

Leveraging Saskatchewan's Core Strength in Agriculture

VALUE-ADDED PRODUCTION

April 2015

PURPOSE

This report provides clear evidence on Saskatchewan's value-added ecosystem¹ in agriculture. It also describes options for building on the province's core strength in agriculture and advancing related opportunities in processing and agri-food.

Our objectives are as follows:

- Provide a snapshot of the critical players in the ecosystem and the distinguishing characteristics of the value-added cluster (while respecting the management team's decision to concentrate our interviews outside the province)
- Reveal ways that Saskatchewan's infrastructure, policies, and programs complement its advantages in agriculture and encourage value-adding activities
- Describe the implications of this project's results for future research and technology development in the province

¹ *Ecosystem* is used to describe the mix of small, medium, and large companies within a sector and the institutions that support them.

- Identify major barriers that constrain the province's opportunity to add value to agriculture
- Find options to address key limiting issues
- Bring forward international examples of how other places implement systemic programs and infrastructure investments that drive success and fortify similar strengths

Note to reader

In an attempt to improve readability, we've put references to most of the data into footnotes (rather than wading through it in this document). A consequence of this strategy is that executive opinions appear to dominate the results. This isn't the case. More than half of the overall effort consisted of data analytics, and more than 50 unique data sets were used in the analysis. If detailed data is of interest, please follow the references to the data sets we used. For an overview of our methodology and process, please see Appendix A.

KEY PROJECT RESULTS

A short report like this hardly needs an executive summary, but it's worth pointing out the highlights before diving in.

Saskatchewan's success in agri-value processing will depend on its ability to invest in and maintain world-class transportation infrastructure and logistics capacity. The barrier of distance is the province's greatest constraint.

Executives warn that the cost of transportation breaks Saskatchewan's most attractive options for adding value to agriculture. Tackling this limitation deliberately has potential to create more value than any other intervention available to the government.

Sophisticated transportation and logistics has the added advantage of creating virtual economies of scale. It allows processors to aggregate volumes more efficiently into few loads to reduce costs and increase profit. This multiplies the advantage of focusing on niche production (where supply proximity remains an advantage) and encouraging successful mid-size processors.

Our job here isn't to surprise anyone with the results or even to find some secret special sauce. We were asked to

find real, evidence-based opportunities to add value through processing.

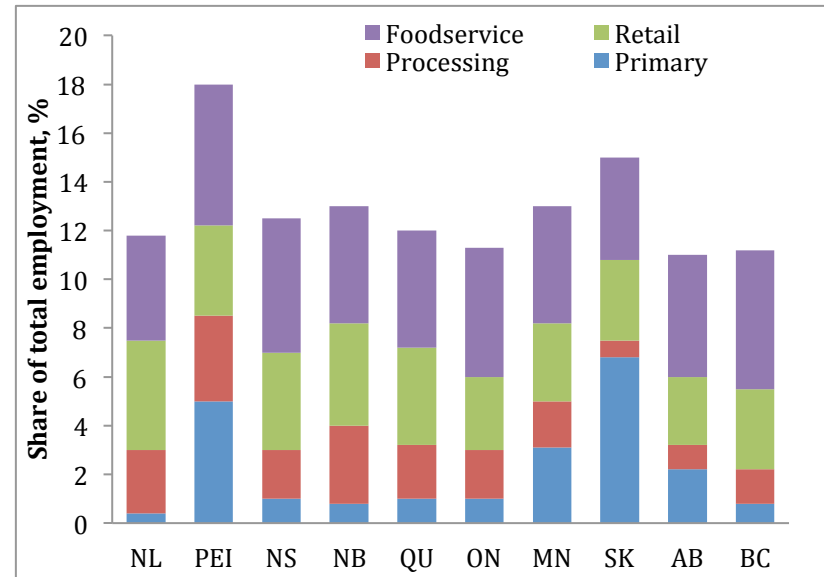
What we relay in this report is probably obvious to anyone with some background in agriculture. But perhaps the report achieves something subtle and actually more important: it shows that there are a few options for moving forward, and opens up the opportunity to defend a path of disciplined, focused investment.

AGRICULTURE MATTERS IN SASKATCHEWAN

Even though Saskatchewan is highly urbanized, with 65 per cent of its population in urban areas, farming is still an important driver in the economy.² Agriculture generates 7.5 per cent of jobs in the province, and the food-processing sector generates 1.4 per cent.³ Saskatchewan is the only province in Canada where primary agriculture accounts for more jobs than the food retail and wholesale industry (see Exhibit 1).

Agriculture and agri-food are growing as contributors to provincial GDP. In 2012, agriculture was 5.8 per cent of GDP, and food processing (excluding beverage and tobacco processing) was 1.5 per cent.⁴ Agriculture rose to 7.5 per

Exhibit 1: Share of provincial employment, 2009



cent in 2013, but relative to the economy, food processing only increased slightly.

Gross domestic product from agriculture was \$3.3 billion in Saskatchewan and \$1.5 billion in Manitoba in 2012.

In spite of the scale difference, Manitoba's food-manufacturing sector did far better than Saskatchewan's. Revenue from food manufacturing was \$4.9 billion in Manitoba and \$3.8 billion in Saskatchewan. With half as

² Saskatchewan Bureau of Statistics. 2013. *Economic Review 2013* 67, pp. 9 and 12. www.stats.gov.sk.ca/stats/ER2013.pdf.

³ Agriculture and Agri-Food Canada. 2014. *An Overview of the Canadian Agriculture and Agri-Food System 2014*. pp. 18-19. www.agr.gc.ca/eng/about-us/publications/economic-publications/alphabetical-listing/an-overview-of-the-canadian-agriculture-and-agri-food-system-2014/?id=1396889920372.

⁴ Statistics Canada. Table 379-0030 - Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS), provinces and territories, annual (dollars).

much domestic primary product, Manitoba produced 30 per cent more revenue and employed almost three times more people (13,000 in Manitoba vs. 5,200 in Saskatchewan).⁵

Manitoba is building on its advantage of closer proximity to markets through ongoing investments in infrastructure and commitment to leveraging transportation opportunities, including ready access to three rail lines, position along truck routes across Canada and the United States, integrated access to air transport, and even its mostly unexploited opportunities in sea transport through Port Churchill.

Clearly, Saskatchewan's dominance in primary production doesn't translate directly into an advantage in processing. In our interviews,⁶ executives described a wide range of reasons

⁵ Statistics Canada. Table 301-0006 - Principal statistics for manufacturing industries, by North American Industry Classification System (NAICS), annual (dollars unless otherwise noted).

⁶ The interviews include 23 executives in Alberta, 22 in Saskatchewan, three companies in Manitoba, two in British Columbia, two in federal agencies, and five multinationals based in the U.S. We contacted but did not hear back from another 13 companies. Of the executives we interviewed, 49 per cent were in agri-food and agriculture processing and 25 per cent led supporting institutions (research agencies, universities, and government departments). We were asked to stay out of primary (only 7% of the executives we contacted were farmers), and the rest of the interviews were spread through finance, input providers, service providers, technical services, and transportation. Equal numbers of small, medium, and large companies were interviewed.

(which we'll cover more thoroughly later) for Saskatchewan's lagging performance in value-added production: the province is far away from densely populated markets, transportation costs are too high, it's easier to transport Saskatchewan's mix of commodities than it is to process them at origin, and it hasn't invested in the processing technologies manufacturers need in order to be competitive.

Executives cautioned us that political interest wouldn't overcome these business realities. Supply advantage is not enough. Market advantages matter more.

