultats positifs. La promotion des pratiques d'achat d'aliments locaux par les institutions du Québec était *troublante* pour le ministère de l'Agriculture il y a quelques années. Toutefois, celles-ci se sont normalisées avec le temps et font désormais partie des programmes de financement. Les organisations intégrant des pratiques de commercialisation d'aliments plus transparentes et participatives ont permis d'établir de nouvelles relations entre les consommateurs et les acteurs de la chaîne d'approvisionnement alimentaire. Enfin, l'IRSA a favorisé la construction de connexions interorganisationnelles entre des initiatives isolées qui partagent des objectifs similaires, contribuant ainsi à des changements plus systémiques.

Deuxièmement, l'IRSA **modifie les contours et limites des systèmes de signification** du système dominant. L'association des pratiques régénératrices aux pratiques et aux technologies de la production conventionnelle à grande échelle modifie les frontières de ce que l'on comprend par « système dominant ». Selon Lawrence et Suddaby (2006), cela contribuerait au changement institutionnel vu qu'il y a plus de chance d'adoption de ces pratiques par les agriculteurs du système dominant. La modification des systèmes de signification est également favorisée par le partage de « compétences et connaissances » (Lawrence and Suddaby, 2006) propres à l'IRSA. Dans nos résultats nous avons vu des exemples de ce type de travail institutionnel comme la formation de travailleurs sur les pratiques agricoles orientées vers l'IRSA, l'enseignement des modèles de commercialisation qui intègrent des principes de responsabilité, et la sensibilisation des consommateurs aux pratiques alimentaires responsables.

Troisièmement, l'IRSA favorise la **reconstruction des règles** dans le système alimentaire dominant, soutenant ainsi le changement institutionnel. Dans nos entrevues, les acteurs engagés dans les achats alimentaires institutionnels ont créé de nouvelles règles pour permettre l'intégration des principes de responsabilité dans l'approvisionnement alimentaire. En outre, « l'acceptation » de la pertinence de l'intégration de principes de responsabilité dans les achats institutionnels au sein des organismes gouvernementaux a favorisé la mise en place de mécanismes formels de soutien à ce type d'initiatives.

Quatrièmement, dans l'article 3 nous avons identifié des exemples de la façon dont les acteurs engagés dans des pratiques responsables ***résistent*** aux dynamiques du système alimentaire dominant. Les acteurs engagés dans l'IRSA ont résisté au changement dans leurs pratiques et ont

fait du plaidoyer pour contrer l'incorporation de pratiques responsables par le système dominant, même si les dynamiques institutionnalisées mettaient de la pression pour aller dans une autre direction. La pertinence de ce type de travail institutionnel peut être mieux comprise à la lumière d'un parallèle avec le Guide alimentaire brésilien. Ce guide a été élaboré avec le soutien technique du Centre de recherche épidémiologique en nutrition et santé de l'Université de São Paulo (Nupens/USP), conformément aux instructions du ministère brésilien de la Santé, et en consultation avec l'Organisation panaméricaine de la santé de l'OMS. Il est le produit d'une « consultation nationale approfondie » et reconnu internationalement parce que ses directives soutiennent la biodiversité, protègent les ressources naturelles et l'environnement. Les seuls aliments que le Guide recommande d'éviter sont les produits ultra-transformés. En 2020, les fabricants d'aliments ultra-transformés au Brésil ont tenté de discréditer le Guide par une note technique préparée par deux fonctionnaires du ministère brésilien de l'Agriculture, de l'élevage et de l'approvisionnement (MAPA). Cette note demandait au ministère de la Santé de revoir d'urgence le Guide, affirmant qu'il était « l'un des pires de la planète », et en particulier « de supprimer sa recommandation d'éviter la consommation de produits alimentaires ultra-transformés sans citer aucune preuve pertinente à l'appui » (Monteiro and Jaime, 2020, traduction libre, p. 96). En réponse, 33 éminents universitaires des États-Unis, du Canada, du Royaume-Uni, de l'Australie, de la Nouvelle-Zélande, de l'Afrique du Sud, du Mexique et du Chili ont écrit au ministre de l'Agriculture du Brésil pour confirmer que cette note technique n'avait « aucun fondement valable » (Monteiro and Jaime, 2020, traduction libre, p. 96).

En conclusion, cette thèse contribue à mieux comprendre comment le système alimentaire dominant est composé de pratiques sociales ancrées dans le monde matériel de telle façon qu'elles s'auto-renforcent de manière évidente et possiblement durable. Toutefois, l'émergence de l'IRSA crée de nouvelles façons de faire et génère du travail institutionnel qui contribue à la transition. Celles-ci nécessitent des ressources matérielles (équipements, intrants, ressources financières, etc.), mais créent aussi de la matérialité par les innovations produites et par les effets sur l'environnement et la société. Ainsi, l'ensemble de cette thèse contribue à faire avancer les connaissances en faisant ressortir la pertinence de la théorie institutionnelle dans l'analyse de la socio matérialité de la transition et du travail institutionnel généré par l'IRSA.

Contributions à la pratique et implications pour les politiques publiques

Les résultats de cette thèse peuvent soutenir l'élaboration et la mise en place de pratiques qui favorisent la transition vers plus des systèmes alimentaires favorables à la santé. Dans cette section, nous dégageons ses principales contributions à la pratique ainsi que les implications pour les politiques publiques.

Tout d'abord, cette thèse met en évidence le rôle de la société dans son ensemble en tant qu'acteur ayant un rôle à jouer dans la transition des systèmes alimentaires. La résilience des systèmes alimentaires et, par conséquence, la sécurité alimentaire sont menacées par le changement climatique. Si le comportement humain est un moteur de changement climatique, celui-ci est aussi crucial pour « atténuer l'impact de l'anthropocène » (Nature Human Behaviour, 2022, traduction libre, p. 1441). Cette thèse montre que la mise en place de l'IRSA est souvent l'œuvre de quelques acteurs intéressés à faire les choses autrement. Par ailleurs, la pression exercée par la société civile a été mentionnée comme un facteur primordial pour favoriser l'élaboration de politiques publiques qui intègrent des principes de responsabilité, comme l'achat institutionnel d'aliments biologiques ou locaux. Ainsi, même si la lutte contre le changement climatique nécessite des actions collectives et repose sur des solutions à grande échelle, « l'action collective commence généralement par des individus qui sensibilisent l'opinion publique et suscitent le changement » (Nature Human Behaviour, 2022, traduction libre, p. 1442).

La deuxième contribution pratique de cette thèse est sur le plan organisationnel. La définition provisoire de l'IRSA, basée sur la littérature et étayée empiriquement, lance un appel aux parties prenantes impliquées dans toutes les étapes du système alimentaire à réfléchir sur la façon dont l'innovation responsable peut être intégrée dans leurs organisations. La définition développée dans cette thèse fournit des éléments concrets qui peuvent être intégrés dans toutes les étapes du système alimentaire. Cela comprend notamment les producteurs d'aliments, ces acteurs dont le travail est non seulement primordial à la résilience des systèmes alimentaires, mais aussi pour permettre notre continuité en tant qu'espèce humaine. La contribution au bien-être de ces acteurs était au cœur de nos motivations pour mener à bien cette thèse. Contrairement à Dalziel

et coll. (2018), qui affirment que l'innovation responsable est un processus coûteux qui ne peut être justifié que si cela « crée des attributs valorisés pour lesquels les consommateurs sont prêts à payer » (traduction libre, p. 498), cette thèse souligne que l'intégration des attributs de responsabilité se voit de plus en plus indispensable dans le contexte actuel et futur.

Toutefois, cela ne peut pas être de la responsabilité individuelle de chaque producteur ou acteur d'une autre étape du système alimentaire. Ainsi, la troisième contribution pratique de cette thèse concerne les implications pour les politiques publiques de nos résultats. Cette thèse renforce la nécessité d'une orientation plus claire sur le but des systèmes alimentaires qui devrait d'abord être la sécurité alimentaire. Cette orientation contribuerait à mieux articuler et soutenir des éléments contextuels qui favorisent la transition des systèmes alimentaires. Par ailleurs, la définition d'une direction au niveau politique peut contribuer à coordonner les efforts pour le développement d'une approche renouvelée en Science, Technologie et l'Innovation (STI) qui valorise des principes de responsabilité comme la durabilité et l'équité et non seulement le profit économique (Schot and Steinmueller, 2018). L'article en annexe de cette thèse propose une réflexion sur comment une telle approche peut contribuer à clarifier les failles et à résoudre les défis rencontrés par des organisations qui intègrent des principes de responsabilité dans le système alimentaire. Ainsi, les politiques publiques doivent soutenir la mise en place d'une approche STI qui contribue à générer des changements « transformateurs » (Schot and Steinmueller, 2018).

Lors de la collecte de données pour cette thèse, les participants ont souligné que le gouvernement peut être soit un 'accélérateur' de la transition soit un 'mur' contre lequel il faut se battre pour changer les choses. Au-delà de ces deux extrêmes, nos résultats indiquent que les politiques publiques sont souvent créées en réaction aux mouvements sociétaux, car le consensus est un facteur important pour l'approbation des élus. Comme mentionné par un participant, les organismes gouvernementaux peuvent être vus comme la métaphore d'un paquebot sur l'océan qui prend du temps pour changer son cap. Souvent, cela fait en sorte que les initiatives en émergence dans le système alimentaire doivent être capables de survivre sans soutien politique jusqu'à leur reconnaissance et, ensuite, pouvoir être intégrées dans les programmes de soutien. Or, les défis sociétaux complexes auxquels nous faisons face aujourd'hui comme la sécurité

alimentaire et le changement climatique demandent un engagement plus fort au niveau politique. Le paquebot doit alors changer son cap plus rapidement, voire faire demi-tour. Cette thèse montre que l'IRSA peut contribuer à mieux définir l'orientation et à clarifier les outils nécessaires pour ce réalignement.

Réflexions finales sur la transition des systèmes alimentaires

Dans cette thèse, nous avons analysé la contribution de l'innovation responsable dans la transition des systèmes alimentaires dans deux contextes économiques différents. Si nous revenons sur la définition de transition tel que formulée par von Braun (2021), il s'agit du « mouvement de passage d'un état à un autre » (traduction libre, p. 749). En tant que mouvement, la transition est alors un processus dynamique qui renvoie à des tensions et des équilibres qui se (ré)ajustent continuellement. Dans cette thèse, l'IRSA est explorée un peu comme un 'moteur' à l'intérieur de ce processus. Dans nos analyses, nous avons abordé son rôle sous différentes perspectives. Par exemple, dans l'article 2 nous avons exploré les dynamiques contextuelles qui à la fois favorisent et limitent le 'mouvement' dans les systèmes alimentaires. Dans l'article 3, nous avons exploré en profondeur la façon dont ce 'moteur' fonctionne pour transformer les pratiques dans le système alimentaire. C'est comme si nous avons fait un *zoom* sur la transition pour regarder comment elle s'opère dans deux contextes différents.

Les résultats de l'article 1 nous permettent, toutefois, de mettre en perspective l'ampleur des transformations que le système alternatif apporte au système dominant. Dans cet article, nous avons montré que même si la province du Québec démontre le plus grand pourcentage de fermes certifiées biologiques au Canada, cela représentait seulement 4% des fermes de la province à l'époque (Keable, 2018). Il est intéressant de noter que cette portion est passée à 8% selon des données de 2021 (Keable, 2023). Par ailleurs, même si nous avons observé la présence de pratiques de commercialisation d'aliments par l'entremise de canaux de distribution alternatifs au Québec, ceux-ci restaient limités, représentant seulement 2,5 % des aliments distribués dans la province (Gouvernement du Québec, 2016). Dans l'État de São Paulo, les exploitations familiales représentaient la majorité des établissements agricoles, mais contribuaient à seulement 13% de la valeur agricole brute (IBGE, 2019).

