Synthesis Report of 3 Workshops (organized by CAPI and the Agriculture Policy Research Community):

- Trade, Globalization and Evolving Markets
- Environment and Health
- Enabling Environment: Innovation

Policy Research Priorities and A New Engagement Process

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I. INTRODUCTION

Preamble

Canada's agri-food sector enjoys significant natural, social and economic advantages, yet, like many countries, we face some profound challenges as well as some exciting new opportunities. This all happens concurrently with rising societal expectations and increasing interest in food and food policy issues, while adjusting to the implementation of trade liberalization initiatives and possibly stricter environmental regulations. To help fulfill our agri-food potential, we need to develop new ideas and mobilize existing knowledge through new, effective and systematic modes of engagement to facilitate the required innovation.

In order to rethink the engagement model for a better informed policy dialogue, to better frame and better inform the key questions, and to facilitate the systematic engagement of the academic community in policy discussions, the Canadian Agri-Food Policy Institute (CAPI) sponsored 3 policy workshops which were jointly organized with the academic policy research community. The specific objectives of the workshops were:

- To start a consistent dialogue with the experts in the academic community
- To identify key issues/challenges facing the agriculture and agri-food sector and their policy implications
- To move forward in developing the new model of engagement between academia, Agriculture and Agri-Food Canada (AAFC), CAPI and a broad range of stakeholders

Themes for workshops were inspired by the report from CAPI's November 2015 Forum on Canada's Agri-Food Future, which engaged stakeholders and the policy community around the future of Canadian agri-food. Three thematic areas for the workshops were identified as:

1. Trade, Globalization and Evolving Markets
2. Environment and Health
3. Enabling Environment (Innovation)

What we have learned

Key drivers of change, including population and income growth in emerging economies, climate change, science and technology and globalization have impacts on the agriculture and food sector through various changes. These can be summarized as changes in demand (both in quality and quantity), changes in supply (changing comparative advantage, new technologies, etc.) as well as changes in consumer/societal expectations regarding the environment, production practices and food quality. These evolutions represent big opportunities as well as significant challenges for the Canadian agri-food sector, which could be translated into the following questions:

- What are the implications of increased demand and climate change on the industry, and what does it mean in terms of added pressure on global resources?
- How could Canada turn the challenge/threat of climate change in to an opportunity by taking advantage of its abundant resource base? How should natural capital, more specifically water, be valued?

- Does the Canadian agri-food industry have the capacity to exploit emerging opportunities? Is Canada's infrastructure up to the challenge?
- Do we have the right organizational model for innovation systems and right institutions to manage our natural capital in order to achieve optimum outcomes?

In order for Canada to take advantage of all these changes we need to have well thought out responses to the following:

- What knowledge and (possible new) data is needed? (some of these were identified)
- What types of institutions or institutional change are required? (e.g. property rights on water, etc.)
- What types of technological, social and policy innovations are needed?
- What kind of partnerships will enable us to produce timely, policy relevant responses?

II. POLICY RESEARCH PRIORITIES

These questions defined the Policy Space illustrated in Chart 1. As we moved from one workshop to the next, the connections amongst the 3 thematic areas became clearer, and so did the opportunities for engagement.