The advice of executives is aligned with the evidence we found. The province's strongest value-adding options are in ingredients, preprocessing, and niche products.⁷ Growing value-added agriculture means focusing on mid-size

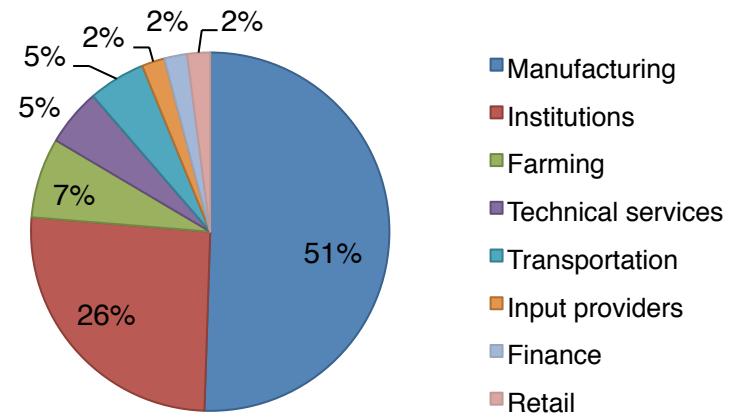
⁷ *Creating markets*, *niche markets*, and *emergent markets* are phrases used interchangeably by executives and by us in this document. These phrases don't necessarily mean "small," at least not relative to Saskatchewan's current agri-value production (even if we include canola processing). Niche or emergent markets are opportunities where there isn't globally concentrated demand and proximity to supply is still a business-relevant advantage.

processing⁸ instead of colourful start-ups and capital-rich multinationals. Mid-size companies can afford competitive technologies while being nimble enough to adopt them and recuperate capital costs. But most of all, the success of value-added will depend on access to world-class transportation infrastructure and logistics capacity. The barrier of distance is the province's greatest constraint.

CHOOSE NICHE OVER HIGH-VOLUME, CONVENTIONAL MARKETS

Of the 24 executives we interviewed on Saskatchewan's best options (see Exhibit 2), 100 per cent said its best fit is among niche opportunities that leverage the province's strength in growing and breeding high-quality, pedigree-level commodities.⁹ An additional 30 executives, interviewed in

Exhibit 2: Industrial allocation of 54 interviews



⁸ Mid-size is a relative term. Alliance Grain Traders, for example, is a very large firm in Saskatchewan. In a place like California or Pennsylvania, it would be mid-size. For Saskatchewan, we're roughly categorizing mid-size as between 50 and 500 employees and between \$10 million and \$500 million in revenue. Mostly, the distinction is meant to highlight the lack of fit between Saskatchewan's current strengths and the needs of major multinational players like Kraft Foods and Campbell Soup. That doesn't mean these companies should be ignored if they express executive-level interest. It means mid-size companies are a worthwhile focus and the majors are not.

⁹ We agreed, with the project manager Scott Adams, that the identity of the executives interviewed and their companies is confidential. Many of the executives we called asked to remain anonymous.

other agriculture-related projects, echoed this view.¹⁰

High-volume processing of finished products makes most sense close to markets. Processing of conventional ingredients (like wheat flour) does too. Niche markets, where the product is new or production of the commodity is specific to the region, is where Saskatchewan's opportunity is strongest.

The executives who know Saskatchewan well, especially outsiders, praise the province for the quality of its crops, its ability to engineer plant characteristics, and its strength in tailoring crop varieties. They emphatically assert that these are strengths worth protecting.¹¹ The broad consensus among corporate executives, both inside and outside the

¹⁰ When we make use of interview results, we run a triangulation process to test what we're hearing. If three or more executives, from separate organizations, say the same thing, we will carry those topics forward. If fewer than three executives raise an issue but it's supported by two or more sets of data, we carry that forward too. It's also important to say that what we're reporting here (except in places where we'll announce our opinions) is what we found. If the results are disagreeable, the argument isn't with us; it's a debate to pick up with other leaders in the field.

¹¹ It's worth noting that outside executives have an interest in keeping high-quality supply chains healthy. There is some tension between their advice to focus on quality and the province's interest in processing at home.

province, is that Saskatchewan's best options in value-added will build:

- New opportunities for existing processors
- Channels for new commodities and ingredients
- Leverage for the region's competitive advantage in high-quality primary production
- Options that enhance its reputation for trustworthy, clean, tailored commodities

Canola and its related crushing activities are a good example of how this strategy matures. The crop was developed in the 1970s and only recognized as safe by the United States in 1985. High-stability canola was introduced as recently as 2004. Because the crop was relatively new and regionally specific, it created sufficient supply-side advantages to anchor local processing.

Canola isn't really niche any longer (except in some specialized varieties), but it was. And while processing is shifting out of Western Canada (China is crushing canola now), Saskatchewan still enjoys huge opportunities related to this emergent commodity that was built on the province's (and Western Canada's) advantages.

That natural maturing, which is pulling processing out of Western Canada toward densely populated markets, should be anticipated. Some will say Canada's investment in canola was wasted if it can't retain control of processing. But this is short-sighted. Canada, and Saskatchewan, captured enormous value by creating that market. Executives say that the province has similar opportunities in further specialized versions of canola (for example, canola with particularly high levels of erucic acid), and there are other niche opportunities in cereals, peas, and lentils.

Don't rely on supply advantage alone

We didn't find any evidence of a major systemic block that prevents the growth of large-scale processing. The province is competitive on taxes¹² and construction costs.¹³

Unit labour costs are competitive. Productive capacity is strong.

Saskatchewan is one of the strongest performers in the country (\$0.56 per unit of labour relative to the Canadian

average of \$0.63).¹⁴ Agriculture (\$0.24) and non-durable manufacturing, which includes food (\$0.39), are two of the strongest sectors in the province.

The viability of unit labour costs is a strong signal that though Saskatchewan is competitive, business barriers limit growth. Transportation costs and capital constraints break most options.¹⁵

Given this context, spending political bandwidth to attract large-scale companies with no history in Saskatchewan won't gain the province much. If they come, they will rely on the supply chains they've built outside the province (as we already see in mining and oil and gas). And, inevitably, the province will lose them, as it's lost Maple Leaf and XL

¹⁴ Statistics Canada. Table 383-0029 - Labour productivity and related variables by business sector industry, consistent with the North American Industry Classification System (NAICS) and the System of National Accounts (SNA), provinces and territories, annual.

¹⁵ Some might wonder how China can import commodities from places like Canada and then ship back finished product. Its success is a great example of how powerful population and proximity to market is in offsetting the tremendous capital costs involved in processing. China's population advantage means it can sink huge capital costs such that transportation costs are marginal (not business breaking). The population advantage enables high-volume production, which is leveraged to drive down shipping fees.

¹² KPMG. 2014. Guide to International Business Location Costs, Competitive Alternatives. www.competitivealternatives.com/results/reports.aspx.

¹³ RSMeans Online. 2014. www.rsmeansonline.com.

Foods. That's not meant to say that Saskatchewan made mistakes that cost it those processors. We mean that the forces that caused those companies to consolidate in other regions are powerful and pervasive.

Between 2006 and 2014, 140 Canadian food plants closed (resulting in 24,000 job losses).¹⁶ Of these, 90 per cent were among multi-plant companies. The companies closed plants to reinforce others. If Saskatchewan hasn't got a plant to add on to, the odds of getting a new one are low.

Companies are expanding capital assets, not making new ones. The two biggest reasons given for plant closures were lack of competitiveness and the need to consolidate operations.

Companies are aggregating investments to be close to markets (not supply), gain access to skilled labour pools, and attain margins that enable adoption of new technologies. Saskatchewan hasn't got any of these advantages.

¹⁶ D. Sparling, and S. LeGrow. 2014. *The Changing Face of Food Manufacturing in Canada: An Analysis of Plant Closings, Openings and Investments*. CAPI Processed Food Research Program. Ivey Business School.

Leverage strengths and reduce constraints by focusing on niches and ingredients

Based on the interviews for this project, our work in other areas of manufacturing, the state of Saskatchewan's industrial ecosystem (discussed in the next section), and the status of its investment in processing technologies and infrastructure, the province's best option is supporting mid-size companies focused on niche areas, preprocessing, and ingredients (see Exhibit 3).

The results support the province's current SLIM program (Saskatchewan Lean¹⁷ Improvements in Manufacturing), marketing and outreach programs, a shift in the Saskatchewan Agri-Value Initiative (SAVI) to focus on mid-size processors of ingredients and intermediate products, deeper investments in skilled labour and food science training, strengthening transportation policy and infrastructure investments, and growing existing companies instead of chasing foreign direct investment.