Ainsi, en adoptant une perspective plus globale que celle utilisée pour analyser les pratiques de l'IRSA au Québec et dans l'État de São Paulo, nous sommes encore loin du changement de paradigme nécessaire pour aboutir à des systèmes alimentaires plus favorables à la santé. D'autant plus que nous avons constaté la place qu'occupe actuellement la recherche sur la 'transition numérique' dans le système alimentaire. Comme d'autres chercheurs le soulignent, il sera très difficile de remplacer le système dominant par des systèmes alternatifs. Notre contribution à travers cette thèse est toutefois de tourner le regard vers des innovations susceptibles de 'mettre en marche' le mouvement requis à l'intérieur des systèmes alimentaires. En faisant cela, nous avons cherché à développer les connaissances permettant de soutenir le développement de ce type d'innovations qui sont susceptibles de participer à la transition juste des systèmes alimentaires.

Limites

Cette thèse a été menée par le biais d'une étude de cas multiple. L'étude de cas est une méthode de recherche empirique qui permet d'étudier un phénomène en profondeur et dans son contexte réel (Yin, 2018). Elle est donc bien adaptée pour atteindre le but général de cette thèse. Cependant, la recherche par étude de cas comporte des pièges qui peuvent réduire sa rigueur scientifique et sa crédibilité. Ainsi, même si nous avons suivi des normes méthodologiques rigoureuses, cette thèse comporte quelques limites, décrites ci-dessous.

Tout d'abord, cette thèse s'appuie sur la définition de système alimentaire décrite par Malassis (1994) qui conceptualise le système alimentaire comme « l'ensemble des activités qui concourent à la fonction alimentation dans une société donnée, et représente la façon dont les personnes s'organisent pour produire et consommer » des aliments. L'utilisation de cette approche a permis d'atteindre les objectifs de cette thèse. Toutefois, une telle conceptualisation du système alimentaire n'a pas permis d'analyser en profondeur les interactions entre des « dynamiques économiques, des acteurs sociaux et des politiques impliqués dans la disponibilité et l'accès à la nourriture et à l'alimentation » (Maluf, 2021, traduction libre, p. 2). L'adoption de l'approche « multi-échelle » développée par Maluf (2021) et appliquée par Maluf et al. (2022) aurait

contribué à mieux saisir ces dynamiques. L'utilisation de l'approche multi-échelle est une piste pertinente pour des recherches futures sur la transition des systèmes alimentaires car elle permet de mieux rendre compte de la coexistence de plusieurs systèmes alimentaires dans une même région.

La deuxième limite de cette thèse concerne le type de données que nous avons utilisées pour atteindre le premier objectif (article 1). Ces données reflètent la façon dont les gouvernements abordent les systèmes alimentaires, c'est-à-dire principalement comme une activité économique. Bien que ces données étaient bien adaptées pour caractériser la structure et la dynamique des systèmes alimentaires dans les deux régions ciblées, les données relatives à l'étape de la distribution alimentaire étaient moins abondantes malgré le fait que cette étape du système alimentaire est la plus importante, d'un point de vue économique, dans les deux régions. Plus précisément, dans le cas de São Paulo, les données concernant l'origine des aliments disponibles pour la population étaient très limitées. Cette limite a été mitigée en ayant recours à la littérature scientifique.

La troisième limite de cette thèse est reliée à la collecte et à l'analyse de données primaires très abondantes pour répondre aux deuxième et troisième objectifs (articles 2 et 3). Afin d'accroître la rigueur de l'étape de collecte et d'analyse des données primaires, nous avons sélectionné de nombreux informateurs clés très compétents et ayant des perspectives diverses sur le phénomène. Par ailleurs, la stratégie de codage pour atteindre les objectifs de la thèse a été élaborée avec le soutien d'autres membres de l'équipe In Fieri qui ont critiqué les résultats et partagé de nombreux points de vue. Cette démarche a contribué à accroître la validité interne de la recherche. Bien que le grand nombre d'organisations participantes puisse être considéré comme une force qui augmente la robustesse de nos résultats, nous n'avons pas pu décrire les dynamiques spécifiques à chaque cas dans les articles en raison du grand volume de données. Par ailleurs, bien que nous ayons recueilli les points de vue d'acteurs qui jouent différents rôles dans le système alimentaire, ceux engagés dans les activités de transformation d'aliments étaient sous-représenté dans l'échantillon. L'ajout de participants dans ce groupe aurait permis d'améliorer l'étendue et la profondeur des résultats. Compte tenu de l'absence d'une définition claire et d'un cadre analytique spécifique aux systèmes alimentaires responsables, la sélection des participants

a été structurée en adaptant le cadre de l'Innovation responsable en santé. Cela a pu nous amener à ignorer des organisations pertinentes, notamment celles qui se trouvent dans l'étape de la transformation alimentaire.

Finalement, dans le protocole de recherche, nous avions formulé l'objectif de mener une enquête avec des consommateurs afin de mieux comprendre le rôle de ces acteurs dans la transition des systèmes alimentaires. Toutefois, cette étape, onéreuse en temps et en efforts de collecte et d'analyse des données, n'a pas pu être réalisée. Lors de la défense du protocole, l'un des membres du jury a suggéré de modifier le premier objectif de la thèse. Cette modification a résulté dans l'article 1 et a demandé une analyse secondaire de données publiques afin de rencontrer cet objectif. Par ailleurs, lors du recrutement de participants pour la collecte de données primaires, nous avons sélectionné un nombre plus grand de participants que prévu initialement au protocole car, une fois sur le terrain, nous avons constaté qu'il serait nécessaire d'avoir une plus grande diversité de participants afin d'atteindre la saturation empirique. Ainsi, cette thèse n'a pas abordé directement le rôle des consommateurs dans les systèmes alimentaires.

Recommandations pour les recherches futures

Étant donné que la façon dont les systèmes alimentaires dans des économies émergentes et matures peuvent s'engager dans une réelle transition reste interconnectée à l'échelle mondiale, des recherches supplémentaires pourraient examiner comment différentes régions parviennent à la sécurité alimentaire grâce à des innovations responsables et comment ces dernières peuvent être mises à l'échelle ou adaptées à d'autres contextes. Par ailleurs, des recherches supplémentaires sont nécessaires pour examiner la transition des systèmes alimentaires en utilisant des données longitudinales plutôt que de manière transversale comme c'était le cas dans cette thèse.

Compte tenu de l'augmentation importante de la présence des aliments manufacturés dans le monde, la science doit évaluer les effets à long terme sur la santé de ces innovations (Mozaffarian et al., 2018). L'approche de l'innovation responsable nous amène à réfléchir également sur le rôle de la recherche et de l'innovation dans le maintien du système alimentaire dominant. Des

recherches futures pourraient s'appuyer sur notre définition de l'innovation responsable dans le système alimentaire pour mieux comprendre ce phénomène. Il serait intéressant d'analyser, par exemple, les technologies utilisées dans le système alimentaire en s'appuyant sur les attributs de l'innovation responsable recensés dans l'article 3. Ces technologies incluent, par exemple, les semences, les machines utilisés dans le champ, ainsi que d'autres intrants qui peuvent à la fois contribuer à maintenir, voire renforcer, le système dominant ou encore contribuer à transformer les pratiques institutionnalisées. En outre, la transition des organisations du système alimentaire conventionnel vers des systèmes alimentaires basés sur des principes de responsabilité doit être mieux comprise. Dans cette thèse, nous avons analysé la demande institutionnelle comme un levier pour changer les pratiques des distributeurs alimentaires. Néanmoins, une analyse approfondie sur le comportement et le rôle des consommateurs dans la transition demeure un phénomène pertinent qui doit être mieux compris par des recherches futures.

Dans cette thèse nous avons utilisé la définition de système alimentaire de Malassis (1994). Des recherches futures pourraient s'appuyer sur la conceptualisation de systèmes alimentaires décentralisés développé par Maluf (2021). Selon Maluf (2021), « les systèmes alimentaires décentralisés renvoient à la manière dont les aliments sont produits, circulent et sont consommés dans les localités. Ils résultent de l'intersection entre des dynamiques systémiques locales, nationales ou internationales impliquant une grande variété d'acteurs sociaux, de conflits et de processus de prise de décision qui existent également à plusieurs niveaux » (traduction libre, p.2)

Cette définition place la nourriture et l'alimentation « au centre de l'observation » ce qui permet de « mettre en lumière les acteurs, les processus et les tensions qui façonnent les politiques alimentaires [...] » (p. 5). Cette approche « diffère des notions de système alimentaire qui donnent la priorité à l'agriculture et partent de la sphère de la production [...]. L'approvisionnement en nourriture devient alors un 'point final' » (Maluf, 2021, traduction libre, p. 8). L'approche multi-échelle soulignée plus tôt est une voie pertinente pour appliquer cette conceptualisation des systèmes alimentaires. Dans ces études, le point de départ analytique est l'approvisionnement alimentaire d'une localité donnée. La localité est conçue comme une « des unités socio-spatiales délimitées à partir du noyau urbain dans lesquelles les acteurs sociaux et les activités liées à l'alimentation interagissent » (Maluf, 2021, traduction libre, p. 3). L'application

de l'approche multi-échelle favorise ainsi le changement de perspective entre la production des aliments —et ses logiques économiques— et la consommation des aliments — et ses logiques de santé et de bien-être. En conséquence, le point de départ se trouve dans les aliments consommés par la population de la localité choisie plutôt que dans les aliments produits dans une cette localité. Cette conceptualisation est cohérente avec l'IRSA et pourrait guider des études ayant pour but de répondre à des questions de recherche comme : Comment favoriser l'approvisionnement en aliments provenant de l'IRSA? Comment les dynamiques et les tensions des systèmes alimentaires affectent-elles la consommation d'aliments qui résultent de l'IRSA?

Finalement, les considérations de justice dans la transition peuvent être intégrées dans des recherches futures sur l'IRSA et la transition des systèmes alimentaires (Kaljonen et al., 2021; Maluf et al., 2022). Il semble y avoir un alignement entre les attributs de l'IRSA identifiés dans cette thèse et les trois formes de justice : distributive, procédurale et de reconnaissance. Des recherches futures pourraient viser à mieux comprendre la convergence entre ces concepts et répondre à des questions de recherche comme : Pourquoi s'appuyer sur l'IRSA pour favoriser une transition juste des systèmes alimentaires? Comment développer des innovations qui soutiennent la justice distributive, procédurale et de reconnaissance dans les systèmes alimentaires?

Chapitre 6 – Conclusion

Dans cette thèse, nous avons poursuivi le but de mieux comprendre la transition des systèmes alimentaires. Cette transition concerne le passage d'un système alimentaire basé sur des pratiques conventionnelles vers des systèmes alimentaires composés davantage d'organisations et de pratiques responsables dans le but de promouvoir la sécurité alimentaire de façon durable. Les résultats de cette thèse nous permettent de conclure que, malgré les pressions institutionnelles, l'innovation responsable transforme les différentes étapes du système alimentaire. Toutefois, ces transformations ne sont pas encore suffisantes pour remplacer les pratiques dominantes en place. Par ailleurs, même si les acteurs engagés dans des pratiques plus responsables s'efforcent à mener un travail institutionnel de résistance, de nombreuses pratiques émergentes sont capturées par le système dominant. Ainsi, même si plusieurs systèmes alimentaires coexistent, le système conventionnel reste dominant car il est ancré dans un *modus operandi* bien établi au sein de nos sociétés et profite largement aux structures et aux détenteurs de capitaux déjà en place.