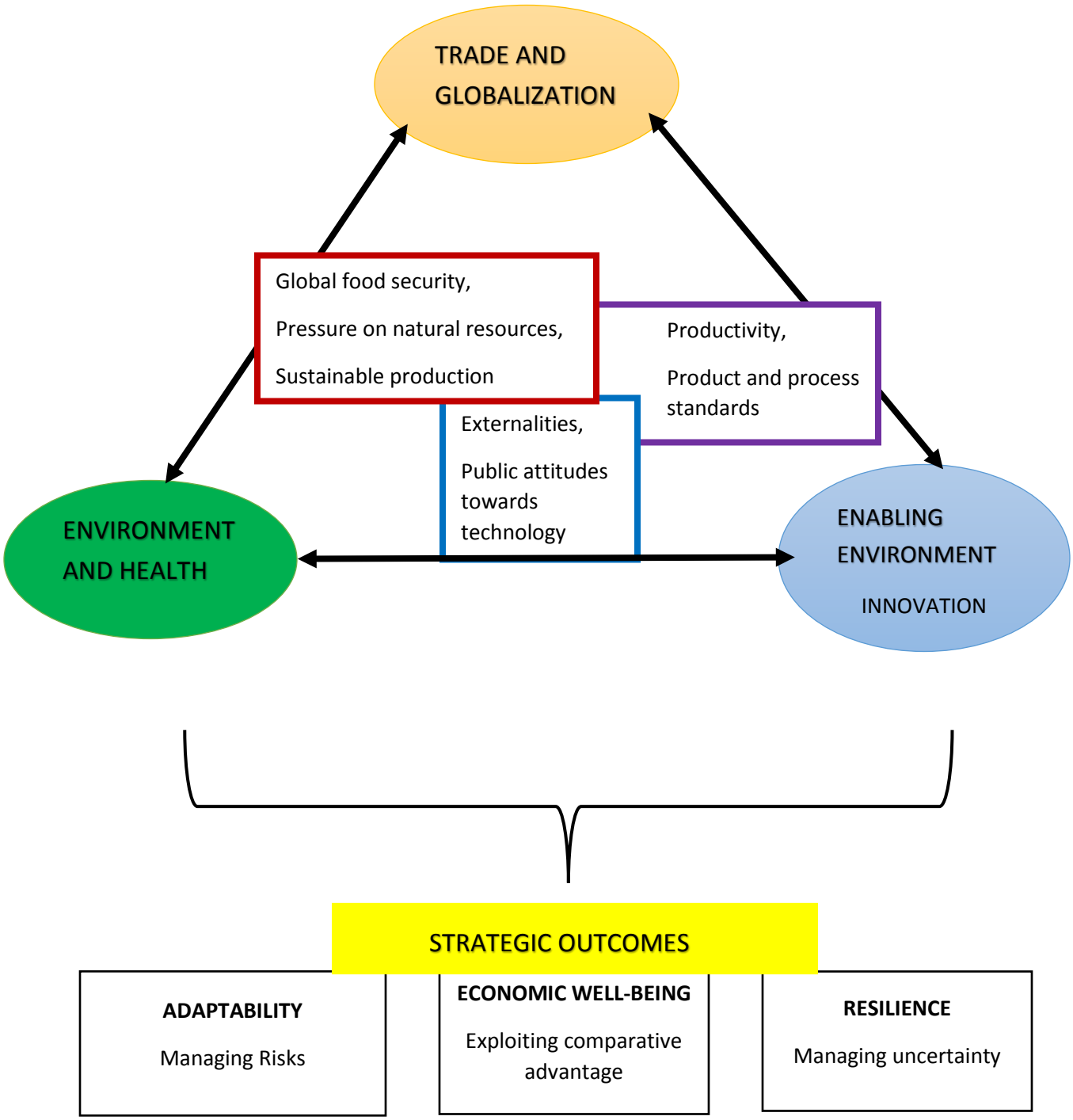
Each workshop produced a list of important policy research issues (a full list can be found in the Annex 2, which is available only in English). These issues could be grouped as ones that are specific to each issue area and could be treated as "independent from others" (oval text boxes), and those that connect thematic areas to each other (rectangular text boxes).

The policy research issues in rectangular overlapping boxes are interconnected strategic issues that need to be revised regularly and kept ever-green, creating an opportunity and need for continual engagement, which could take the form of foresighting exercises or environmental scans. Likewise, the synthesis of interconnected research results, which will contribute/inform government policies and industry strategies towards meeting the strategic outcomes,[1] will need to be communicated to the broadest audience possible, giving rise to further need for engagement.

One common concern, which was raised in every workshop, was the need for "Sharing Data and Tools", and investigating "open-source approaches". This desire creates an opportunity for a different type of collaboration amongst the members of the policy research community, and motivates the need for renewed engagement.