¹⁷ Lean production is aimed at the elimination of waste in every area of production. Its goal is to incorporate less human effort, less inventory, less time to develop products, and less space to become highly responsive to customer demand while producing top quality products in the most efficient and economical manner possible.

Exhibit 3: Executive view on niche markets versus established markets for Saskatchewan

Tailored commodities / emergent markets		Conventional commodities / established markets	
Pro	Con	Pro	Con
Provide competitive opportunity for start-ups and mid-size companies	Demand a small volume that will not transform industry	Utilize high volume of commodities produced by the province	Saskatchewan is far from markets; those closest to markets win
Involve lower capital costs and lower safety risk in ingredients	Do little to impact high volume of conventional commodities	Add value before exports	Increase transportation costs and reduce freshness
Create new markets fed by Saskatchewan producers	Still don't change high risk that, as markets mature, processors will leave	Leverage economies of scale created by supply volume	Compete with quality and reputation of producers; processing reputation is low but primary production reputation is high
Shift balance to supply-side because markets are fragmented	Mid-size processors will struggle without economies of scale in thin-margin industry	Match major capital cost with provincial primary production (high cost, high volume)	Can't achieve economies of skill and management capacity because there are not enough people
Leverage crop engineering strength and pedigree producers	Until transportation structure changes, mid-size firms won't get service they need	Build on strengths in primary production	Have a poor reputation in traceability
Dilute disadvantage of distance, because everything is transported in emerging markets		Encourage transportation efficiency and service because of higher volume	Few business variables anchor the region's opportunity in high-volume processing
Take advantage of reputation for high-quality commodities and crop development capacity		Create highly concentrated demand for technologies and skilled labour	Create supply risk if volume demanded overwhelms market or ability to transport
Leverage strengths of STEP			Require technological capacity that doesn't exist in the province
Right scale: align with ability of Saskatchewan to support research and existing pool of skills			Transportation system isn't cost-effective or specialized to agri-food exports

Executives agree that the province’s opportunity to invest in the successful creation of markets for its commodities (by growing mid-size companies in emerging products) is more likely to be productive than trying to convince a few large-scale processors to set up and stay in Saskatchewan.

Case study: Growers Express

The success of Growers Express, in Salinas, California, offers a related recipe relevant for Saskatchewan.¹⁸ Started in 1987, Growers Express is a farmer-owned, vertically integrated grower, packer, and shipper of high-quality fresh fruit and vegetables.¹⁹ In 1995, Growers Express became a licensed partner of Green Giant Fresh, one of the largest U.S.-based processors in the fresh produce category.

Growers is an example of what’s possible, even among relatively small operations. Despite its small size, it partnered with a major processor, implemented a sophisticated traceability system that reduces liability and meets consumer demand for better information on production, and leverages

¹⁸ GS1 US. 2005. *Case Study: Growers Express*. www.producetraceability.org/documents/case%20study%20growers%20express%20052511.pdf.

¹⁹ Growers Express. 2014. www.growersexpress.com..

its logistics systems to meet demand for freshness and improve margins through greater efficiency.

Taking advantage of its small size, Growers created an in-house food-safety system that complemented its vertically integrated structure. The system enables precision in handling food recalls and hedges the risk its partner, Green Giant, accepts when using Growers as a supplier. Just as importantly, the system encourages deeper integration within the supply chain, promotes freshness because products move through more quickly, and enables more efficient transportation.²⁰ It’s the high standard of safety, quality, and efficiency—not tax incentives or other government promises—that attracts Green Giant to Growers Express.

²⁰ Two companies report cost savings of \$100,000 per year. GS1 US. 2013. *Case Study: The Oppenheimer Group*. www.producetraceability.org/documents/The_Oppenheimer_Group_Case_Study.pdf.

GS1 US. 2011. *Case Study: Paramount Citrus*. www.producetraceability.org/documents/case%20study%20paramount%20citrus%20updated%20061311.pdf.

Compete on business benefits, not tax advantages

Using tax abatement or other incentives to court established processors might create a few short-term wins but will do little to create sustained value. Financial incentives erode the province's ability to address its real competitive challenges. It needs that money to finance infrastructure, invest in competitive technologies, and train graduates. Seeding new markets creates enduring opportunities for primary producers.

Executives in niche areas say they can maintain premiums because they offer specialized products. As long as competition is thin and the market is fragmented, it makes sense to produce niche products in the province.

Processors find it easier to ship intermediate products and ingredients versus finished products. Transportation costs are lower, border issues are fewer, safety issues aren't as complicated, and the food science isn't as complex. The advantage of being close to supply and the economies gained by volume are enough to overcome proximity to the ultimate customer pressure.

Areas for research and development

In addition to the research-related issues mentioned above (new commodities, new ingredients, safety, and traceability), there are other areas where government can support niche opportunities.

Invest in crop characteristics to enable premium products

Executives say that new research in cereals could lead to the sort of success recently seen in lentils and mustard. Along this vein, if the province wants to pursue niche products, one of its paths is the development of crops with premium characteristics. For example, Caldic, a major distributor of ingredients, is keenly interested in high-erucic canola.²¹ A further step in this direction is to research the complementary relationship between crop science and food science. If the province creates capacity on the food science side, it can better tailor crops to deliver premium products.

²¹ Sift Every Thing interviews. 2014.

Explore irrigation as an anchor

Our work in the Lethbridge region of Alberta makes clear how important irrigation is in anchoring its food manufacturing industry. Saskatchewan has an opportunity to pursue similar opportunities (though this is not something we heard about in any of our interviews).

Companies like McCain and Maple Leaf invest in Lethbridge because irrigation creates a baseline they can depend on in the ecosystem. Bonduelle is investing aggressively in food-processing capacity in Quebec for similar reasons.²²

Freshness is a factor that can, to some extent, push back on pressure to be close to market (specialty crops are another).²³

²² The Canadian Agri-Food Policy Institute. February 2014. *Case Studies on Success Traits: Bonduelle Americas*. www.capi-icpa.ca/proc-food/project4/CAPI-PFRP-4a-Bonduelle.pdf.

²³ Still, Bonduelle is only focused on markets with a critical mass of demand where it can acquire local production capacity rather than importing exclusively. *Bonduelle Canned and Frozen Vegetables Product Portfolio*. 2014. www.foodservice.bonduelleamericas.com/static/pdf/food_service/en/brochure.pdf.

INVEST IN COMPANIES THAT CAN LEVERAGE TECHNOLOGY

The choice to strategically pursue mid-size companies in preprocessing, ingredient manufacturing, and intermediate products leverages the province's potential to tailor commodities, design characteristics, and deliver high-quality inputs. It's a path forward that fits well with the ecosystem that exists in the province (see Exhibit 4).

Ecosystem snapshots

Capital investments by companies

Saskatchewan's agri-value options build from its strong primary agriculture sector and investments in infrastructure. The agriculture sector continues to make capital investments in its future. In 2014, \$1.6 billion was invested in Saskatchewan while \$1.5 billion was invested in Alberta and \$580 million was invested in Manitoba.²⁴ Saskatchewan's agriculture producers are confident in their future.

²⁴ Statistics Canada. Table 383-0029 - Labour productivity and related variables by business sector industry, consistent with the North American Industry Classification System (NAICS) and the System of National Accounts (SNA), provinces and territories, annual.

Exhibit 4: Strengths and weaknesses of the agriculture value-added industrial ecosystem

Strengths of industrial ecosystem	Weaknesses of industrial ecosystem
Crop producers are making significant capital investments. This highlights their expectation that the future for agriculture is strong.	Access to technology is limited, and research capacity is focused on crop science, not processing.
World-class reputation for quality is leveraged by mid-size processors (and any other size processor).	Processing companies have a poor record for commercializing new technologies, and this will impede competitiveness.
Unit labour costs in processing are very strong and relieve some of the pressure processors will face in the race for economies of scale.	Food safety is a major challenge among mid-sized companies operating in the province.
Provincial primary producers commercialize agronomic side successfully.	There isn't enough skilled labour, even for mid-sized companies, and there are few related graduates coming out of the local post-secondary system.
Scale of government support is well tailored to needs of local, mid-size companies (if allocated to those firms).	The pool of management capacity in the region is shallow.
	Unit labour costs in transportation are just average, relative to the rest of the country. Given its distance from markets, Saskatchewan needs to be very strong in this area.
	Paradoxically, buyers trust Saskatchewan's production quality and don't need to be close (strength of primary production creates weakness in value-added ecosystem).
	There is no real cluster, and focus on large-scale processing won't create one.