Récemment, lors de la Conférence des Nations Unies sur le changement climatique en novembre 2022 (COP27), près de 200 événements sur la transformation des systèmes alimentaires ont été organisés par des instituts internationaux, des groupes de réflexion, des entreprises et d'autres détenteurs d'enjeux. L'ajout de la question de l'alimentation à l'ordre du jour de la conférence était une bonne chose car celle-ci a rendu plus visible les liens entre l'alimentation et le climat. Toutefois, la vision des systèmes alimentaires reflétée dans le document final de la COP27 soulève de sérieuses questions car les mots *agroécologie* et *systèmes alimentaires* ont été supprimés du texte et l'accent a plutôt été mis sur les émissions de carbone dans l'offre alimentaire (Visions of food systems at COP27, 2022). Bien que les émissions de carbone représentent un aspect important pour les activités du système alimentaire, l'accent mis sur cet aspect risque de « détourner l'attention des causes profondes » de l'impact du système alimentaire dominant sur le climat, ce qui « n'est pas conforme à la perspective holistique et intégrée nécessaire à la transformation des systèmes alimentaires » (Visions of food systems at COP27, 2022, traduction

libre, p. 969). En fait, la stratégie consistant à remplacer des technologies polluantes par des technologies plus propres « ne suffit pas » pour s'attaquer aux défis sociétaux contemporains (Laybourn-Langton and Smith, 2021).

Cette thèse montre que l'approche de l'innovation responsable peut contribuer au développement d'innovations qui ont le potentiel de s'attaquer aux causes profondes des enjeux du système alimentaire dominant. Le concept de l'IRSA développé dans cette thèse présente des éléments pertinents pour examiner les points faibles des innovations et amener des réflexions sur les impacts et les externalités des produits, processus et organisations qui composent le système alimentaire. Ces trois dimensions — nécessaires à l'innovation— sont souvent difficiles à analyser si les lunettes analytiques ne sont pas bien ajustées. Par ailleurs, ce concept peut être mobilisé par les décideurs afin d'ajuster l'orientation de la transition et, ainsi, soutenir la création de contextes plus favorables à l'émergence et à l'institutionnalisation d'IRSA. En conclusion, l'intégration de changements transformateurs dans le système alimentaire doit s'appuyer sur l'IRSA pour articuler une transition juste vers des systèmes alimentaires capables de faire face à l'insécurité alimentaire dans un contexte de changement climatique (Kaljonen et al., 2021; Schot and Steinmueller, 2018).

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Annexe A. Article 4. How can alternative food systems contribute to the sustainable development goals?

Statut de publication : Publié par la revue Systèmes Alimentaires/Food Systems

Pozelli Sabio R, Lehoux P, « How can alternative food systems contribute to the sustainable development goals? », Systèmes alimentaires / Food Systems, n° 4, 2019, p. 209-218

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Introduction

In 2015, the United Nations proposed a plan of action comprised of 17 Goals and 169 targets to achieve Sustainable Development by 2030. The pursuit of the Sustainable Development Goals (SDGs) requires coordinated action among different sectors and countries and calls for further reflections on the ways in which Science, Technology and Innovation (STI) may serve as a lever to their achievement (United Nations, Economic and Social Council, 2016). More specifically, our ability to meet SDG2, which aims to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture,” requires a closer examination of the whole food system, which relies on an interdependent set of actors oriented towards satisfying consumer needs (Rastoin and Ghersi, 2010). The last report from the Food and Agriculture Organization shows that hunger affected 821 million people in 2017, notably in developing nations (FAO, IFAD, UNICEF, WFP et WHO, 2018). A contradiction to this situation is the fact that almost 2 billion people in the world are overweight or obese (WHO, 2018) and many countries are struggling with the results of a diet rich in calories, but poor in nutriments: an increased prevalence of chronic diseases such as diabetes, cardiovascular problems and cancer.

This situation is partly attributable to the fact that our food comes mostly from an industrial food system, based on intensive modes of production and distribution which have direct and indirect implications for the "three pillars" of sustainable development: economic, social and environmental (United Nations, Economic and Social Council, 2016). Furthermore, while it has contributed to reducing food costs in the past decades, it has also transformed consumer behaviour, increasing the consumption of ultra-processed products that have resulted in negative health impacts. This food system is unlikely to help us to achieve SDG2 while it affects other SDGs negatively. We thus concur with the Eat-Lancet Commission, which stresses that achieving the SDGs will require "great food transformation" (Willet and et al, 2019). Although alternative food systems (AFS) that rely on more responsible modes of production and economic models are not without limitations (Born and Purcell, 2006), they offer a promising avenue (Le Velly, 2017). However, to generate the system-level changes required by the SDGs, AFS need to be supported by a specific STI approach, one that values sustainability and equity. Therefore, this essay aims to explore how AFS supported by a different STI approach could contribute to the achievement of the SDGs.

The role of STI in the emergence and development of food systems

STI refers to the combination of three powerful means that societies support through taxation to produce and apply novel knowledge. Whereas science refers to the "systematic study of the physical or material world (natural science) and of society (social science)", technology entails the application of scientific knowledge to develop and produce goods or services for practical purposes. Innovation characterizes the novelty or significant improvement of a product, service, process, social organization or commercial method (United Nations, Economic and Social Council, 2016).

Schot and Steinmueller (2018) describe two frames that dominated STI priorities in the past and which are still present in innovation policies. The first began in the Post-World War II period during which governments sought to institutionalize public support for science. Focusing on "innovation for growth," this frame posited the value of STI for "prosperity" and "towards mass production and consumption" (Schot and Steinmueller, 2018). Broader implications for the environment or health were either ignored or viewed as the cost of progress (Schot and

Steinmueller, 2018). The second frame emerged in the 1980s with globalization and an emphasis on competitiveness, which shaped many national systems of innovation. The consequences or "externalities" of economic growth were partly recognized, but not fully prioritized as inequalities within and between countries continued to increase (Schot and Steinmueller, 2018).

The current food system was established during the Industrial Revolution, in the context of population growth and wealth. The explosion in demand, coupled with an STI approach dedicated to economic growth, allowed companies to develop and shape production, distribution, and consumption worldwide. The STI approach that prevailed after the late 1980s and entail profit driven and highly capital-intensive ways of producing novel products and technologies reinforced the path dependency of the dominant food system. STI advances were indeed generally aligned the needs of this system, supporting specialized production, crop uniformity, economies of scale, discovery of new ingredients to increase products shelf life and palatability.

Although STI priorities are key to addressing food and health challenges, few scholars explicitly sought to identify how STI approaches could better support AFS. According to Khan et al. (2016), integrating food systems research into public health research and examining how "responsible innovation" supports sustainable production of healthy and affordable food is urgent. And it requires a specific STI approach.

A different STI approach to consolidate AFS and better address the SDGs: three examples

While definitions of what makes AFS "responsible" vary, scholars emphasize modes of production and distribution wherein public and private actors coordinate their actions to successfully address food security while reducing as much as possible their negative social and environmental impacts (Khan et al., 2016; RESOLIS, 2016). For instance, a Territorialized Food System (Système Alimentaire Territorialisé), which is a form of AFS, is defined as "a set of agri-food chains that meet the criteria of sustainable development, located in a geographical area with a regional dimension and coordinated by territorial governance" (RESOLIS, 2016). For Schot and Steinmueller (2018), the SDGs call for a new STI approach, one that can support the production and use of knowledge related to "greener production, increased social justice, fairer

distribution of welfare, sustainable consumption patterns and new ways of producing economic growth." This STI approach should be aimed at "transformative change", which refers to a deep systemic transition and implies social, behavioural and technological change (Schot and Steinmueller, 2018).

Below, we describe how this STI approach could contribute to the consolidation of AFS and enable them to better address SDG2 and other SDGs. We selected three initiatives that operate at different levels – micro, meso and macro – in the Canadian province of Québec. A report on 100 local initiatives in this province concluded that there is a plurality of local, innovative and responsible ways to produce, distribute and consume food (RESOLIS, 2016). Since initiatives similar to the three, we have chosen are emerging in many parts of the world, our analyses are likely to be of interest to many food system scholars.

MICRO-LEVEL: URBAN ROOFTOP FARMING

The first example involves an urban rooftop farm, that have emerged as a way to produce fresh food in urban areas by converting unused black-tarred surfaces into productive green spaces (Orsini et al., 2015). Rooftop farms can help to lower air temperature and thus reduce urban heat island effects (Hoag, 2015). While the multifaceted impacts of these farms on urban life (from air temperature to human well-being) still needs to be better understood (Hoag, 2015), the following example suggests that such initiatives may contribute to the SDGs.

Lufa Farms is a for-profit organization that aims to provide more locally produced food to people in Québec, with a focus on the largest city, Montreal. This company was the first in the world to create a commercial rooftop greenhouse in 2011 (LUFA Farms, 2018). Its business model is based on the provision of weekly food baskets to subscribers. The company also established partnerships with other growers to better respond to consumers' demand (around 10,000 households).

Initiatives like Lufa Farms may contribute to SDG2 because they promote sustainable local agriculture. They may have a positive influence on SDG9 (industry, innovation, and infrastructure) because they combine sustainable economic activities and innovation. In addition, they could have an effect on SDG11 (sustainable cities and communities) since they optimize resource use

and have the potential to reduce the temperatures of the roof surface and the surrounding air during summer (Hoag, 2015). Finally, by promoting access to fresh production from a local production, they contribute to SDG12 (responsible production and consumption).

Specific transformative STI efforts are required to design efficient rooftop horticulture systems, to improve how space can be optimized while the crops diversified, and to estimate productivity in view of the resources being used (Orsini et al., 2015). Further STI investments could also be targeted at producing knowledge and tools on ways to mitigate the conflicts between the requirements of the existing buildings and those of the greenhouses to be developed.

MESO-LEVEL: NETWORK OF AFS ACTORS

The second initiative emphasizes the role of networks that bring AFS actors together and seeks to align their respective activities. Such networks aim to integrate and coordinate a range of actions in order to have a systemic impact. Whereas AFS initiatives are typically small, networks have more power to contest the rules and institutions of the dominant food system (Levkoe, 2014). For Levkoe (2014), it is through networks that AFS can better address the interrelated aspects of food systems. The Montreal Food System Council (SAM, 2021) is a regional network of more than 200 partners, representing different segments of the food system (from production to post-consumption). Its vision is to make sure that by 2025 all Montrealers have access to a healthy, diversified, local and affordable diet. The network provides regional food leadership by engaging stakeholders, advising policymakers, and supporting projects.

Initiatives like SAM contribute to SDG2 because they connect many actors interested in improving food supply and enable collective discussions to reduce hunger and improve food quality access. Networks like SAM may also positively affect SDG16 (peace, justice, and strong institutions) by contributing to the development of effective and accountable institutions. Since they enable different actors and organizations to collaborate on a long-term basis, they may contribute to SDG17 (partnership for the goals).