[1] The strategic outcomes for Canada's agri-food sector that were expressed at all workshops are improved competitiveness, adaptability and resilience in the provision of public and private goods and services.

Chart 1: Policy Space



Environment and Health:

- Impacts of climate change (CC) on productive capacity and human health
- Costs and opportunities associated with carbon pricing or regulating emissions
- Measuring and valuing natural capital

Trade and Globalization:

- Impacts of various trade agreements
- Impacts of subsidies and regulations in trading partners
- Ability to penetrate markets

NEXUS 1

Nexus of Trade and the Environment:

- The composition, location and the volume of global demand for food are shifting as climate change causes disruptions in production patterns. This results in added pressure on infrastructure and natural capital of exporting countries such as Canada. How could Canada use this situation to its advantage?
- New technologies offer potential solutions to global food security issues. However, public rejection of new technologies and products functions as a de facto trade barrier. Could alignment of standards across countries resolve this issue?
- How can the depletion of water resources, wildlife habitat, biodiversity and other forms of natural capital be better managed within a global trading environment?
- How will the emerging big data revolution enable new ways of monitoring and meeting demands for transparency, particularly on nutritional quality of food and environmental sustainability in the production process, and how will it force the restructuring of the supply chains globally?

Trade and Globalization:

- Impacts of various trade agreements
- Impacts of subsidies and regulations of trading partners
- Ability to penetrate markets

Innovation:

- Productivity measures and data
- Funding levels and models for innovation in Canada
- The models of organization of innovation
- The roles of public, private and NGO sectors in innovation

NEXUS 2

Nexus of Trade and Innovation:

- Innovation is key to improved productivity and comparative advantage. It also produces new products with a variety of attributes that could, in principle, improve competitiveness. However, new products and production processes can also create new technical barriers to trade. What are the right approaches to regulations globally to prevent these types of barriers to trade?
- The rejection (social auditing) of technology is an emerging global phenomenon amongst some consumer segments or civil society groups. What are the strategies for a well-managed process of introducing new products and production processes? What are the requirements for the development of flexible regulatory systems? How can trade be facilitated in this environment?
- Will the availability of 'big data' help companies to introduce new products for certain market segments?

Innovation:

- Productivity measures and data
- Funding levels and models for innovation in Canada
- The models of organization of innovation
- The roles of public, private and NGO sectors in innovation

Environment and Health:

- Impacts of climate change (CC) on productive capacity and human health
- Costs and opportunities associated with carbon pricing or regulating emissions
- Measuring and valuing natural capital

NEXUS 3

Nexus Innovation and the Environment:

- Innovations to improve the environmental and human health are becoming increasingly more important, and with this trend comes the need to address public distrust of technology. What types of policy and institutional innovations are required to address externalities and to develop strategic approaches to public/consumer acceptance of new technologies?
- What types of innovations in agri-environmental policy instruments will be critical to address externalities and to improve adaptability in the sector?
- What data are required for the measurement of natural capital and its impact on productivity and GDP? How would these measures inform R&D priorities?
- What are the implications of big data revolution and ability to segment markets on genomics research?

III. A NEW ENGAGEMENT MODEL

The continuity of engagement between the various stakeholders in the agri-food policy space is essential for creating an environment for a better informed policy process. The stakeholders include the public (governments) and private sectors (firms, industry organizations), the policy research community, consumers, and broader civil society and NGOs. To be effective, the interplay between these stakeholders must reflect both a deliberate approach to engagement as well as spontaneous approaches when pressing issues that require timely solutions or opportunities arise.