Investments in infrastructure are even stronger. From 2013 to 2014, capital investments in transportation grew from \$830 million to \$1.6 billion. Over the same period, Manitoba's investment fell by \$15 million (down from \$720 million in 2013).²⁶

Agri-value processors among the top 100 companies

A look through Saskatchewan's top 100 companies²⁷ shows that every one that's in agriculture processing is in preprocessing, ingredients, or intermediate product manufacturing.²⁸ These companies operate within an ecosystem of around 190 other food-processing

²⁶ The numbers comparing Manitoba and Saskatchewan imply two things. One, Saskatchewan is making investments to catch up. Two, Manitoba's performance in food processing outpaces Saskatchewan's even though it's supported by far less investment. Elements like proximity to market, market momentum, and access to skilled capacity outweigh the advantage of increased investment.

²⁷ Top 100 Companies. 2011. www.sasktop100.ca/index.php?year=2011 and www.canadastop100.com/sk/.

²⁸ The top 100 agri-food-processing companies operating in Saskatchewan include Alliance Grain Traders / Saskcan Pulse Trading, Canpulse Foods, Pound-Maker Agventures, Prairie Malt, South West Terminal, Viterra, and the Weyburn Inland Terminal.

companies.²⁹ But that ecosystem is immature. It's not like transportation and warehousing³⁰ or even the broader manufacturing sector³¹ with its strong base of small companies, solid core of mid-size companies, and few large top-predator companies.³² The agri-value sector needs to evolve.

Corporations in emerging areas

In an effort to address the ecosystem's weaknesses, growth companies, like Alliance Grain Traders, reach outside the region through acquisitions and invest aggressively (in-house) in food-processing science and technologies.³³

Companies like Agrisoma Biosciences, Bioriginal Food & Science Corp, Emerald Seed Products Ltd, Metabolix

²⁹ Statistics Canada and AAFC calculations. 2014. *An Overview of the Canadian Agriculture and Agri-Food System*. Agriculture and Agri-Food Canada.

³⁰ Transportation's ecosystem includes 6 large companies, 22 mid-size companies, and 2,200 small companies.

³¹ Three large companies, 56 mid-size firms, and 1,100 small companies.

³² Statistics Canada. Table 551-0006 - Canadian business patterns, location counts, employment size and North American Industry Classification System (NAICS), national industries, by Canada and provinces, June 2014, semi-annual (number), CANSIM (database).

³³ Sift Every Thing interviews. 2014.

Oilseeds Inc., MPT Mustard Products & Technologies Inc., and Quantum Genetics Canada Inc. are focused on functional aspects of crops produced in Saskatchewan.³⁴ Their focus complements the province's strength in primary production and its constraints in other sectors (like environmental issues in mining and oil and gas).

Alliance Grain Traders, Bioriginal Food & Science Corp, and CanMar Grain are the kinds of companies that executives encourage the province to focus on growing. Corporate executives who lead Saskatchewan-based, agri-value companies are critical of the fact that many economic development organizations focus on start-ups and courting multinational companies. They argue that more needs to be done to strengthen companies already succeeding in the province: investing in the economies of scale among mid-size players and building a baseline capacity of food-processing technologists and managers.

³⁴ Note that none of these were included in the list of companies that Saskatchewan provided to us while planning the roster of executive interviews.

Innovation activity within Saskatchewan

The need for innovation shines through when we investigate the track record of the province and its companies in developing, implementing, and commercializing technologies.

Patenting is nearly non-existent in the province. While not an ideal indicator,³⁵ patenting data is valuable in two ways. It can signal emerging areas of interest among companies. It's also an indicator of the transition of agency-led research into industrial applications. But from 1976 to the present, Saskatchewan averaged 1.7 patents³⁶ per 10,000 citizens.³⁷ The Canadian average is 4.3.

³⁵ We understand that patenting isn't the primary tool used in food processing to protect intellectual property, at least not in Saskatchewan. That said, Pepsico has been granted more than 80 patents since 2011. Still, patent data as an indicator of innovative capacity is weak. It can't carry much weight. But as a signal, weak or not, it is well aligned with what we learned from executives, and that's the point. There isn't good innovation-oriented data in Saskatchewan. The data that does exist, like this patent information, confirms what we heard in interviews.

³⁶ USPTO Patent Full-Test and Image Database. United States Patent and Trademark Office. 2014. patft.uspto.gov/netahtml/PTO/search-bool.html.

³⁷ Ministry of Finance, Saskatchewan Bureau of Statistics. Table 8: Saskatchewan Quarterly Population, 1971 to 2014. www.stats.gov.sk.ca/pop/stats/population/pop2.pdf.

Of major population centres in the province, Saskatoon (133 patents since 1976), Regina (28 patents), and Prince Albert (8 patents) are the most active in innovation. Compare this to activity in the Capital Region of Alberta, where from 2009 to 2013, innovators were granted 1,100 patents (most of which were in manufacturing).³⁸ With 180 patents in 2011, Edmonton alone got more patents in one year than Saskatchewan has received in 38 years.

Government investment in research and development

Government funding to research and development is slightly ahead of neighbouring provinces, but it's not even half of one per cent of GDP.³⁹ The federal government invests as much as the provincial government. Even together, that

³⁸ USPTO Patent Full-Test and Image Database. United States Patent and Trademark Office. 2014. patft.uspto.gov/netahtml/PTO/search-adv.htm.

³⁹ Government's investment in research and development as a percentage of its GDP is an indicator of its commitment to innovation. Saskatchewan invested 0.48 per cent of GDP (\$730 million) in research in 2012. In 2012, Alberta invested 0.55 per cent and Manitoba invested 0.69 per cent. Federal investment and research and development as a percentage of provincial GDP was 0.45 per cent in Saskatchewan, 0.27 per cent in Alberta, and 0.67 per cent in Manitoba. Statistics Canada. Table 358-0001 - Gross domestic expenditures on research and development, by science type and by funder and performer sector, annual (dollars).

\$730 million from governments is fairly modest considering that it covers the entire economy, not just food processing.⁴⁰ The average investment by food-processing companies to upgrade an individual facility is \$3.7 million.⁴¹ For large-scale processors, the cost to upgrade a facility is often well over \$10 million. At that scale, the technology risks and scaling challenges are significant. If the government wants to play a tangible role in large-scale processing, it must either increase its investment or reorient its focus to mid-size companies. To have an effect, it needs to focus and maintain its commitment to industry.

⁴⁰ Just 9% if IRAP's research investments are aimed at food processing. But 21% go to agriculture. Goss Gilroy Inc. 2012. *Evaluation for the NRC Industrial Research Assistance Program*. pp. 9, 11, 13, and 18. www.nrc-cnrc.gc.ca/obj/doc/about-apropos/planning_reporting-planification_rapports/evaluation-evaluation/Report_Evaluation_NRC-IRAP_Sept_2012.pdf.

⁴¹ D. Sparling, and S. LeGrow. 2014. *The Changing Face of Food Manufacturing in Canada: An Analysis of Plant Closings, Openings and Investments*. CAPI Processed Food Research Program. Ivey Business School.

Post-secondary graduates entering value-added sector

Government focus spills over into the kinds of graduates its academic institutions are producing. Less than four per cent of postsecondary graduates work in agriculture, and less than two per cent go into manufacturing.⁴² Very few of the people trained in the province are going into areas related to value-added agriculture. Among the many implications of this reality are two key consequences: the pool of skilled labour isn't being developed, and the ability of companies to implement new technologies (and thereby compete in global markets) isn't being supplemented by the post-secondary system.