The challenges faced by AFS networks include variations and inequalities in access and the difficulty of achieving or maintaining consensus among participants. Since certain actors could lack the resources or infrastructure needed to participate actively, they could be ignored or left

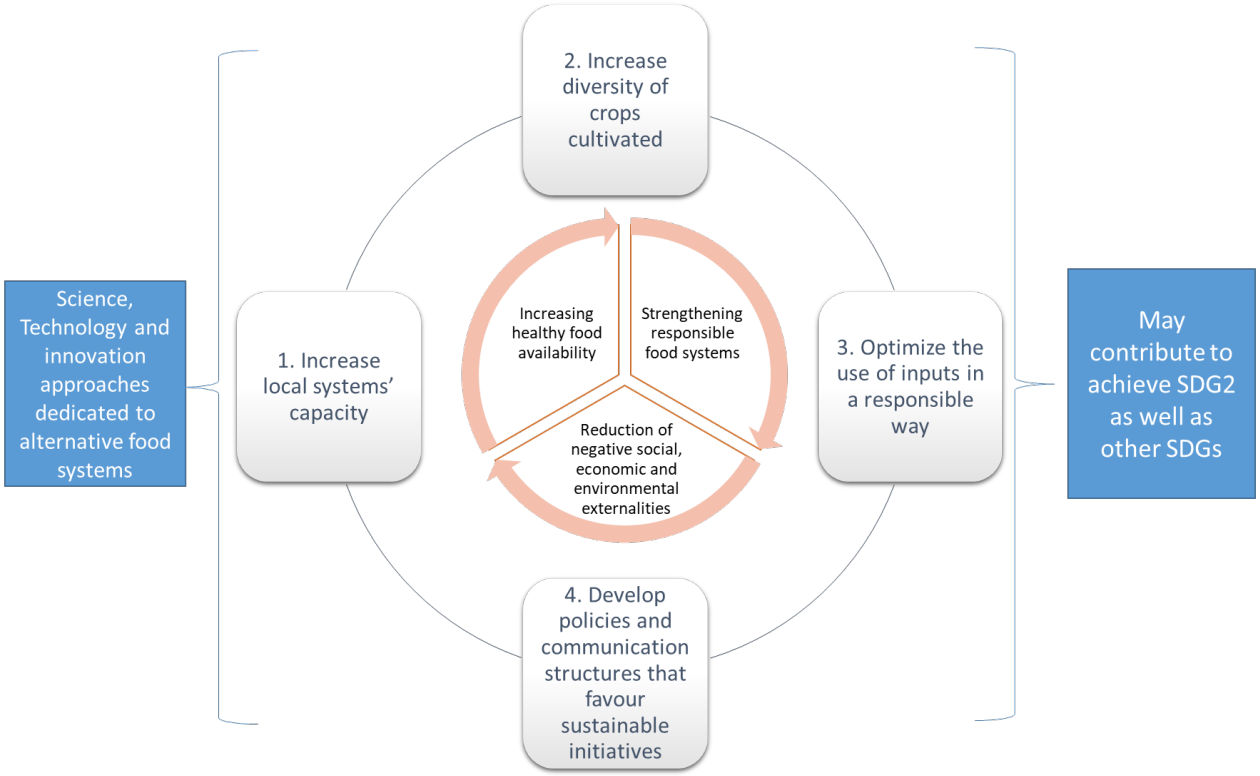
behind. While “networking strategies may enhance the collective power of the network”, they may also “increase internal tensions based on class, culture and geography” (Levkoe, 2014). Hence, transformative STI efforts should seek to develop and share knowledge on the ways in which appropriate governance structures can enable even access to AFS networks. It is also important to identify practice-oriented mechanisms that can be used to build consensus. Levkoe (2014) indeed found that participants often feel that their own “approaches, goals, ideologies, and strategies are being compromised.”

MACRO-LEVEL: COMMUNITY SUPPORTED AGRICULTURE

The third example involves Community Supported Agriculture (CSA), which emerged in Japan in the 1970s to establish direct contact between producers and consumers (Lemay, 2008). To support a more stable annual flow of revenues, consumers pay in advance, and, during the harvest, the growers deliver weekly baskets to them at a distribution point. Such CSA initiatives promote good land management and more security to small growers since they know their production will be sold at a predictable price (Lemay, 2008). For consumers, this model means that they will obtain locally produced fresh products and could be encouraged to cook more and reduce the consumption of processed and ultra-processed foods. Équiterre family farmers was created as a nonprofit organization more than 20 years ago in order to accelerate the transition toward a healthy, sustainable and equitable society (Équiterre, 2018). The organization pioneered agricultural short circuits in the province by implementing and scaling a large CSA model (Lemay, 2008). Today, Équiterre has about 18 thousand subscribers. One aspect that could partly explain its success in scaling up CSA lies with the online platform it developed. Using their zip code, consumers can search for distribution points that are the nearest to their workplace or house as well as access details about the specific products growers distribute throughout the year. Through this platform, consumers can choose and “adopt” a grower during the season. Macro-level initiatives like Équiterre contribute to SDG2 through the promotion of sustainable agriculture and nutritious food. From a food production standpoint, they may also have a positive effect on SDGs that are related to the economic context in which the AFS entrepreneurs and workforce evolve. Since such initiatives can help to sustain small growers, improve the predictability of their revenues, and reduce commercial disparities between large and small growers, they may

contribute to SDG1 (no poverty), SDG10 (reduced inequalities) and SDG8 (decent work and economic growth). From a consumption standpoint, it may positively influence SDG3 (good health and well-being) and SDG12 (responsible consumption and production) because of their focus on the consumption of healthy foods. One key challenge faced by initiatives like Équiterre is the need to develop an infrastructure that can be effectively shared by multiple actors. Since this collective infrastructure needs to be maintained and updated, STI research could examine how such a platform may eventually reduce growers' administrative tasks and increase their responsiveness towards consumers' evolving demand.

Figure 12. (Figure 1 from paper 4) A framework to further examine how AFS may contribute to the SDGs.



Source: Authors, 2018.

Concluding remarks

Figure 1 summarizes this essay's key arguments through a framework that could support further research. It suggests that a STI approach dedicated to AFS should seek to produce novel knowledge on ways to: (1) increase local food system capacity; (2) increase the diversity of crops

cultivated; (3) contribute to the responsible use of inputs; and (4) inform the development of policies and communication structures that favour sustainable initiatives. The figure also indicates that the application of such knowledge would serve to strengthen AFS, increase the supply of healthy food and reduce social, economic, and environmental externalities. Altogether, such STI priorities would address directly SDG2 and move us closer to other SDGs by "changing skills, infrastructure, industry structures, products, regulations, user preferences and cultural predilections" (Schot and Steinmueller, 2018). In sum, this essay argued that our ability to meet the 2030 agenda requires a closer examination of our food system. Currently established STI approaches, which frame innovation as a means to "fuel" economic growth (Khan et al., 2016) are poorly aligned with the SDGs. An STI approach dedicated to transformative change can consolidate AFS and enable them to scale and spread. While the shortcomings of AFS still need to be carefully examined (Born and Purcell, 2006) and resistance to change is often strong (Schot and Steinmueller, 2018), the three examples we discussed show their potential. Whether such initiatives will flourish or not depends upon what food systems will benefit from future STI investments. The system-level changes required by the SDGs could be achieved if AFS were supported by an STI approach that values sustainability and equity.

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Annexe B. Description de cas de l'organisation QC-10

Identification
Nom: QC-10 **Date de début**: 2015 **Emplacement**: Montréal, QC **Innovation**: Achats groupés d'aliments non périssables éco-responsables en vrac **Attributs de l'IRS:** AEJS; Éco-responsabilité; Inclusivité; Modèle d'affaires **Date de l'entrevue:** 12-06-2019
Caractéristiques organisationnelles
Mission: Rendre accessibles des aliments biologiques non périssables de haute qualité, tout en économisant de l'argent et en ayant un impact positif sur l'environnement et les gens. **Forme d'organisation:** Organisation privée. **Modèle d'affaires:** (1) proposition de valeur: Achats groupés d'aliments non périssables éco-responsables dans 18 villes de la province de Québec. La proposition de valeur aux consommateurs est l'opportunité d'acheter des aliments biologiques à un prix juste; aux fournisseurs, ils offrent des achats stables a un prix que soit équitable; aux bénévoles, ils offrent une réduction dans le prix d'achat des aliments (2) segment de marché: Les consommateurs qui achètent chez QC_10 sont invités à participer aux activités en tant que bénévoles dans les activités de l'organisation; la majorité d'entre eux sont des femmes de classe moyenne âgées de 25 à 40 ans, dont de nombreuses jeunes mères, ainsi que des familles. (3) chaîne de valeur: L'organisation est basée à Montréal et dispose de 'points de collecte' dans 18 villes de la province. Dans chaque ville, il y a des responsables qui doivent trouver un endroit pour la livraison des commandes et trouver des bénévoles pour aider dans la préparation des commandes. Leurs fournisseurs sont locaux, mais aussi dans d'autres régions du pays ou du monde. Ils sélectionnent les fournisseurs selon des critères de qualité, d'éco-responsabilité et de responsabilité sociale. Les produits sont achetés directement ou par l'intermédiaire d'un distributeur alimentaire (4) modèle de revenus et financement: Vente de produits alimentaires ; ils prévoient également de louer les locaux de l'organisation lorsqu'ils ne les utilisent pas; crowdfunding (5) stratégie concurrentielle: Ils reconnaissent qu'il y a de plus en plus d'épiceries zéro déchet, d'épiceries en vrac ou de sections en vrac dans les épiceries existantes, mais ne voient pas ces organisations comme des concurrents. Ils essaient donc de collaborer avec eux autant que possible. **Historique du modèle d'affaires**: Le choix de la structure organisationnelle de 'société privée' a été faite en 2019, parce qu'aucune des options de forme organisationnelle disponibles ne correspondait vraiment à la nature unique du projet. Avant 2019, il s'agissait d'une 'société en nom collectif'. Dans leur perception, ils sont à 'mi-chemin' entre l'organisation à but non lucratif, la coop et l'entreprise privée.
Références et défis socio matériaux
Références : Un modèle de gestion horizontale; le livre "reinventing organizations" (Frédérique Laloux). **Défis** : La croissance rapide de l'organisation ; l'atteinte de la viabilité financière ; la rétention des consommateurs.
Environnement institutionnel
Mesures d'impact : Impact positif pour les petits producteurs locaux, car l'organisation achète des quantités stables et paie un prix équitable. **Influences sur l'environnement institutionnel :** Non mentionné. **Influences de l'environnement institutionnel :** Le choix de la structure de l'organisation (privée) a été contrainte par les options disponibles, même si aucune d'entre elles correspondait à 100% à leurs intérêts et valeurs. **Éléments contextuels qui contribuent:** La demande accrue par produits éco-responsables; la disponibilité d'un modèle de gestion et d'un logiciel répondant aux valeurs de l'organisation; le soutien de la communauté. **Éléments contextuels contraignants :** Trouver des informations sur les pratiques de production ou sur l'origine de certains produits achetés; la viabilité financière de l'organisation ; certains participants (consommateurs) n'ont pas le temps et la patience nécessaires pour acheter leurs produits alimentaires dans l'organisation car cela demande du temps, ce qui limite leur capacité à fidéliser les consommateurs.

Annexe C. Description de cas de l'organisation SP-15

Identification
Nom: SP_15 **Date de début**: 2016 **Emplacement**: São Paulo, SP **Innovation** : Réseau agroécologique de femmes agricultrices résidant dans des quilombos basé sur les principes de l'économie solidaire **Attributs de l'IRS:** AEJS; Éco-responsabilité; Inclusivité; Inégalités; Modèle d'affaires; Réactivité **Date de l'entrevue:** 06-08-2020
Caractéristiques organisationnelles
Mission: Promouvoir l'éveil des femmes agricultrices résidant dans les quilombos. **Forme d'organisation:** Organisation à but non lucratif. **Modèle d'affaires:** (1) proposition de valeur : le réseau contribue à la commercialisation de la production agricole, ainsi qu'à l'auto-reconnaissance et à la reconnaissance communautaire des femmes en tant qu'agricultrices (2) segment de marché : le réseau est composé d'agricultrices résidant dans les quilombos dans la région du Vale do Ribeira; les produits sont vendus aux consommateurs de la région de São Paulo (3) chaîne de valeur: les femmes remplissent un 'carnet agroécologique' avec tous les produits qu'elles sont prêtes à offrir aux consommateurs. Puis, elles apportent les listes de produits aux groupes de consommateurs et commercialisent ces produits avec le soutien du réseau. (4) modèle de revenus et financement: au début, le réseau était financé par une politique publique qui finançait des projets d'assistance technique; en 2017, la politique a changé et le financement est passé à un financement international (5) stratégie compétitive: Les valeurs du réseau sont basées sur l'économie solidaire. Ainsi, leur stratégie est basée sur la coopération entre les agricultrices du réseau, ainsi, elles sont invitées à échanger des produits entre eux avant de vendre aux consommateurs d'autres villes. **Historique du modèle d'affaires:** L'organisation a démarré en 1963 ; le réseau de femmes agricultrices a été créé en 2016 et formalisé en 2019.
Références et défis socio matériaux
Références: Non mentionnées. **Défis**: Défis logistiques; gestion de l'information.
Environnement institutionnel
Mesures d'impact : Augmentation de l'autonomie (financière, sociale, personnelle) des femmes. **Influences sur l'environnement institutionnel :** Les femmes qui participent du réseau commencent à se reconnaître et à être reconnues par leur communauté en tant qu'agricultrices; changements dans la perception des produits qui n'étaient pas valorisés par les femmes des quilombos, parce que les consommateurs de la ville veulent les acheter (comme les 'plantes comestibles non conventionnelles') ; grâce aux réseaux, les femmes sont plus connectées les unes aux autres, et elles échangent des produits et des connaissances. **Influences de l'environnement institutionnel :** Les produits alimentaires vendus par les industries alimentaires, dans les villes, sont parfois plus valorisés par les femmes que leur propre production agricole. L'une de préoccupations du réseau est que « personne ne vend du poulet de campagne pour acheter du poulet au supermarché ». Même si la production de sucre roux est importante dans les quilombos, les femmes aiment avoir du sucre blanc dans leurs maisons, car le fait de n'avoir que du sucre roux à la maison leur donne le sentiment de ne pas « bien vivre », car ce sucre a été consommé lorsqu'elles ne pouvaient pas se permettre d'aller au supermarché ; les exigences de la législation découragent la commercialisation de produits d'origine animale, tels que le fromage, les œufs et le miel. **Éléments contextuels qui contribuent:** Politique publique ; société civile. **Éléments contextuels contraignants**: Manque de continuité des projets précédents (bris de confiance) ; manque d'outils de gestion adaptés à l'économie solidaire.