What is preventing a multi-player, interdisciplinary, systematic dialogue from occurring? There are built-in institutional rigidities concerning the parties involved. These are mostly shaped by different mandates, planning horizons, incentive structures and client bases. As a result, engagement is often very limited in scope and participants, and the engagement that does occur is often bi-lateral and ad hoc. To overcome these rigidities and to have a systematic and continuous policy dialogue there is a need for deliberate engagement with a strategic approach. The new model needs to respond to 3 questions that are linked to the strategic priorities discussed in the previous section:

- How to keep strategic priorities updated/ever-green?
- How to secure the delivery of research on priority issues?
- How to create synthesis of research to inform government policies and industry strategies towards achieving Strategic Outcomes?

Chart 2 summarizes the process that responds to these questions, which consists of 3 stages: Priority Setting, Policy Research, and Knowledge Synthesis and Mobilization. To enable this ever-green process, the right hand side of the schematic shows the elements of engagement corresponding to each stage of the process; namely, participants, process, and products.

The priority setting process leads to specific strategic priorities, such as those in the square text boxes in the policy space chart (e.g. productivity, global food security, etc.). These strategic priorities then feed into the research process via a detailed research agenda. Outcomes from the research process then feed into a knowledge synthesis and mobilization (KSM) stage, where knowledge and insights gained through research inform strategic outcomes; adaptability, economic well-being, and resilience.

'Priority Setting' stage would benefit from multitude of participants representing the priorities and concerns of governments and industry, bringing in existing knowledge and information that reside in the policy research community/networks, governments and CAPI. The process of priority setting could take the form of foresight meetings, environmental scans or small group brain-storming sessions and produces, first and foremost, a shared understanding of strategic priorities, and a strategic policy research agenda.

Policy research on issues identified could be conducted by policy researchers in academia and elsewhere. This model does not presuppose the presence of ERCA-like networks. However, the resources that could be available to networks would enhance the existing research capacity by allowing more systematic collaboration possibilities across universities and ensures the systematic delivery of research on key issues. Networks could also play a significant role in sharing/preserving data and models, and contributing to training of high quality personnel (HQP).