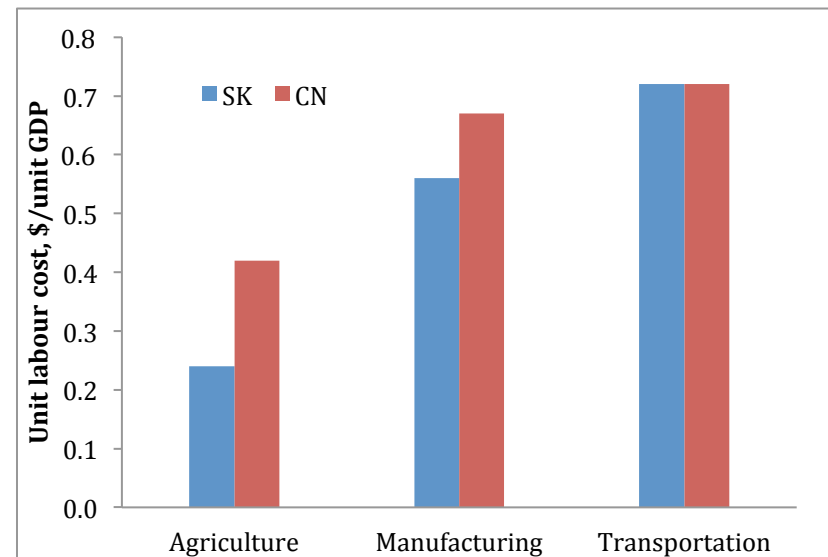
Productivity within manufacturing

The realities of the existing ecosystem make it difficult for processing companies to be successful, even though agriculture and non-durable manufacturing (the part of

manufacturing that includes food processing) are two of the most productive sectors in the province and in Canada.

Unit labour costs,⁴³ a measure of productivity, average \$0.63 per unit of GDP in Canada (see Exhibit 5).⁴⁴ The average in

Exhibit 5: Unit labour costs per unit GDP, 2013



⁴² Prairie Research Associates. 2012. *2011-12 Survey of 2009-10 Saskatchewan Post-Secondary Graduates*. p.7, pp.80-82, pp. 99-100. ae.gov.sk.ca/2011-12-survey-of-2009-10-post-secondary-graduates-final-report.

⁴³ Lower is better.

⁴⁴ Statistics Canada. Table 383-0029 - Labour productivity and related variables by business sector industry, consistent with the North American Industry Classification System (NAICS) and the System of National Accounts (SNA), provinces and territories, annual.

Saskatchewan is \$0.56 (one of the best in Canada), and in agriculture it's \$0.24. In non-durables manufacturing, it's \$0.39. This is an indicator with two important implications. First, the data signals the competitive potential of the region and the value-added sector. But it also highlights the significance of the other aspects of competitiveness (proximity to market, transportation efficiency, and access to skilled labour). The province is competitive on productivity, but this hasn't been enough to overcome other market realities. Productivity in agriculture and manufacturing is strong, but in warehousing and transportation, the province holds close to the national average (\$0.72). This area of weakness is where it needs to be strongest.

Focus on successful mid-size companies

All of the above, when compiled, provides clear evidence that the province's value-added ecosystem is well positioned to support mid-size players, and government support is better aligned with that level of company too.

Areas for research and development

Build capacity in food science

All of the processing companies in the province described a vacuum of food-science capability. Companies like Alliance Grain Traders are investing in the creation of that capacity themselves. A great way to support winners is to get behind their own proactive response to needs.

Keep supporting STEP

The Saskatchewan Trade and Export Partnership (STEP) is one of the most respected government-related agencies we've ever come across. In this project, in previous projects in Saskatchewan, and in our work in other regions, we've consistently heard executives praise STEP for the value it creates among exporting companies. Executives value STEP for its introductions into international markets and its facilitation of trade development tours.

Investigate risk management

We heard, from several executives, that risk management mechanisms are needed for food processors. The executives point to risk-related options made available to farmers and

want something similar. Facilitating the provision of aggregate food processors insurance might be a way to offset the massive liability associated with potential food recalls. Several cited Alberta's Agriculture Financial Services Corporation (AFSC), which also provides insurance, as a potential model.

INVEST IN TRANSPORTATION AND LOGISTICS TO SUPPORT VALUE-ADDED AGRICULTURE

Transportation and logistics are two of Saskatchewan's strongest areas of opportunity relative to agri-value processing and could be the province's best areas for research and development.

Over and over, executives warned that the cost of transporting feedstock is lower than the cost of transporting finished product. Transportation costs break most of Saskatchewan's most attractive options for adding value to agriculture. Tackling this limitation deliberately has potential to create more value than any other intervention available to government. It's well within its mandate to undertake. And the benefits of doing so accrue to all sectors.

For this project, we'd say that Saskatchewan's transportation challenges include:

- The complex maze of issues that erode access to rail for mid-size processors

- Backhaul shortfalls in trucking that might be addressed by aggregating production volumes
- Investment in rails, highways, and loading facilities together with a concentration on industrial corridors
- Investigating options for specialized transportation capabilities (specialized rail cars tailored to specialized products, refrigeration efficiencies, etc.)

Logistics challenges include:

- Food safety and product traceability (including within transit)
- Acquisition and integration of logistics data into production processes to enhance transportation efficiency and product freshness
- Relay of transportation data (space availability, backlogs, border delays) into aggregation activities to economies of volume
- Aggregate outbound transportation of products as well as inbound transportation of inputs to improve economies of scale and backhaul opportunities

Obviously the province is already an aggressive exporter. Merchandise exports were at a record high in 2014 (\$35 billion), up 8.9 per cent from 2013.⁴⁵

In agriculture, the province's largest exports (by both value and volume) are to the United States, China, Japan, and India.⁴⁶ By value, its largest markets for processed foods are the United States, China, Japan, Mexico, and Korea.

Within Canada, British Columbia and Ontario account for more than 90 per cent of all vegetables, canola, and other oilseeds as well as animal feed and other animal products exported by Saskatchewan.⁴⁷ More than 80 per cent of its wheat and other cereal grains go to B.C. and Ontario. Nearly 70 per cent of domestically exported milled grains go to these provinces too.

In 2009,⁴⁸ Saskatchewan's total non-energy exports (domestic and international) were \$16 billion.⁴⁹ Of this,

⁴⁵ Statistics Canada. CANSIM. Tables 228-0059 and 376-0105.

⁴⁶ Ministry of Agriculture. 2013. *Saskatchewan Agriculture Exports 2013*. pp. 5-25. www.agriculture.gov.sk.ca/Default.aspx?DN=849dec7c-10c5-4ee2-ba96-d0bc1c534b56.

⁴⁷ Statistics Canada. Table 404-0021 - Rail transportation, origin and destination of commodities, annual (tonnes), CANSIM (database).

⁴⁸ Unfortunately, transportation data is notoriously difficult to come by (see M. Warachka, and B. Prentice. 2004. *Measuring What You Manage*:

Challenges for Provincial Transportation Policy. Transport Institute. University of Manitoba).

Our data on transportation channels comes from Global Trade Information Services (GTI), and it doesn't differentiate among the modes used when bringing commodities and produced goods to ports. Statistics Canada data for transportation requires in-house analytical capacity that this project hasn't got the scope to include (see notes below). For these reasons, while we have 2014 data on volume from GTI, we only have 2009 modal data.

Notes:

Customs-based vs. Balance of Payments Trade Statistics: Customs-based data differs from the balance of payment (BOP) in that the data based on customs involves the physical movement of goods and is recorded on customs documents while the BOP method tracks the flow of money between Canada's business and government agencies and the rest of the world.

Import vs. Export Data: Import statistics as collected by customs are based on the province of clearance, meaning that goods are recorded at the province in which they were cleared by customs. This may not coincide with the province in which these commodities are ultimately consumed. For example, goods imported from Asia but cleared through Manitoba can possibly be consumed in another Canadian province. Customs documentation does not track the final provincial destinations.