Annexe D. Certificat d'approbation éthique du Comité de la recherche en sciences et en santé (CERSES) avec l'attestation de renouvellement

Université de Montréal

N° de certificat
18-126-CERES-D

Comité d'éthique de la recherche en sciences et en santé (CERSES)

CERTIFICAT D'APPROBATION ÉTHIQUE

Le Comité d'éthique de la recherche en sciences et en santé (CERSES), selon les procédures en vigueur, en vertu des documents qui lui ont été fournis, a examiné le projet de recherche suivant et conclu qu'il respecte les règles d'éthique énoncées dans la Politique sur la recherche avec des êtres humains *de l'Université de Montréal.*

Projet	
Titre du projet	**L'innovation responsable en alimentation: Les systèmes alimentaires**
Étudiante requérante	**Renata Pozelli Sabio** (ND), Candidate au Ph. D. en santé publique, École de santé publique - Département de gestion, d'évaluation et de politique de santé
Sous la direction de	Pascale Lehoux, professeure titulaire., École de santé publique - Département de gestion, d'évaluation et de politique de santé, Université de Montréal

Financement	
Organisme	IRSC
Programme	Fondation
Titre de l'octroi si différent	Responsible innovation in health: Designing technologies for sustainable healthcare systems
Numéro d'octroi	FDN-143249
Chercheur principal	Pascale Lehoux
No de compte	RNI00260

Comité d'éthique de la recherche en sciences et en santé (CERSES)

Bureau de la conduite responsable en recherche

Université de Montréal

15 février 2023

Pascale Lehoux, Professeure titulaire
École de santé publique - Département de gestion, d'évaluation et de politique de santé
Université de Montréal

Renata Pozelli Sabio, Candidate au Ph. D. en santé publique,
École de santé publique - Département de gestion, d'évaluation et de politique de santé
Université de Montréal

OBJET :	Projet # 2018-708 - Titre : Comprendre le rôle de l'innovation responsable dans la transition vers des alimentaires favorables à la santé: Étude de cas au Québec et dans l'État de São Paulo Financement: IRSC Fondation Responsible innovation in health: Designing technologies for sustainable healthcare systems FDN-143249 RNI00260

Bonjour,

Vous avez présenté au Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal, en date du 15 février 2023, une demande de renouvellement pour votre projet cité en objet.

Après évaluation, le tout étant jugé conforme aux règles en vigueur en éthique de la recherche,, j'ai le plaisir de vous informer que votre demande a été approuvée par le Comité.

La présente approbation éthique est valide du 15 février 2023 au 15 février 2024.

Il est de votre responsabilité de compléter le prochain formulaire de renouvellement (formulaire F9) que nous vous ferons parvenir annuellement via Nagano 1 mois avant l'échéance de la présente approbation, à défaut de quoi l'approbation éthique émise par le CERSES sera suspendue.

Dans le cadre de l'évaluation éthique continue, le Comité vous demande de vous conformer aux exigences suivantes en utilisant les formulaires Nagano prévus à cet effet :

- Soumettre, pour approbation préalable, toute demande de **modification** au projet de recherche ou à tout autre document approuvé par le Comité pour la réalisation du projet (formulaire F1).
- Soumettre, dès que cela est porté à votre connaissance, toutes **informations supplémentaires, nouveau renseignement et/ou correspondances diverses** (formulaire F2).
- Soumettre, dès que cela est porté à votre connaissance, tout **incident ou accident** lié à la réalisation du projet de recherche (formulaire F5).
- Soumettre, dès que cela est porté à votre connaissance, l'**interruption prématurée** du projet de recherche, qu'elle soit temporaire ou permanente (formulaire F6).
- Soumettre, dès que cela est porté à votre connaissance, toute **déviation** au projet de recherche susceptible de remettre en cause le caractère éthique du projet (formulaire F8).
- Soumettre une demande de **renouvellement** un mois avant l'échéance de la date d'approbation afin de renouveler l'approbation éthique (formulaire F9).
- Soumettre le rapport de la **fin du projet de recherche** (formulaire F10).

Finalement, nous vous rappelons que la présente décision vaut pour une année et peut être suspendue ou

révoquée en cas de non-respect de ces exigences.

Le CERSES de l'Université de Montréal est désigné par le ministre de la Santé et des Services Sociaux aux fins de l'application de l'article 21 du Code civil du Québec. Il exerce ses activités en conformité avec la *Politique sur la recherche avec des êtres humains* (60.1) de l'Université de Montréal ainsi que l'*Énoncé de politique des trois conseils* (EPTC). Il suit également les normes et règlements applicables au Québec et au Canada.

Annexe E. Certificat d'approbation éthique Comité d'éthique de la recherche du CHUSJ

CHU Sainte-Justine
Le centre hospitalier universitaire mère-enfant
Université de Montréal

Formulaire de demande de renouvellement annuel de l'approbation d'un projet de recherche

Titre du protocole : **L'innovation responsable en alimentation: Les systèmes alimentaires favorables à la santé**

Numéro(s) de projet : **2019-2121**

Identifiant Nagano : **L'innovation responsable en alimentation**

Chercheur principal (au CER Éval) : **Josée Lavoie**

Date d'approbation du projet par le CER : **2019-05-08**

Formulaire : **F9H-45365**

Date de dépôt initial du formulaire : **2022-08-09**

Date de dépôt final du formulaire : **2022-10-05**

Statut du formulaire : **Formulaire approuvé**

Décision finale du CÉR

1. **Décision de la demande**
   Approuvé - comité restreint

2. **Commentaires concernant la décision**

   Bonjour,

   Les membres du comité restreint du Comité d'éthique de la recherche du CHU Sainte-Justine ont examiné votre demande de renouvellement de l'approbation éthique de votre projet à leur réunion du 05 octobre 2022. L'approbation éthique de votre projet a été renouvelée par le Comité.

   Le formulaire d'information et de consentement n'a pas été réévalué puisque votre rapport annuel indique que le recrutement des participants est terminé.

   Nous accusons également réception de l'article suivant:

   - "How Does Context Contribute to and Constrain the Emergence of Responsible Innovation in Food Systems? Results from a Multiple Case Study" Renata Pozelli Sabio & Pascale Lehoux (2022)

   En vous souhaitant une bonne poursuite de votre projet.

3. **Période couverte par ce renouvellement:**

   Du 05 octobre 2022 au 05 octobre 2023.

Annexe F. Certificat d'approbation éthique Comité d'éthique de la recherche au Brésil

CENTRO UNIVERSITÁRIO
IESB/ BRASÍLIA

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Inovação Responsável em Alimentação: sistemas alimentares favoráveis à saúde
Pesquisador: RENATA POZELLI SABIO
Área Temática:
Versão: 1
CAAE: 29251519.3.0000.8927
Instituição Proponente: Institut de Recherche en Santé Publique - Université de Montréal
Patrocinador Principal: École de Santé Publique de l'Université de Montréal

DADOS DO PARECER

Número do Parecer: 3.979.121

Apresentação do Projeto:
A alimentação desempenha um papel fundamental na saúde humana, não só diretamente através das relações entre o consumo alimentar e a saúde, mas também indiretamente, uma vez que a sua produção tem efeitos econômicos, ambientais e sociais que, em última análise, influenciam a saúde dos indivíduos.
O presente protocolo de pesquisa se trata de coparticipação junto à Universite de Montreal, que tem sua análise expedida e apensada nesse processo, como aprovada. Parte dessa pesquisa já foi realizada em Quebec.

Objetivo da Pesquisa:
Como objetivos específicos, os autores relatam:
1) Caracterizar os sistemas alimentares da província de Quebec e do estado de São Paulo;
2) Analisar a emergência de organizações e práticas responsáveis em seus respectivos sistemas alimentares;
3) Compreender como os limites e oportunidades destes contextos regionais afetam a institucionalização de produtos, processos e práticas alimentares responsáveis.

Avaliação dos Riscos e Benefícios:
Segundo os pesquisadores, a participação neste estudo envolve um risco mínimo para os participantes. Este risco é relacionado à possibilidade de identificação do nome da organização ou

Endereço: CAMPUS NORTE SGAN Quadra 609 módulo D Av. L2 Norte
Bairro: Asa Norte **CEP:** 70.830-404
UF: DF **Município:** BRASILIA
Telefone: (61)3962-4682 **E-mail:** cep@iesb.br

iniciativa em nossas publicações por meio de dedução. Para minimizar este risco, os autores propõe: anonimizar o nome dos participantes, atribuindo um pseudônimo no momento da coleta de dados e garantir que os detalhes que serão publicados não sejam publicizados.

Comentários e Considerações sobre a Pesquisa:

Trata-se de protocolo de cooperação em pesquisa junto à Universitè de Montreal, complementando estudo que já se iniciou em Quebec.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados os termos necessários para essa análise.

Conclusões ou Pendências e Lista de Inadequações:

Sem pendências.

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1438306.pdf	26/12/2019 14:37:22		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE.docx	26/12/2019 14:25:27	RENATA POZELLI SABIO	Aceito
Projeto Detalhado / Brochura Investigador	ProtocoloDetalhado.pdf	26/12/2019 14:23:57	RENATA POZELLI SABIO	Aceito
Cronograma	Cronograma.pdf	26/12/2019 14:15:06	RENATA POZELLI SABIO	Aceito
Folha de Rosto	FolhaRosto.pdf	22/12/2019 10:53:47	RENATA POZELLI SABIO	Aceito
Parecer Anterior	ParecerTraduzido.pdf	16/12/2019 23:36:59	RENATA POZELLI SABIO	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Annexe G. Formulaire d'information et de consentement en français

Formulaire d'information et de consentement

Nom du projet :	L'innovation responsable en alimentation : les systèmes alimentaires favorables à la santé
Chercheuse :	**Renata Pozelli Sabio**, candidate au doctorat à l'École de santé publique de l'Université de Montréal, sous la direction de **Pascale Lehoux**, professeure titulaire à l'École de santé publique du Département de gestion, évaluation et politique de santé de l'Université de Montréal, et chercheuse à l'Institut de recherche en santé publique de l'Université de Montréal (IRSPUM)

Vous êtes invité à participer à un projet de recherche. Avant d'accepter d'y participer, veuillez prendre le temps de lire ce document présentant les conditions de participation au projet. N'hésitez pas à poser toutes les questions que vous jugerez utiles à la personne qui vous présente ce document.