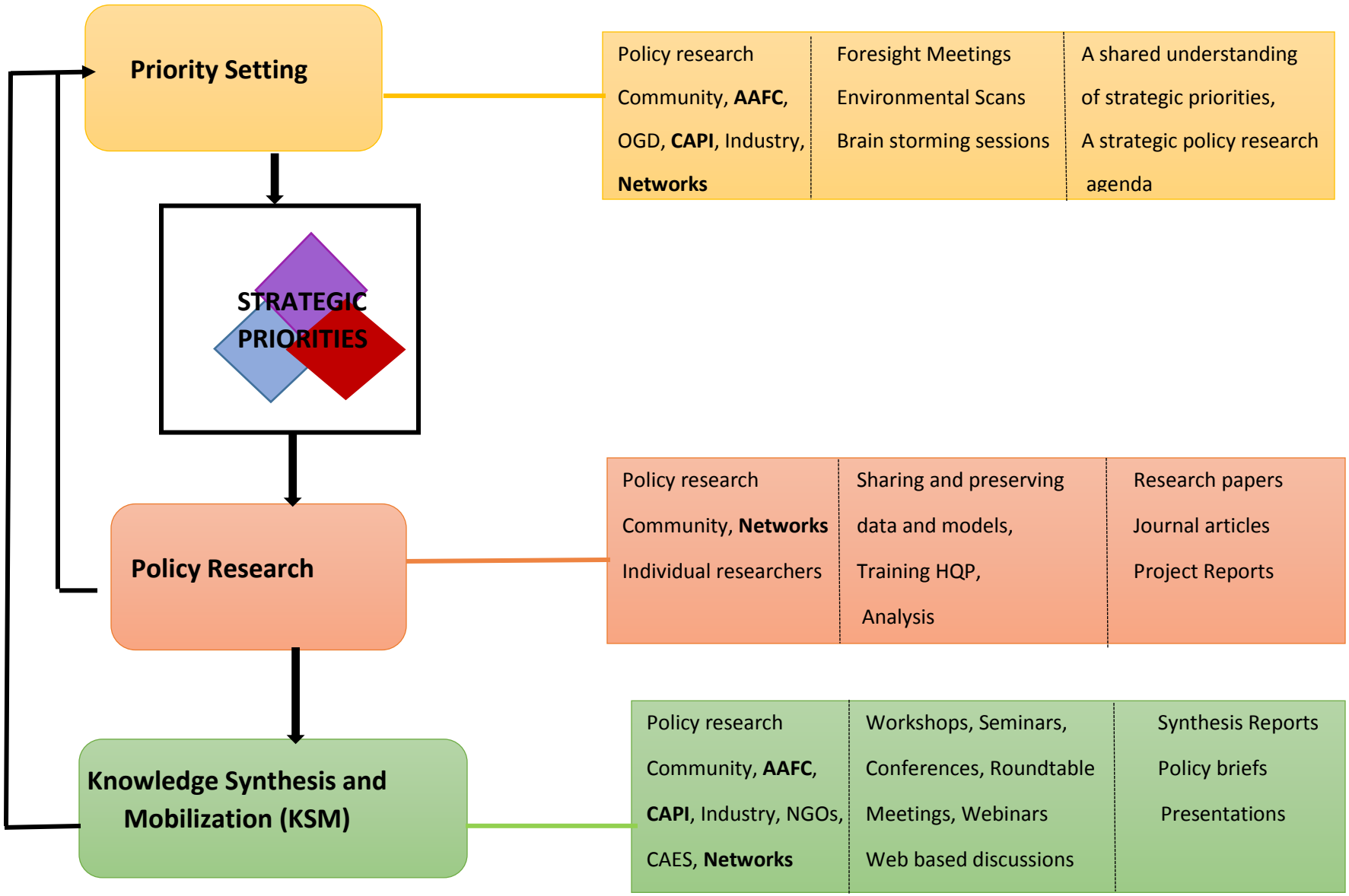
Products of 'Policy Research" stage, including journal articles, project reports, and research papers, would be the major inputs into "Knowledge Synthesis and Mobilization' stage. Various dissemination and knowledge mobilization methods, such as workshops, seminars, webinars, conferences, etc., will particularly be critical in KSM stage, which would involve creating derivative, non-technical, reader-friendly products for a more general audience, including policy analysts in governments, various industry groups, and NGOs. This stage will also benefit from a neutral venue to discuss results, and from various conferences, seminars, web events and workshops that could lead to synthesis of various analysis on issues of key importance.

This model so far provides a logical chain of events that could produce desirable outcomes to inform the policy without explicitly recognizing the resources that will be required at every stage. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), for example, currently invests in policy research through a program that engages University researchers. OMAFRA's agri-food and rural research program covers several thematic areas, including 'Agricultural Policy and Rural Development'. While this is a competitive, directed research program, it also creates a certain level of engagement through its process for setting research priorities and for exchanging information. The network of advisory bodies that are involved in this process includes participants from stakeholders, members of the academic community, and policy researchers from the University of Guelph. This network of advisory bodies provides long-term, strategic guidance for research program development as well as identification of short-term and emerging research priorities. The program also includes a knowledge mobilization component. Clearly, engagement at the priority setting stage requires resources for bringing people together and for synthesizing the conversation and articulating the strategic priorities, which marks only the beginning of the process. Having identified a set of priorities, regardless of their relevance, does not guarantee that research will be conducted on these issues. Strategic priorities may inspire some researchers to focus on these areas, however, this does not necessarily create an obligation to do so. The delivery of policy research on strategic priorities would definitely require significant investments.

Knowledge Synthesis and Mobilization activities will also require a significant investment, if there is to be qualitative and quantitative improvements in these activities.

It is important to identify which participant could bring the groups, or subsets of these groups together as equal partners in a neutral venue. One question that comes to mind is whether CAPI could fulfill this role in "Priority Setting" and in certain KSM activities?