Export statistics are recorded by customs by province of departure from Canada (the export analogue to imports' province of clearance). Additionally, province of origin (the province where the goods were grown, extracted, or manufactured) is available for export data. Province of origin does not necessarily match province of departure. For example, commodities that originated in Saskatchewan could have exited through Manitoba and vice versa. The availability of both the origin and departure data offers analysis of export data a "richness" not available to analysis of import data. Any review of trade routing and provinces' use of their own and other provinces' transportation infrastructure is understandably limited to analysis of export data.

Trade by Sector: With the purpose of attempting to quantify sector-based trade, Manitoba's International Trade Division has created an internal

\$2.1 billion departed directly from the province (13% of the total—see Exhibit 6). Relative to Manitoba (directly shipped 50% of \$9.9 billion in total exports) and Alberta (directly shipped 27% of \$26 billion), Saskatchewan shipped very little through its own ports.

commodity-sector concordance list that allows a basic approximation of sector trade. Caution must be taken as this is a rather simple measurement in an attempt to quantify the relative importance of sector-based trade in Manitoba and Canada.

Modal Information: When using customs-based trade statistics, there are caveats to be noted on the mode of transport for both imports and exports. For imports, information on the transportation mode of a commodity usually refers to the last mode by which commodities were transported to the Canadian port of clearance and documented by customs. This may not always be the mode by which goods arrived at the Canadian port of entry in the case of inland clearance.

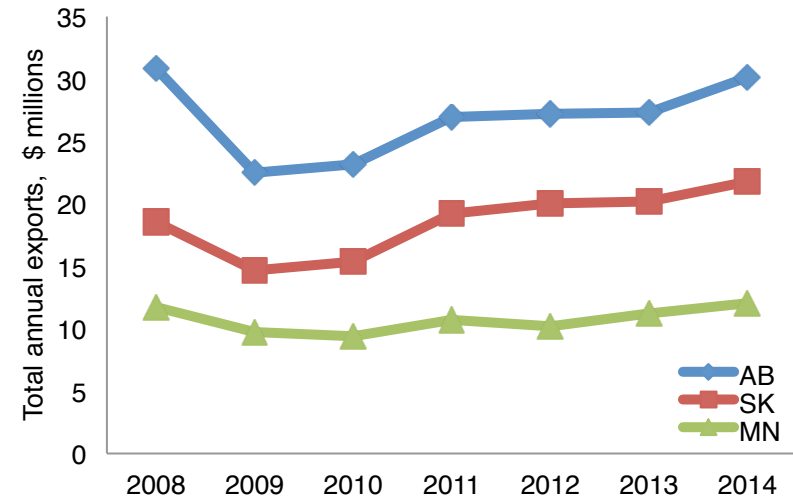
⁴⁹ *Manitoba Transportation Report.* 2010. Transportation Institute. University of Manitoba.

Exhibit 6: Non-energy exports leaving Canada via originating province, 2009

	Mode of transport	Export from origin (\$ millions)	Total provincial exports (\$ millions)	% Depart from origin
Alberta	All modes	\$7,200	\$26,000	27%
	Road	\$4,200	\$7,400	57%
	Rail	\$500	\$7,200	6.9%
	Air	\$1,400	\$1,600	88%
Saskatchewan	All modes	\$2,100	\$16,000	13%
	Road	\$930	\$2,000	47%
	Rail	\$950	\$4,100	23%
	Air	\$110	\$140	79%
Manitoba	All modes	\$5,000	\$9,900	50%
	Road	\$4,100	\$4,800	85%
	Rail	\$580	\$1,700	34%
	Air	\$190	\$270	70%

Of course, the economy has changed significantly since 2009. Saskatchewan's total exports rose dramatically, from \$22 billion in 2009 to \$35 billion in 2014 (61%).⁵¹ So did Alberta's, from \$70 billion in 2009 to \$120 billion in 2014 (74%). But Manitoba's only rose from \$11 billion to \$13 billion (26%). The performance of non-energy exports is more muted, but Saskatchewan leads the pack with 48 per cent growth (Alberta registered 34% and Manitoba 24%—see Exhibit 7). A big part of this, for Saskatchewan, came from 76 per cent growth in exports of farm and intermediate food products.

Exhibit 7: Total annual non-energy exports



⁵¹ Statistics Canada. Table 228-0060 - Merchandise imports and domestic exports, customs-based, by North American Product Classification System (NAPCS), Canada, provinces and territories, monthly (dollars).

Improve transportation and logistics to create virtual economies of scale

The province is in a good position to strengthen its capabilities in transportation and logistics. Its ratio of debt⁵⁷ to GDP is solid.⁵⁸ The average age of its infrastructure is right on the edge of needing replacement (resulting in opportune timing if replacements deliberately drive transportation efficiency).⁵⁹ And capital formation among companies is holding steady, signalling (at least in 2014) that companies aren't retreating.⁶⁰

About 40 per cent of the province's infrastructure (not including roads and rails) is rated as being in poor condition,

and 48 per cent is characterized as fair.⁶¹ Just 12 per cent is ranked as good.

Relative to its interest in value-added agriculture, the province might not be supporting enough projects at sufficient scale to deliver on expected outcomes. Private investment accounts for 85 per cent of funding for all major projects in the province, and 34 per cent of projects are funded entirely by private interests.⁶² Mining attracts almost all of this investment (\$33 billion in 2013). Manufacturing (\$3.2 billion), infrastructure (\$2.6 billion, which includes municipal renewal, roads, water, sewer, and the Global Transportation Hub), and agriculture (\$340 million) get relatively little.

⁵⁷ Debt consists of two components: the amount borrowed to finance government programs, and the debt of Crown corporations and other government entities. Debt of the government accounts for about one-third and debt to the Crown corporations accounts for the other two-thirds.

⁵⁸ Saskatchewan Ministry of Finance. 2014. *Annual Report for 2013-2014*. pp. 8-11. www.finance.gov.sk.ca/PlanningAndReporting/2013-14/201314FinanceAnnualReport.

⁵⁹ Saskatchewan Ministry of Central Services. 2014. *Plan for 2014-15*. p. 7. www.finance.gov.sk.ca/PlanningAndReporting/2014-15/CSPlan1415.pdf.

⁶⁰ Saskatchewan Bureau of Statistics, Ministry of Finance. 2014. Table 1.6: Saskatchewan Gross Fixed Capital Formation by Industry. *Saskatchewan Provincial Economic Accounts*. www.stats.gov.sk.ca/stats/PEA%20December%202014%20Tables.pdf.

⁶¹ Saskatchewan Ministry of Central Services. 2014. *Plan for 2014-15*. p. 7. www.finance.gov.sk.ca/PlanningAndReporting/2014-15/CSPlan1415.pdf.

⁶² Saskatchewan Ministry of the Economy. *2013 Major Projects Inventory*. economy.gov.sk.ca/2013-MPI.

Testing the reality of growth in value-added products

Some people have a sense that there's been significant growth in value-added products in recent years. We don't see it in the data (at least up to 2013).

Based on GTI data, shipments by rail dominate transportation. Taking all the agriculture-related goods in Saskatchewan's top 25 value-added exports between 2011 and 2014 yields 10 billion kilograms (canola cake, refined canola oil, crude canola oil, brewing waste, and oat groats). By road, Saskatchewan shipped another 560 million kilograms of agri-value products (pearled oats, wheat flour, bran, rolled oats, pulse flour, etc.). Water accounts for 260 million kilograms (mostly malt, canola meal, and animal feed).

These are indeed big numbers, but if we compare yearly volume and value data, 2011 to 2013, we don't see much growth:

- From 2011 to 2012, the volume of canola oil exports grew by 18 per cent, but the value of exports was virtually unchanged (the price of canola oil fell, chewing through any volume increase).
- From 2012 to 2013, the volume fell by one per cent, and the value held even (the price rose slightly, and provincial exporters deftly rode the trend).
- For malt (another key export), from 2011 to 2012, volume fell 18 per cent, and value fell by one per cent.
- From 2012 to 2013, volume in malt fell 24 per cent, and value fell 18 per cent.