Raison pour laquelle vous recevez cette invitation

Vous êtes invité à participer à notre étude parce que vous détenez une expertise qui nous permettra d'atteindre le but de notre projet de recherche sur les systèmes alimentaires.

But de l'étude

Les enjeux de santé liés à l'alimentation sont aggravés par les modes de production et de distribution industriels qui prédominent actuellement dans le système alimentaire. Des initiatives visant à changer la situation grâce à la production, à la distribution et à la consommation d'aliments plus sains et responsables sont de plus en plus présentes dans le monde. Ainsi, le but de cette étude est de mieux comprendre ces initiatives et de déterminer comment elles arrivent à influencer le système alimentaire. Ce projet fait partie du programme de recherche In fieri, qui a pour objectif de produire et diffuser de nouvelles connaissances sur la conception, le financement et la commercialisation de l'innovation responsable en santé (IRS). L'IRS consiste en une démarche collaborative au sein de laquelle les parties prenantes s'engagent à clarifier et à appliquer un ensemble de principes, de valeurs et d'exigences éthiques, économiques, sociales et environnementales lorsqu'elles conçoivent, financent, produisent, distribuent et utilisent des solutions sociotechniques afin de répondre aux défis et besoins des systèmes de santé de façon pérenne.

Rôles et fonctions de la chercheuse principale

Cette étude fait partie d'un projet de doctorat mené par la chercheuse principale. Elle sera responsable de la sélection et du recrutement des participants, de la cueillette et de l'analyse des données, ainsi que de la diffusion des résultats. Le recrutement des participants se fera au moyen de contacts par courriel et d'appels téléphoniques afin d'expliquer l'étude aux participants

potentiels et de répondre à leurs possibles questions. Les personnes qui acceptent de participer à l'étude recevront une invitation formelle par courriel.

Conflits d'intérêts

La chercheuse principale estime qu'aucune des situations dans lesquelles elle se trouve ne la place en conflit d'intérêts.

Nature de votre participation

Vous êtes invité à participer à cette étude pour une période de deux (2) ans. La première entrevue requerra la présence des participants pour une durée de 60 à 90 minutes. La chercheuse responsable de l'étude se déplacera pour vous rencontrer à une date qui vous conviendra. Avant la réalisation de l'entrevue, elle vous transmettra le formulaire de consentement pour que vous puissiez le lire attentivement. Le jour de l'entrevue, elle recueillera le formulaire signé. Un an après l'entrevue initiale, la chercheuse réalisera une entrevue téléphonique d'une durée de 40 à 60 minutes avec vous, et vous devrez alors réitérer votre consentement. Cette entrevue sera fixée au préalable, à la date et à l'heure qui vous conviendront. Vous serez libres, toutefois, de refuser de prendre part à cette entrevue.

Compensation

Il n'y a pas de compensation financière associée à votre participation à cette étude.

Usage et conservation des données

Nous constituons une plateforme Web sécurisée spécifique au programme *In fieri*, qui contient l'ensemble des données recueillies pour des études telles que celle-ci. Cette banque est logée sur un serveur (situé dans un laboratoire fermé à clé) et est accessible aux membres de l'équipe de recherche par l'entremise d'un nom d'usager et un mot de passe. Nous vérifions régulièrement les données de navigation de ce site et mettons à jour les mécanismes de sécurité pertinents.

Selon les règles en vigueur à l'Université de Montréal, nous conserverons les données pendant une période maximale de 7 ans après la fin du projet en 2021. Les coordonnées des participants ne seront pas conservées pour des projets futurs. Toutefois, les étudiants et membres de notre équipe de recherche pourront éventuellement exploiter les données anonymisées qui se trouveront dans notre banque. Une telle utilisation secondaire de nos données se fera dans le contexte des objectifs décrits sur notre site web (www.infieri.umontreal.ca).

Risques et inconvénients

La chercheuse est d'avis que la participation à ce projet de recherche comporte peu de risques pour vous. Outre le temps que vous consacrerez à notre étude, il n'y a pas d'inconvénients ni de risques physiques, psychologiques ou socioéconomiques associés à nos cueillettes de données.

Avantages

Il n'y a pas de bénéfice tangible à retirer de notre étude. Toutefois, vous partagerez votre expérience et votre point de vue et, en retour, nous partagerons avec vous les résultats et les leçons tirées de notre étude. Ainsi, vous contribuerez à l'avancement des connaissances sur les systèmes alimentaires alternatifs.

Protection de la confidentialité et de l'anonymat des participants

Nous maintiendrons l'anonymat et protégerons la confidentialité des participants en leur attribuant un pseudonyme au moment de la cueillette des données ou dès que les enregistrements audio seront transcrits. Le nom des organisations participantes ne sera pas divulgué dans nos présentations et publications. Toutefois, l'identité de celle-ci pourrait être découverte en cherchant dans les médias et sur Internet des informations complémentaires à celles contenues dans nos publications. Lorsque nous préparons nos articles et nos présentations, notre logique est de réduire la possibilité d'une identification en gommant des détails et de nous assurer que les propos rapportés ne nuisent pas aux personnes concernées. Cependant, nous ne pouvons pas éviter que des personnes puissent deviner le nom des entreprises, des innovations ou des organisations.

Diffusion des résultats

Cette étude résultera en la publication d'articles scientifiques. Par ailleurs, les principaux résultats de cette étude seront diffusés dans le blogue Hinnovic (www.hinnovic.org), un important axe de transfert et d'échange de connaissances pour notre programme de recherche. Le site Web dédié au programme In fieri comporte également une rubrique de nouvelles dans laquelle nous annonçons nos publications récentes (www.infieri.umontreal.ca). Nous prévoyons également envoyer un résumé vulgarisé des principaux résultats de cette étude aux participants.

Participation volontaire et droit de retrait

Vous êtes libre d'accepter ou de refuser de participer à ce projet de recherche. Vous pouvez vous retirer de cette étude à n'importe quel moment, sans avoir à donner de raison. Vous n'avez qu'à aviser la personne-ressource, et ce, par simple avis verbal. Le cas échéant, vous pouvez décider si nous avons le droit d'utiliser les informations que vous nous auriez déjà fournies dans nos analyses ou si vous préférez que nous ne les utilisions pas.

Responsabilité de l'équipe de recherche

En acceptant de participer à cette étude, vous ne renoncez à aucun de vos droits ni ne libérez les chercheurs, l'organisme qui finance l'étude ou l'établissement de leurs responsabilités civiles et professionnelles.

Personne-ressource

Si vous avez des questions sur les aspects scientifiques de l'étude, vous pouvez contacter Renata Pozelli Sabio, responsable du projet, par téléphone au [numéro supprimé dans ce document] ou par courriel à renata.pozelli.sabio@umontreal.ca.

Pour toute préoccupation au sujet de vos droits ou des responsabilités des chercheurs en lien avec votre participation à ce projet, vous pouvez contacter le conseiller du comité d'éthique de la recherche en santé (CERES) :

- Courriel : ceres@umontreal.ca
- Téléphone : 514 343-6111, poste 2604
- Site Web: http://recherche.umontreal.ca/participants

Toute plainte concernant cette recherche peut être adressée à l'ombudsman de l'Université de Montréal, par téléphone au 514 343-2100 ou par courriel à ombudsman@umontreal.ca. L'ombudsman accepte les appels à frais virés. Il s'exprime en français et en anglais et reçoit les appels entre 9h et 17h.

Consentement

Déclaration du participant

Je comprends que je peux prendre mon temps pour réfléchir avant de consentir ou non à participer à la recherche.

Je peux poser des questions à l'équipe de recherche et exiger des réponses satisfaisantes.

Je comprends qu'en participant à ce projet de recherche, je ne renonce à aucun de mes droits ni ne dégage les chercheurs de leurs responsabilités.

Je consens à ce que les données recueillies dans le cadre du présent projet de recherche soient utilisées aux fins d'autres projets de recherche, conditionnellement à leur approbation par un comité d'éthique de la recherche.

J'ai pris connaissance du présent formulaire d'information et de consentement et j'accepte de participer au projet de recherche.

Prénom et nom du participant Signature du participant

(En caractères d'imprimerie)

Date :

J'accepte que l'entrevue soit enregistrée (audio). Oui : Non :

Engagement de la chercheuse

J'ai expliqué les conditions de participation au projet de recherche au participant. J'ai répondu au meilleur de ma connaissance aux questions posées et me suis assurée de la compréhension du participant. Je m'engage, avec l'équipe de recherche, à respecter ce qui a été convenu dans le présent formulaire d'information et de consentement.

Prénom et nom de la chercheuse Signature de la chercheuse

(En caractères d'imprimerie)

Date :

Annexe H. Formulaire d'information et de consentement en anglais

Information and Consent Form

Project name :	Responsible innovation in food: food systems that contribute to health
Chercheuse :	**Renata Pozelli Sabio,** PhD candidate at the École de santé publique de l'Université de Montréal, under the direction of Pascale Lehoux, full professor at the École de santé publique in the Department of Health Management, Evaluation and Policy at the Université de Montréal, and researcher at the Institut de recherche en santé publique de l'Université de Montréal (IRSPUM)

You are invited to participate in a research project. Before agreeing to participate, please take the time to read this document outlining the conditions for participation in the project. Feel free to ask any questions you feel would be useful to the person presenting this document.

Reason for receiving this invitation

You are invited to participate in our study because you have the expertise to help us achieve the goal of our food systems research project.

Purpose of the study

Food-related health issues are compounded by the industrial production and distribution patterns that currently predominate in the food system. Initiatives to change the way to produce, process, distribute and consume food are increasingly present around the world. Thus, the purpose of this study is to better understand these initiatives and how they are influencing the food system. This project is part of the In fieri research program, which aims to generate and disseminate new knowledge on the design, financing, and commercialization of responsible innovation in health (RIH). The RIH is a collaborative approach in which stakeholders commit to clarify and apply a set of ethical, economic, social, and environmental principles, values and requirements when designing, financing, producing, distributing, and using socio-technical solutions to meet the challenges and needs of health systems in a sustainable manner.

Roles and functions of the principal investigator

This study is part of a doctoral project led by the principal investigator. She will be responsible for selecting and recruiting participants, collecting, and analyzing data, and disseminating results. Participants will be recruited through email contacts and telephone calls to explain the study to potential participants and answer any questions they may have. Individuals who agree to participate in the study will receive a formal invitation by email.

Conflicts of interest

The principal investigator believes that none of the situations in which she finds herself places her in a conflict of interest.

Nature of your participation

You are invited to participate in this study for a period of two (2) years. The first interview will require the presence of participants for 60 to 90 minutes. The researcher in charge of the study will come to meet you at a date that is convenient for you. Before the interview, she will send you the consent form so that you can read it carefully. On the day of the interview, she will collect the signed form. One year after the initial interview, the researcher will conduct a 40-to-60-minute telephone interview with you, and you will then need to reiterate your consent. This interview will be scheduled in advance, at a time and date that is convenient for you. You will be free, however, to refuse to participate in this interview.

Compensation

There is no financial compensation associated with your participation in this study.

Data use and storage

We are a secure web platform specific to the In fieri program, which contains all the data collected for studies such as this one. This bank is housed on a server (located in a locked laboratory) and is accessible to members of the research team through a username and a password. We regularly check the navigation data on this site and update the relevant security mechanisms. According to the rules in effect at the Université de Montréal, we will keep the data for a maximum period of 7 years after the end of the project in 2021. Participants' contact information will not be kept for future projects. However, students and members of our research team may eventually be able to use the anonymized data in our bank. Such secondary use of our data will be in the context of the purposes described on our website (www.infieri.umontreal.ca).