CHART 2. ENGAGEMENT SPACE



IV. CONCLUSIONS

This project was made possible by resources put together, in kind or financial, by AAFC and CAPI as well as participants who volunteered their time. At the end, we collectively created a solid policy research agenda and a roadmap for a deliberate engagement strategy. Its implementation depends on the resources that will be made available.

CAPI, for its part, is moving forward to continue its engagement with the policy research community with certain pieces of work that overlaps with the outcomes of the Forum on Canada's Agri-Food Future 2015. These include:

- Further work on natural capital, its impact on productivity and its valuation,
- Further work on the metrics as it relates to social licencing,
- A KSM pilot, which will involve producing a derivative product based on a scholarly article.

CAPI would also consider partnering with the interested parties in keeping the priority setting process updated regularly.

Further implementation of a research program based on the strategic priorities identified in this process, in full or partial, will require continued commitments from all parties involved.

ANNEX 1: WORKSHOPS' PARTICIPANTS

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David Zilberman, University of California, Berkeley

ANNEX 2: RESEARCH PRIORITIES IDENTIFIED IN 3 WORKSHOPS

Many issues were introduced and discussed at the workshops. Naturally there was a great deal of overlap in drivers of change across 3 workshops, which is reflected in identified research priorities. It was not possible, or perhaps not even desirable, to create a consensus on a priority ranking. We did, however, group the issues by key drivers of change for the sector, or aggregated them under key research areas. The results were reported below by workshops.

WORKSHOP 1: TRADE, GLOBALIZATION AND EVOLVING MARKETS

Following a presentation by Dan Sumner, the discussions were centered around the following 4 key drivers and their impact on Canada's performance in global markets: Population and income growth in emerging economies; Climate change; Science and technology; Trading environment which is defined by trade agreements, political (in)stability, monetary policies and exchange rate volatility.

Population and income growth in emerging economies:

The changes in the composition and volume of food consumption in emerging economies, driven by income growth and population was identified as a key driver for Canadian exports. In addition, nutrition policies in importing countries are expected to have a significant impact on consumption patterns and on agri-food demand growth. Whether Canada exports more commodities and/or value added products will largely depend upon the extent and nature of demand growth, the supply growth in the ROW, TPP and other trade agreements, and finally, on Canada's ability to supply these markets.

Increased trade and Canadian exports will put additional pressure to Canada's infrastructure. The implications on physical infrastructure and how Canada responds to them will likely affect the ability of the agri-food industry to export.

Key Issues:

- Composition and volume of food demand
- Nutrition Policies and Demand
- Increased demand for infrastructure

The next question was 'what are the potential policy responses to these issues?', and the response was "investment in market intelligence and market development". This led to the following research questions:

- Should market intelligence and analysis be provided as public goods or as private/club goods?
- Does the Canadian agri-food industry have the production capacity to exploit the emerging opportunities in large markets? If so, is Canada's infrastructure up to the challenge?
- Will Canada's increased participation in global value chains impact any one of these issues?

Climate change:

Climate change (CC) was identified as another key driver. CC is anticipated to result in disruptions in global production patterns leading to critical questions regarding how the location of production will shift and how this will affect regional/national supply and demand balances and trade patterns. Vital

questions in this context, are: how will the shift in production patterns affect global demand for natural capital and what are the implications for Canada.

The recent Paris agreement on climate change also raises the issue of how CC mitigation policies will influence trade policies and ultimately trade in agri-food products. How will, for example, China's plans to adopt a cap and trade system affect trade in both carbon credits and agri-food products? What is the future of biofuels?

Natural capital issues will need to be considered in relation to both drivers 1 and 2, as increased demand and climate change jointly will increase the stress on global resources and the availability of natural capital.

Key Issues:

- Shifting demand and trade due to disruptions in production patterns
- Nexus between climate policy and trade policy

Science and technology:

Science and technology in general are identified as one of the key drivers. Electronic communication and the emerging big data revolution are enabling new ways of monitoring and meeting demands for transparency. Both have the power to force restructuring of the supply chains. A question that arises is how will Canadian supply chains cope with these changes? Will they be positioned to partake in the global value chains to effectively benefit from changes in trade patterns?