Since canola and malt account for 90 per cent to 95 per cent of the value of annual processed agriculture products, we don't see evidence to support a view that agri-value is improving significantly. The only substantive growth is coming from primary exports of lentils, peas, and linseed.

Sources: Government of Saskatchewan. 2014. Ministry of Agriculture & Global Trade Information Services. 2014. www.gtis.com/english/GTIS_About.html

Create systemic value chains

One of the greatest challenges for mid-size processors is that larger competitors are better able to achieve economies of scale. But we've found three examples of other places creating economies of scale through transportation and logistics while preserving the advantages and character of mid-size companies: New Zealand applied this strategy in both its wine and meat industries. And in Edmonton, Alberta, manufacturers consolidated input and product transportation to attain efficiencies that no single processor could achieve.

The two examples from New Zealand (wine and meat exports) illustrate the opportunity that remote places have to cooperate and focus on core challenges, like transportation, and leverage those investments to create competitive systemic value chains.

Their success illustrates the powerful relationship between data, traceability, logistics, transportation, and competitiveness. Done right, these dynamics enable virtual economies of scale among fragmented producers and processors (when focused on export markets).

New Zealand bulk wine: Ingredients incentivize transport, reduce cost, and increase profit

In the late 1990s, the number of wineries in New Zealand started to grow. The industry tripled in size since and saw a fivefold increase in value over the last 10 years.⁶³ But the sector is fragmented. It's composed of many small wineries producing a broad range of grapes. Production varies widely from year to year. All of this makes transport difficult to predict.

Together, the Marlborough and Auckland regions have 30 per cent of the wineries, and 90 per cent of them are small. Because different wine varieties require different handling and target different markets, all these small wineries make for a complicated transportation and logistics riddle across the sector.

Most wineries are located within a geographic cluster and together have built up a sophisticated logistics support structure. But those outside the cluster haven't got access to

⁶³ L. Spanjaard, and R. Warburton. 2012. *Supply Chain Innovation: New Zealand Logistics and Innovation*. New Zealand Transport Agency Research Report 494. Deloitte. www.nzta.govt.nz/resources/research/reports/494/docs/494.pdf.

this capacity. They face high transportation costs and can't take advantage of backhaul options. Most bottling facilities are located in just one city (Auckland), which makes transportation to bottling facilities and bottling fees the most expensive component of Australia's wine business.

With these issues in mind, the industry began to seek new ways to increase competitiveness. For New Zealand to be a major and differentiated global competitor, the industry needed to address its transportation, logistics, and freight challenges. It needed to provide government with a range of incentives that support and improve the efficiency of freight logistics operations and incentivize the adoption of best practices.

Historically, most wineries transported fresh grapes from the vineyard to their own processing facilities. Sauvignon Blanc grapes accounted for about 85 per cent of volume, but Pinot Noir, Chardonnay, Pinot Gris, Merlot, sparkling, and Cabernet are also produced. To become competitive, reduce end price, and improve transportation costs, the industry shifted toward bulk processing of these grapes. Bulk processing and transportation reduces costs, improves stability of the product, leverages large-scale offshore

bottling processes, and scales the purchasing volume of bottles and packaging material.

Reducing costs makes the industry more competitive, but the move to bulk also increases the efficiency of infrastructure use. Instead of competition on product differentiation, infrastructure is used more effectively to compete on superior service delivery. The efficiency encourages greater synergies with shipping lines, exporters, port operators, and land-based freight providers. Instead of violently competing, exporters now work together to understand the mix of cargoes and identify opportunities to build cargoes across export sectors for specific destinations.

The public sector engaged by ensuring complementarity between development approvals for land-side infrastructure and ports. Government investigated freight infrastructure, seeking new paths to greater efficiency. Regulations were changed to speed up and increase the rigour of decision-making processes.

Government also invested in a systemic approach to freight infrastructure planning, developing contingency planning, identifying research options that assist industry, and developing the bigger picture of what is happening across

industries and regions. The public sector opened up, even at the municipal level, to identify options for higher productivity among motor vehicles, particularly opportunities for higher payloads. Public investments were made to leverage data from road user charges for road planning, support expansion of systems for gathering freight information, utilize traceability data, and make the data publicly available.

As a result of these efforts, New Zealand's bulk wine sells at a lower price in the market, but it's much more profitable. From 2010 to 2011, New Zealand increased its volume of bulk wine by 27 per cent, increased value by 33 per cent, and only increased price by four per cent.⁶⁴ China quadrupled its demand for New Zealand wine from 2006 to 2009, and in 2012 New Zealand opened its first Winegrowers office in Hong Kong. Exports to the U.S. increased 25 per cent by 2012.

⁶⁴ World Bulk Wine. 2012. Brochure. www.worldbulkwine.com/descargas/brochure_wbwe_2012_english_visitors.pdf.

By 2013, the price of bulk New Zealand wine had increased 30 per cent,⁶⁵ tariffs were lower,⁶⁶ and the cost of packaging was nearly non-existent. Shipping in large containers stabilized the product and improved quality. Supermarkets now carry the burden of branding and packaging, freeing up producers to invest in quality.⁶⁷

But New Zealand has made mistakes along the way. It made a big push through the 1980s and 1990s but did not maintain its momentum. It could have pushed harder for port ownership restructuring, resolution of conflicts between local governments and companies, port labour agreements that kept pace with business needs, and continued updating of infrastructure. Import-export data was not collected in consistent ways, which eroded reliability

⁶⁵ V. Moore. 2014. "Incredible Bulk: Why Are We Bottling Foreign Wine in Britain?" *The Telegraph*. www.telegraph.co.uk/foodanddrink/wine/10606959/Incredible-bulk-why-are-we-bottling-foreign-wine-in-Britain.html.

⁶⁶ New Zealand Wine Directory. 2013. www.nzwinedirectory.co.nz/industry-links/marketing-and-distribution/.

⁶⁷ UK companies such as Tesco, Asda, Sainsbury, and Morrison are aggressively buying New Zealand product. New Zealand Trade and Enterprise. Wine in the United Kingdom. www.nzte.govt.nz/en/export/market-research/wine/wine-in-the-united-kingdom/.

and usefulness. Land-side movements, origin-destination, and transport-mode data wasn't always kept.

While value-added activity in the supply chain is less, the bulk strategy embraces the reality of New Zealand's wine market. Consolidating supply while maintaining small and mid-size producers preserves diversity and acknowledges the independence of growers. Lower cost improves export volume. Aggregation of inputs reduces costs and improves efficiency. The move to bulk increases utilization of infrastructure, encourages data collection, and creates incentives to improve infrastructure further. Perhaps most importantly, the move increased understanding of container movement, road freight, and rail transport, shifting the point of competition from firm-level efficiency to systemic efficiency. New Zealand competes on transport and logistics, and that strategy underpins the success of its agriculture and agri-value products.

New Zealand meat transportation: Data, traceability, and logistics

Everything New Zealand did in wine is now informing what it's doing in meat. The meat sector is deeply fragmented,

with 14,000 farms and 80 processors operating two distinct supply chains.⁶⁸ One chain runs from livestock producers to processors. The other chain, which was historically independent, runs from processed meat products to domestic and international consumers.

Like its wine industry, New Zealand's meat producers and processors are geographically dispersed. This increases transportation costs and inefficiency and erodes economies of scale. The country is the world's largest exporter of sheep meat (40% of global exports) and farmed deer (50% of global exports). Most of its meat production is exported (95% of venison, 92% of mutton, and 95% of beef).⁶⁹ One of its key opportunities to increase competitiveness in world

⁶⁸ L. Spanjaard, and R. Warburton. 2012. *Supply Chain Innovation: New Zealand Logistics and Innovation*. New Zealand Transport Agency Research Report 494. Deloitte. www.nzta.govt.nz/resources/research/reports/494/docs/494.pdf.