Risks and disadvantages

The researcher believes that participating in this research project involves little risk to you. In addition to the time, you will spend on our study, there are no physical, psychological, or socio-economic risks or inconveniences associated with our data collection.

Advantages

There is no tangible benefit to be gained from our study. However, you will share your experience and perspective, and, in return, we will share with you the results and lessons learned from our study. In this way, you will contribute to the advancement of knowledge about alternative food systems.

Protection of the confidentiality and anonymity of participants

We will maintain anonymity and protect the confidentiality of participants by assigning them a pseudonym at the time of data collection or as soon as the audio recordings are transcribed. The names of participating organizations will not be disclosed in our presentations and publications. However, the identity of the latter could be discovered by searching the media and the Internet for information complementary to that contained in our publications. When we prepare our articles and presentations, our logic is to reduce the possibility of identification by erasing details and to ensure that the comments reported do not harm the people concerned. However, we cannot prevent people from guessing the names of companies, innovations, or organizations.

Dissemination of results

This study will result in the publication of scientific articles. In addition, the main results of this study will be disseminated through the Hinnovic blog (www.hinnovic.org), an important axis of knowledge transfer and exchange for our research program. The website dedicated to the In fieri program also includes a news section in which we announce our recent publications (www.infieri.umontreal.ca). We also plan to send a popularized summary of the main results of this study to participants.

Voluntary participation and right of withdrawal

You are free to accept or refuse to participate in this research project. You may withdraw from this study at any time, without giving a reason. All you have to do is notify the contact person by simple verbal notice. If so, you can decide whether we have the right to use the information you have already provided us with in our analyses or whether you would prefer that we do not use it.

Responsibility of the research team

By agreeing to participate in this study, you are not waiving any of your rights or releasing the researchers, the organization that funds the study or the establishment of their civil and professional liability.

Contact for further information

If you have any questions about the scientific aspects of the study, you can contact Renata Pozelli Sabio, responsible of this project, by phone at [number erased in this document] or by email at renata.pozelli.sabio@umontreal.ca.

If you have any concerns about your rights or the responsibilities of researchers in relation to your participation in this project, you may contact the advisor of the Health Research Ethics Board:

- E-mail : ceres@umontreal.ca
- Phone : 514 343-6111, poste 2604
- Website: http://recherche.umontreal.ca/participants

Any complaint regarding this research can be addressed to the Ombudsman of the Université de Montréal, by telephone at 514 343-2100 or by e-mail at ombudsman@umontreal.ca. The Ombudsman accepts collect calls. He speaks French and English and receives calls between 9am and 5pm.

Consentement

Participant's statement

I understand that I can take my time to think before agreeing or not to participate in the research.

I can ask questions of the research team and demand satisfactory answers.

I understand that by participating in this research project, I am not waiving any of my rights or releasing researchers from their responsibilities.

I consent to the use of the data collected in this research project for other research projects, subject to approval by a research ethics board.

I have read this information and consent form and agree to participate in the research project.

Participant's first and last name Participant's signature

Date:

I agree to have the interview recorded (audio). Yes: No:

Researcher engagement

I explained the conditions for participating in the research project to the participant. I answered the questions to the best of my knowledge and ensured that the participant understood. I undertake, with the research team, to respect what has been agreed in this information and consent form.

Researcher's firts and last name Researcher's signature

Date :

Annexe I. Formulaire d'information et de consentement pour la collecte de données au Brésil

Termo de Consentimento Livre e Esclarecido (TCLE)

Nome do projeto:	Como a inovação responsável transforma os sistemas alimentares e os torna favoráveis à saúde: Um estudo misto no Québec e em São Paulo
Pesquisadora:	Renata Pozelli Sabio, candidata ao doutorado na Escola de saúde pública da Université de Montréal, sob a direção de Pascale Lehoux, professora titular na Escola de saúde pública da Université de Montréal, no Departamento de Gestão, Avaliação e Política da Saúde, e pesquisadora no Instituto de Pesquisa em Saúde Pública da Universidade de Montreal (IRSPUM)
Instituição	Instituto de Pesquisa em Saúde Pública da Universidade de Montreal (IRSPUM), Programa de Pesquisa In Fieri para a Inovação Responsável em Saúde

Você está sendo convidado a participar de um projeto de pesquisa. Antes de concordar em participar, reserve um tempo para ler este documento descrevendo as condições de participação no projeto. Sinta-se à vontade para fazer quaisquer perguntas que considere úteis à pessoa que apresenta este documento.

Razão pela qual você está recebendo este convite

Você está sendo convidado a participar do nosso estudo porque você tem a experiência necessária para nos ajudar a alcançar o objetivo do nosso projeto de pesquisa sobre sistemas alimentares.

Objetivo do estudo

As questões de saúde relacionadas com a alimentação são agravadas pelos padrões de produção, processamento e distribuição predominantes atualmente no sistema alimentar. Iniciativas que visam mudar a situação através da produção, processamento, distribuição e consumo de alimentos mais saudáveis e responsáveis estão cada vez mais presentes em todo o mundo. Assim, o objetivo deste estudo é compreender melhor essas iniciativas e como elas estão influenciando o sistema alimentar onde estão inseridas. Este projeto faz parte de uma tese de doutorado em saúde pública na Université de Montréal e conta com uma parceria com o professor Eduardo Eugênio Spers, da Escola Superior de Agricultura Luiz de Queiroz. Na Université de Montréal, esta pesquisa está vinculada ao programa In fieri, que visa gerar e disseminar novos conhecimentos sobre o design, financiamento e comercialização de inovação responsável em saúde responsável (IRS). A IRS é uma abordagem colaborativa na qual as partes interessadas se comprometem a aplicar um conjunto de princípios, valores e requisitos éticos, econômicos,

sociais e ambientais na concepção, financiamento, produção, distribuição e utilização de soluções sociotécnicas para responder aos desafios e necessidades dos sistemas de saúde de forma sustentável.

Funções da pesquisadora principal

Este estudo faz parte de um projeto de doutorado liderado pela pesquisadora principal. Ela será responsável por selecionar e recrutar participantes, coletar e analisar dados e disseminar os resultados. Todas as etapas serão supervisionadas pela orientadora do projeto. Participantes em potencial serão contatados através de contatos por e-mail e telefonemas. A pesquisadora principal compromete-se a responder a quaisquer perguntas que estes possam ter da melhor forma possível. Os indivíduos que concordarem em participar do estudo receberão um convite formal por e-mail.

Conflitos de interesses

A pesquisadora principal acredita que nenhuma das situações em que se encontra a coloca em conflito de interesses.

Natureza da sua participação

Sua participação consiste na realização de uma entrevista que durará 60 a 90 minutos. O pesquisador responsável organizará a entrevista em uma data e horário que sejam convenientes para você. A entrevista será realizada via telefone ou Skype, como você preferir. Na semana que antecede a entrevista, ela irá enviar-lhe o formulário de consentimento livre e esclarecido para que possa lê-lo cuidadosamente. No dia da entrevista, ela recolherá o formulário assinado. Você é livre para se recusar a participar desta entrevista e pode retirar seu consentimento a qualquer momento.

Compensação

Não há compensação financeira associada à sua participação neste estudo.

Utilização e armazenamento de dados

Os dados coletados durante a entrevista serão armazenados em uma plataforma web do grupo In fieri. Trata-se de uma plataforma segura específica para o programa de pesquisa, que contém todos os dados coletados para estudos como este. Este banco está alojado num servidor (localizado num laboratório fechado com chave) e é acessível aos membros da equipe de pesquisa através de um *login* e uma senha. Verificamos regularmente os dados de navegação neste site e atualizamos os mecanismos de segurança relevantes.

De acordo com as regras em vigor na Universidade de Montreal, os dados serão conservados por um período máximo de 7 anos após a conclusão do projeto em 2020. As informações de contato dos participantes não serão mantidas para projetos futuros. No entanto, estudantes e membros de nossa equipe de pesquisa podem eventualmente ser capazes de usar os dados anonimizados em nosso banco. Tal uso secundário de nossos dados será no contexto das finalidades descritas em nosso website (www.infieri.umontreal.ca).

Riscos e desvantagens

A pesquisadora acredita que a participação neste projeto de pesquisa envolve pouco risco para você. Além do tempo que você vai gastar em nosso estudo, não há riscos ou inconvenientes físicos, psicológicos ou socioeconômicos associados à nossa coleta de dados.

Benefícios

Não antecipamos a geração de quaisquer benefícios diretos aos participantes do nosso estudo. No entanto, você vai compartilhar sua experiência e perspectiva e, em troca, vamos compartilhar com você os resultados e lições aprendidas com o nosso estudo. Desta forma, você vai contribuir para o avanço do conhecimento sobre sistemas alimentares alternativos.

Proteção da confidencialidade e anonimato dos participantes

Manteremos o anonimato e protegeremos a confidencialidade dos participantes, atribuindo-lhes um pseudônimo no momento da coleta de dados ou assim que as gravações de áudio forem transcritas. Os nomes das organizações participantes não serão divulgados em nossas apresentações e publicações. No entanto, a identidade destes últimos poderia ser descoberta através da busca de informações complementares às contidas em nossas publicações nos meios de comunicação e na Internet. Quando preparamos nossos artigos e apresentações, nossa lógica é reduzir a possibilidade de identificação, apagando detalhes e garantindo que os comentários relatados não prejudiquem as pessoas envolvidas. No entanto, não podemos impedir que as pessoas adivinhem os nomes de empresas, inovações ou organizações.

Divulgação dos resultados

Este estudo resultará na publicação de artigos científicos. Além disso, os principais resultados deste estudo serão divulgados através do blog Hinnovic (www.hinnovic.org), um importante eixo de transferência e intercâmbio de conhecimento para nosso programa de pesquisa. O site dedicado ao programa In fieri inclui também uma seção de notícias na qual anunciamos nossas publicações recentes (www.infieri.umontreal.ca). Também planejamos enviar um resumo dos principais resultados deste estudo aos participantes.

Participação voluntária e direito de rescisão

Você é livre para aceitar ou recusar participar deste projeto de pesquisa. Você pode retirar-se deste estudo a qualquer momento, sem dar um motivo. Tudo o que tem de fazer é notificar a pessoa de contato por simples aviso verbal ou escrito. Caso você decida retirar-se do estudo após a entrevista, pode decidir se temos o direito de utilizar as informações que já nos forneceu nas nossas análises ou se prefere que não as utilizemos.

Responsabilidade da equipe de pesquisa

Ao concordar em participar deste estudo, você não está renunciando a nenhum de seus direitos ou liberando os pesquisadores, a organização que financia o estudo ou o estabelecimento de sua responsabilidade civil e profissional.

Contato para maiores informações

Se você tiver alguma dúvida sobre os aspectos científicos do estudo, entre em contato com Renata Pozelli Sabio:

- Telefone: [número deletado neste documento]
- E-mail: renata.pozelli.sabio@umontreal.ca
- Endereço institucional: 7101, Avenue du Parc, Montreal QC, H3N 1X9 – Canadá

Contato com o Comité de Ética

Em caso de qualquer dúvida sobre seus direitos ou sobre as responsabilidades dos pesquisadores em relação à sua participação neste estudo, você poderá entrar em contato com os comitês de ética em pesquisa que analisaram os aspectos éticos do nosso projeto de pesquisa¸

No Brasil, o projeto foi analisado pela Comissão Nacional de Ética em Pesquisa (CONEP). A CONEP é uma comissão do Conselho Nacional de Saúde – CNS, e tem como principal atribuição o exame dos aspectos éticos das pesquisas que envolvem seres humanos. A missão da CONEP é elaborar e atualizar as diretrizes e normas para a proteção dos participantes de pesquisa e coordenar a rede de Comitês de Ética em Pesquisa das instituições.