Innovations in agriculture are identified as a driver of significant issues, one of which is managing/regulating new technologies such as biotechnology, in order to cope with the fast pace of innovation and the rejection of technology, which could become an effective non-tariff barrier. How will innovations help Canada to maintain or challenge its comparative advantage in production of certain commodities? How could innovations in functional foods lower health care costs and improve competitiveness by lowering labour costs?

Key Issues:

- Communication data revolution and value chains
- Managing emerging technologies (GM, CRISPR, etc.)
- Innovation and health costs
- Innovation and competitiveness

Trading environment:

Trading environment encompasses a multitude of concerns, including multilateral/bilateral/regional trade agreements, political instability in various regions, monetary policies and exchange rate fluctuations, which are somewhat external to the sector, but the research on their impact could be a critical policy input to inform Canadian negotiating positions.

These drivers could also have an impact on international business/transaction costs and on the sector's ability to penetrate emerging markets. Regulatory harmonization could lower some of the transaction costs associated with goods crossing borders.

Key Issues:

- Impacts of regional/bilateral/multilateral trade agreements
- Regulatory harmonization
- Trade costs, market penetration
- Domestic subsidies/regulated industries

WORKSHOP 2: ENVIRONMENT AND HEALTH

Following Professor David Zilberman's presentation, two key questions were raised: How could Canada act on emerging opportunities presented by climate change? And should Canada develop an export strategy for its natural resources, and particularly for water? This led to the identification of following key research issues:

Climate Change: The impacts of global warming are of primary interest, more specifically:

- The economic impacts of extreme weather and natural disasters such as drought and floods;
- The impacts of climate change on safety nets (e.g. BRM programs) and on non-market goods;
- Are there opportunities presented by climate change? What are the priorities to build innovative capacity for the development of clean energy and a dynamic bio-economy? What types of policies are required? What is the potential for market based instruments vs regulations?

Water and landscape issues: There are critical policy issues of concern including water quantity and quality, water export policy, nutrient run-offs, phosphorus management and recapture, land ownership and tenure. As well there are distributional concerns such as where the benefits from programs/policies accrue, amongst producers and regions, and whether farmers have the right to pollute? The following are critical in responding to these issues:

- Availability of high quality spatial data, and landscape scale economic data are major gaps that require attention to produce policy relevant research outcomes
- Measurement of natural capital, its impacts on productivity measures and national accounts

Human Health: There are several aspects of human health that are of significant interest for economics research:

- Big data on food-genomics-health linkages and consumer knowledge;
- Consumer perception of the food-science nexus, including distrust of science and information;
- Increasing demand for foods with enhanced nutritional properties or attributes;
- The role of other food attributes becoming trade barriers;
- Distributional issues (move people to food, Indigenous people, logistic capacity to address food security).

One Health: The nexus between animal disease and potential impact on human health was identified as an emergent theme. Specific issues around the one-health theme included:

- Antibiotic microbial resistance
- Chronic wasting disease in wildlife
- Zoonotic events and disease management

It was recognized that given the nature of the one-health theme, these issues invariably require interdisciplinary research.

Non-Market Innovations: The importance of enhancing non-market innovations related to formal and informal institutions, as well as policy solutions, was identified as being critical to:

- The improvement of agri-environmental policy instruments,
- Land use projections,
- Natural capital measurement/indicators,
- Pricing and property rights of natural capital,
- Introducing adaptive learning to policy design,
- Invasive species and Climate change,
- Food waste,
- Carbon pricing/regulation

WORKSHOP 3: ENABLING ENVIRONMENT

Following 2 presentations by Ted Bilyea and Richard Gray, discussion focused on acceptance of new technologies, innovation and R&D issues.

Public and Consumer Attitudes towards Technology:

Social auditing and rejection of new technologies is a key concern for innovation. A recent example is genomics research which could be one of the key drivers of agri-food innovation. It represents promising solutions to various environmental problems and industry issues, such as the development of trees and plants with higher carbon sequestration potential or lower cost options for traceability by using DNA markers. However, it is also subject to great public controversy which is further fuelled by the rejection of some of these technologies by NGOs and by various questions on property rights. Public and consumer attitudes are not necessarily consistent across all applications, for example the public acceptance of its use in food versus health products or for industrial uses are quite different.

Key Issues:

- How could consumer trust in the innovation system be built? Could the integration of solutions to various societal concerns such as health, sustainability and environmental remediation establish public trust in the system?
- What are the public and consumer acceptance issues regarding nutraceuticals and functional food innovation?
- How should intellectual property rights in genetic technology, and ownership of genetic resources be defined?

- How to govern innovation from a systems perspective, and bring together market demands, societal concerns, and regulatory processes? What is the strategic approach to the introduction of new technologies/products?
- Could improved transparency in contractual relations between scientists and companies improve the credibility of scientists and their findings?

Harmonisation of standards and regulations across countries

In addition to public and consumer acceptance issues, different national or provincial regulations for approval of novel foods act as de facto trade barriers and create serious market access issues and affect incentives to innovate. If trade barriers are large, innovation activities will tend to move to larger national markets. As a small country, Canada faces a dilemma.

Key Issues:

- What are the social and trade policies required for the development of flexible regulatory systems?
- What is the best approach/policy for the low level presence to be accepted by our trading partners?
- What is the scope and the size of the problem and impending problems?

Metrics for innovation

Productivity measures is a long established way of measuring the impacts of innovation and/or technology adoption. There is a concern that with the contraction of government data collection and analysis and retirements in the academic community the capacity to undertake Canadian productivity analysis in the future may be jeopardized. This is occurring at a time of great interest in improving the productivity measures to take into account the uses of natural capital in the measured productivity.

Key issues:

- What is the optimum institutional arrangement for maintaining and sharing the data, including the basic economic data (e.g. sectorial input use, input price, research expenditures) and the analytic capacity for regular, disaggregated productivity measures?
- How to take into account the impacts of natural resources in measuring agricultural production, taking into account both positive and negative externalities?

Supply chain issues

Industry structure and the functioning of supply chains were identified as important variables for innovation and adoption of new technologies.

- How does market power in the retail sector influence innovation across the supply chains?
- What kind of innovation in contracts and institutions would incent coordinated research in a supply chain?
- What is needed to improve health focus/component of the innovation system?

- Does farm size matter for the adoption of precision agriculture? Is there a correlation between industry concentration and adoption of new technologies?
- How does industry structure affect the distribution of benefits from adoption of new technologies/products?
- How effective are environmental programs/standards in inducing innovations?

Research funding

Spending on research and innovation as a percent of GDP is low in Canada. Despite numerous studies that show very high rates of return, research investment in agriculture remains limited relative to many other countries. Some producer groups are investing in research but the majority invest very little. Identified issues included the following:

- Would the Australian RDC model of mandatory check-offs for all resource based sectors be effective in Canada?
- How to get more resources for innovation, are reported returns to research not providing enough rationale?
- How could different funding models be applied; public, industry collective, and private funding models by addressing the issues around crowding-in versus crowding-out?
- How does the effectiveness of spending on innovation and on income support programs compare?
- Should the publicly funded research have a broader perspective beyond profitability, and include environmental and public health goals?

Research governance

There is a commonly held view that research and innovation systems in Canada are poorly coordinated and there is a lack of national agricultural innovation strategy. This observation applies to all stages starting from the priority setting.

Key Issues:

- Could foresighting be effectively used in priority setting?
- What are the models of organization of innovation?
- Does international institutional capacity to deal with governance of agricultural innovations exist? Is it needed?
- What are the roles of various agents in innovation: governments, NGOs, industry organisations, academia and scientific community, society?
- Could network of academics contribute through the development of HQP?
- What types of institutional innovations are necessary for managing natural capital?