Apresentamos abaixo os meios de contato da CONEP:

CONEP

- Endereço: SRTVN 701 –Via W 5 Norte – Edifício PO 700, Lote D, 3º Andar – ASA NORTE – Brasília DF – CEP: 70719-040
- E-mail: conep@saude.gov.br
- Telefone: (61) 3315-5877

Horário de atendimento: das 08h às 20h

No Canadá, este projeto foi aprovado pelo Comitê de Ética em Pesquisa em Ciências da Saúde (CERSES) da Université de Montréal, cujos meios de contato são os seguintes:

- Endereço: C.P. 6128, succursale Centre-ville, Montreal, Québec, Canada - H3C 3J7
- E-mail: cerses@umontreal.ca
- Telefone: +1(514) 343-6111 ramal 33346
- Horário de atendimento: 09h às 17h

Acesso ao termo de consentimento livre e esclarecido

Caso concorde em participar do nosso estudo, você receberá uma via original deste termo de consentimento livre e esclarecido assinada por você e pelo pesquisador responsável, e rubricada em todas as páginas por ambos.

Consentimento

Declaração do participante

Eu entendo que posso dedicar meu tempo para pensar antes de concordar ou não em participar da pesquisa.

Posso fazer perguntas à equipe de pesquisa e exigir respostas satisfatórias.

Compreendo que, ao participar neste projecto, não estou renunciando a nenhum dos meus direitos nem libero os pesquisadores das suas responsabilidades.

Autorizo o uso dos dados coletados neste projeto de pesquisa para outros projetos de pesquisa, sujeito à aprovação de um comitê de ética em pesquisa.

Eu li este formulário de informação e consentimento livre e esclarecido e concordo em participar do projeto de pesquisa.

Nome completo do participante da pesquisa Assinatura do participante da pesquisa

Data:

Concordo que a entrevista seja gravada (áudio). Sim: Não:

Declaração da pesquisadora

Expliquei ao participante as condições de participação no projeto de pesquisa. Respondi às perguntas com o melhor dos meus conhecimentos e assegurei que o participante entendesse. Comprometo-me, juntamente com a equipe de pesquisa, a respeitar o que foi acordado neste formulário de informação e consentimento.

Renata Pozelli Sabio

Nome completo da pesquisadora Assinatura da pesquisadora

Data :

Annexe J. Guide d'entrevue en français

Guide d'entrevue

Le but de cette étude est de mieux comprendre les initiatives de production, de distribution et de consommation d'aliments plus sains et responsables et de déterminer comment elles arrivent à influencer le système alimentaire. Un système alimentaire représente la façon dont les personnes s'organisent pour produire et consommer la nourriture au sein d'une société.

L'entrevue sera d'une durée de 60 à 90 minutes. Cette entrevue sera enregistrée et retranscrite pour être analysée. Elle contient 5 grands blocs, soit l'introduction, la forme organisationnelle, les défis de l'organisation, l'influence institutionnelle, et les éléments dont vous aimeriez ajouter qui n'auront pas été couverts durant l'entrevue.

Dans l'éventualité où certaines questions s'avèrent plus sensibles à répondre en raison d'enjeux de confidentialité vous n'aurez qu'à nous en informer. Avez-vous des questions pour nous?

I. Identification, expertise et motivations du répondant

Les questions suivantes visent à nous aider à vous connaitre, ainsi que les motivations qui vous ont poussé à [développer l'innovation] et/ou [démarrer/joindre] l'organisation :

1. Pouvez-vous dire votre nom complet, dans quelle(s) discipline(s) vous avez été formé et décrire votre rôle actuel chez [nom de l'organisation]?
2. Racontez-moi brièvement l'histoire de l'organisations.
3. Quelles sont les motivations qui vous ont poussé à démarrer l'organisation/vous joindre à l'équipe/développeer l'innovation?

II. Forme organisationnelle

Les questions suivantes visent à comprendre ce que l'organisation cherche à accomplir, et comment elle répond aux défis de sécurité alimentaire:

1. Pouvez-vous nous décrire la proposition de valeur offerte par l'organisation (valeur ajoutée)? Selon vous, de quelle façon la leur valeur ajoutée de l'organisation répond à des défis de santé et/ou de sécurité alimentaire?
2. Est-ce que vous ou l'organisation avez consulté l'opinion des personnes impactées par les innovations avant de mettre en œuvre l'innovation ? Comment cela a-t-il affecté sa mise en œuvre ?
3. Pouvez-vous me décrire globalement le modèle d'affaires de l'organisation? (Relance : amener le répondant à parler de : marché; fournisseur; revenu; partenaires; concurrence.

III. Pratiques socio matérielles

Les questions suivantes visent à comprendre les défis liés aux activités de l'organisation.

1. Pouvez-vous nous décrire les différentes étapes de la mise en place de l'innovation ? (Relance : adaptation des territoires; adaptation des lieux; adaptation des ressources)
2. Quels ont été/sont les défis les plus importants jusqu'à maintenant et comment avez-vous les surmontés? (Relance : défis financiers, technologiques ou organisationnels)

IV. Travail institutionnel

Les questions suivantes visent à comprendre l'influence de l'innovation sur le système alimentaire.

1. Avez-vous remarqué l'impact de l'organisation sur son 'territoire' ? Lesquels?
2. Existe-t-il un moyen de mesurer l'impact de l'organisation actuellement (parlez de l'impact sur les pratiques du système alimentaire).
3. Pouvez-vous décrire brièvement la relation entre votre organisation et des organisations plus traditionnelles dans le même domaine? (Relance : hybridation, partenariats, conflits).
    a. Comment cette relation a-t-elle évolué depuis le début des activités?
4. Selon vous, comment le système alimentaire du Québec a-t-il évolué dans les 10 dernières années?
5. Quelles sont vos priorités pour l'avenir? (Relance : défis pour la pérennité).

V. Clôture

1. Enfin, est-ce qu'il y a des aspects dont nous n'avons pas parlé et qui vous semblent importants à partager?
2. Avez-vous de noms de personnes ou d'organisations externes à l'organisation avec qui vous pensez qu'il serait pertinent pour nous à contacter?

Annexe K. Guide d'entrevue en anglais

Interview guide

The purpose of this study is to better understand initiatives for healthier and more responsible food production, distribution, and consumption and how they are influencing the food system. A food system is the way people organize themselves to produce and consume food in a society.

The interview will be 60 to 90 minutes in length. This interview will be recorded and transcribed for analysis. It contains 5 main blocks: introduction, organizational form, organizational challenges, institutional influence, and items you would like to add that were not covered during the interview.

In the event that some questions are more sensitive to answer due to confidentiality issues, simply let us know. Do you have any questions for us?

I. Identification, expertise, and motivations of the respondent

The following questions will help me get to know you, as well as the motivations that drove you to join the organization:

1. Can you tell your full name, in which discipline (s) you have been trained and describe your current role at [name of organization]?
2. Tell me briefly about your role in the innovation of food practices at the organization.
3. What were your main motivations to develop/join the organization or develop the innovation?

II. Organizational form

The following questions aim to understand what the organization is trying to accomplish in terms of food practices, and how it responds to food security challenges:

1. Can you describe the added value offered by the organization to its community in terms of new food practices? In your opinion, how does this respond to health and / or food security challenges?
2. Have you or the organisation consulted the opinion of individuals impacted by the innovations before implementing the changes? How did this affect its implementation?
3. Can you give me an overall description of the organization's business model? (Prompt: get respondent to talk about: market; supplier; revenue; partners; competition.

III. Sociomaterial practices

The following questions are intended to help me to understand the main challenges in the organization's activities.

1. Can you describe the different stages of the implementation of the innovations in the food practices (adaptation of territories; adaptation of places; adaptation of resources)?
2. What have been / are the most important challenges so far and how have you overcome them (financial, technological, or organizational challenges)?

IV. Institutional work

The following questions aim to help me to understand the organization's influence on its food system.

1. Have you noticed the impact of the organization on its 'territory'? Which ones?
2. Is there a way to measure the organization's impact (talk about impact on food system practices)?
3. Can you briefly describe the relationship between your organization and more traditional organizations in the same field? (Relaunch: hybridization, partnerships, conflicts). How has this relationship evolved since the beginning of the activities?
4. In your opinion, how has the Québec food system evolved in the past 10 years?
5. What are your priorities for the future (challenges for the sustainability of the innovation)?

V. Closing questions

1. Finally, are there any aspects that we haven't talked about that you think are important to share?
2. Do you have any names of people or organizations outside the organization that you think would be relevant for us to contact?

Annexe L. Guide d'entrevue en portugais

Guia de entrevista

O objetivo deste estudo é entender melhor as iniciativas que propõem formas alternativas e responsáveis de produzir, processar, distribuir e consumir alimentos, bem como compreender como estas podem influenciam o sistema alimentar onde encontram-se inseridas. Um sistema alimentar representa a forma como as pessoas se organizam para produzir e consumir em uma determinada sociedade.

A entrevista terá duração de 60 a 90 minutos. Esta entrevista será gravada e transcrita para análise. Ela contém 5 blocos principais: introdução, forma organizacional, desafios organizacionais, influência institucional e itens que você gostaria de acrescentar que não foram abordados durante a entrevista.

Caso algumas perguntas sejam mais sensíveis a responder devido a questões de confidencialidade, basta me informar.

I. Identificação, competência e motivação do participante

As seguintes perguntas irão me ajudar a conhecer você, bem como as motivações que o(a) levaram a desenvolver a inovação e/ou a criar/ se juntar a [nome da organização]

1. Você pode dizer seu nome completo, seu percurso profissional (formação, etc.) e descrever seu papel atual na [nome da organização]?
2. Você pode me contar brevemente sobre a história da organização?
3. Quais são as motivações que o levaram a dar início às atividades/se juntar a [nome da organização] / desenvolver a inovação?

II. Formato organizacional

As perguntas a seguir visam entender um pouco mais sobre o modelo organizacional e como ela está respondendo aos desafios de segurança alimentar em seu contexto:

1. Você pode descrever a proposta de valor oferecida pela organização (qual a contribuição que vocês querem oferecer)? Em sua opinião, de que forma este valor oferecido por vocês responde aos desafios de saúde e/ou segurança alimentar enfrentados pela região ou estado em que você se encontra?
2. Você ou a organização consultaram os pontos de vista das pessoas afetadas pelas inovações antes de implementar a inovação? Como isso afetou sua implementação?

3. Você pode me dar uma descrição geral do modelo de negócios da organização. (Levar o entrevistado a falar sobre mercado, cadeia de valor, modelo de negócios, parceria, concorrência)

III. Práticas Socio-Materiais

As perguntas a seguir visam entender os desafios associados às atividades da organização.

1. Você pode descrever as diferentes fases da implementação deste modelo? (Levar o entrevistado a falar sobre adaptação de territórios; adaptação de espaços; adaptação de recursos).
2. Quais foram/ainda são os desafios mais importantes até o momento e como você os superou? (Falar sobre desafios financeiros, tecnológicos ou organizacionais)

IV. Trabalho institucional

As seguintes perguntas visam compreender a influência da organização em seu sistema alimentar (sistema alimentar da região em que ele está inserido).

1. Você observou algum impacto da organização em seu 'território'? Quais?
2. Há alguma maneira de medir o impacto da organização atualmente? (Falar sobre o impacto em práticas no sistema alimentar).
3. Você pode descrever brevemente a relação entre sua organização e organizações mais tradicionais no mesmo campo? Como esta relação tem evoluído desde o início das atividades?
4. Como você avalia a evolução do sistema alimentar de São Paulo nos últimos 10 anos?
5. Quais são as suas prioridades para o futuro (desafios para a perenidade da organização/inovação)?

V. Encerramento

1. De que forma a pandemia de coronavírus afetou as atividades de vocês?
2. Há algum aspecto sobre o qual não tenhamos falado e que você acha que é importante compartilhar?
3. Você tem algum nome de pessoas ou organizações fora da organização com quem você acha que seria relevante para nós entrarmos em contato?