⁶⁹ New Zealand Meat Industry Association. 2009. *Meat in Focus: A Closer Look at a Key New Zealand Industry*. www.mia.co.nz/docs/Meat%20Industry%20profile%20-%20Final%20version%20-%20November%202009.pdf.

markets is by reducing end price and lengthening shelf life through transportation improvements.⁷⁰

The meat industry moved from consisting mostly of freezing companies to including modern food processors and marketing companies providing tailored, shelf-ready products for individual clients and markets. The industry introduced new technologies, such as yield-grading systems and automated meat cutting, that were expected to yield \$43 million in productivity improvements over the last five years (2010 to 2015).

In general, the industrial strategy is focused on cost reduction, increased use of constrained infrastructure, and superior service delivery. As we said above, this strategy leverages everything already discussed in New Zealand's wine case study. It's also built on new producer-to-producer coordination efforts (something we'll see in the Edmonton manufacturers case study too). Producers cooperate to better use existing capacity, fill containers, and demand

⁷⁰ Deloitte. 2011. *Red Meat Sector Strategy Report*. mia.co.nz/docs/Red%20Meat%20Sector%20Strategy%20Report%20-%20May%202011.pdf.

better service from shipping providers.⁷¹ Several parallel initiatives were undertaken:

- Kotahi Logistics, established by the Fonterra dairy producer, works with Silver Fern Farms and other complementary businesses to pool exports and create critical mass of cargo. This brings greater demand for freight containers, encourages port investment to enable use of bigger ships (which are cheaper), and promote intermodal transport. Kotahi now handles 40 per cent of New Zealand's exports.
- Government set up the FarmIQ Primary Growth Partnership to create a demand-driven, integrated value chain for meat.⁷² Started in 2010, it is co-funded by the Ministry of Primary Industries and industry (with industry providing more than 60% of the funds).

⁷¹ *Commerce Act 1986: Restrictive Trade Practices*. Section 58: Notice Seeking Authorization, September 12, 2011. www.govt.nz and www.cma-cgm.com/media/magazine-article/16/kotahi-a-co-operative-to-serve-new-zealand-exports.

⁷² FarmIQ programme website. 2014. www.farmiq.co.nz/content/about-farmiq-programme. The FarmIQ Primary Growth Partnership Business Plan, Programme. www.farmiq.co.nz/sites/default/files/FarmIQ-PGP-Business-Plan-Summary.pdf.

- The program recognizes the constraints faced by individual farmers, processors, and marketers who haven't got the resources or capacity to improve the scale and profitability of the industry. It also recognizes the opportunity that comes from cooperating as a group. The goal is for the industry to grow by an additional \$1.1 billion by 2017. Most of this growth is expected to come from successful implementation of analytical software programs, used by the entire value chain, to refine market signals, develop innovative products, and target specific customer demands.
- The Red Meat Profit Partnership between government and companies (AAFCO, Alliance Group, ANZCO Foods, Greenly, Blue Sky Meats, and Progressive Meats) aims to invest \$65 million and investigate best practices inside production and between farmers and processors.⁷³
- New Zealand's Ministry of Transportation set up the Freight Information Gathering System to track detailed flow of exports and imports by volume and mode.⁷⁴ It

provides an overview of the movement of freight around New Zealand and includes container freight, rail freight, and bulk costal freight. It was established because of the lack of reliable, consistently collected data. The data is publicly accessible. Data is available for the 10 largest sea ports. Rail data is provided by KiwiRail and shows nationwide freight movements by region and by commodity. Road data is being added.

- New Zealand's Productivity Commission⁷⁵ focuses on the country's high reliance on exports and geographical distance from foreign markets, which make it extremely sensitive to freight costs. Freight costs represent 2.7 per cent of GDP, and more than 80 per cent of trade is done by sea. The structural costs inherent in New Zealand's small size make it even more imperative that it pursue all efficiencies available. Improving its transportation system directly reduces the effects of its remoteness.

⁷³ Meat Industry Association. 2014. *Unlocking Value: Meat Industry Briefing 2014*. www.mia.co.nz/docs/publications/Unlocking%20value.pdf.

⁷⁴ Ministry of Transport. 2014. Freight Information Gathering System, www.transport.govt.nz/sea/figs/.

Freight Information Gathering System and Container Handling Statistics (October 2013 – September 2014). www.transport.govt.nz/assets/Uploads/Sea/Documents/FIGS-September-2014.pdf.

⁷⁵ New Zealand Productivity Commission. 2014. www.productivity.govt.nz/.

From our perspective, having looked at this from the angle of systemic competitiveness, and having looked at many sectors across several jurisdictions, we're struck by the tangible reality of New Zealand's "systemic value chain." We're used to seeing value chains within industries and within companies. The New Zealand example makes clear that perhaps the most important value chains exist at the system level, complemented by and fluidly responding to the firm level.

Edmonton's Agri-Food CEO Club: Substitute transportation efficiency for large-scale processing

Aggregating purchasing power or creating group-purchasing organizations is common practice in other sectors. There are more than 5,000 hospitals in the U.S., and 98 per cent use group-purchasing organizations.⁷⁶ Group Buy, Avendra, and GroupEx are purchasing groups that work within food service (hotels, golf courses, and restaurant chains). Edmonton's Agri-Food CEO Club is a group of nine manufacturers that aggregate their purchasing and freight.

⁷⁶ United States Government Accountability Office. 2010. Group Purchasing Organizations (GAO-10-738).

Group-purchasing organizations are basically a cooperative of buyers. Members group together to leverage their purchasing strength in order to buy goods and services at lower prices. Reducing costs improves competitiveness.⁷⁷

It's worth saying that this sort of thing isn't always viewed favourably.⁷⁸ Those manufacturers and producers passed over by the purchasing group tend to complain. Group-purchasing organizations are also vulnerable to their own dissatisfied members. Some members can feel that savings are unfairly allocated.⁷⁹

⁷⁷ R. E. Bloch, P. P. Scott, and J. S. Brown. 2002. *An Analysis of Group Purchasing Organizations' Contracting Practices under the Antitrust Laws: Myth and Reality*.

⁷⁸ When group-purchasing organizations started gaining strength, there was political concern that these groups would force excessively low supplier pricing. Recently, that concern has declined. Now there's concern that the opposite will happen: group-purchasing arrangements might lead to higher supplier prices and market power. When a few suppliers capture most of the demand, they're given a significant competitive advantage. They gain in efficiency and cost-effectiveness and are able to invest in new technology and other assets. They gain market power. This forces buyers to continue buying from them or forsake all the advantages it creates. M. Cowie. 2011. *Group Purchasing Organizations and Antitrust Law: Recent Developments*. American Health Lawyers Association.

⁷⁹ The best approach is to allocate gains based on the value of each member's contribution. This is an important part of a strong overall approach where partners agree on processes and objectives; define team selection, analysis of opportunities, supply-chain mapping, and performance

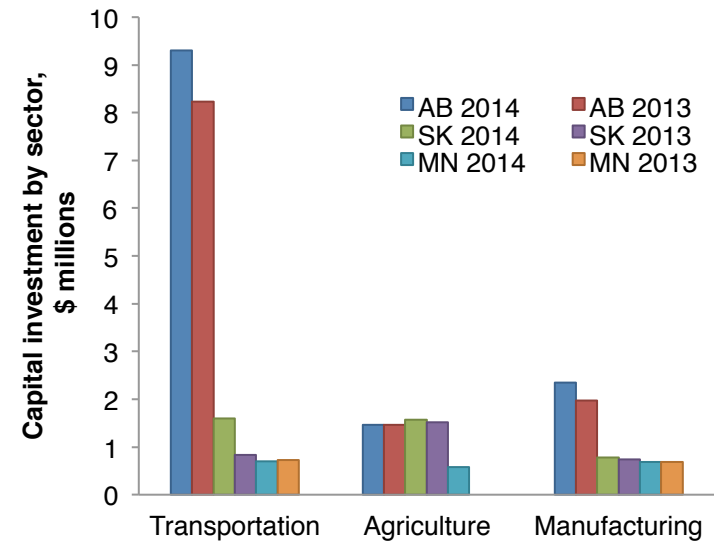
Still, group purchasing creates significant advantages. A 2002 study of the American health care industry estimated that savings of just one per cent reduce public and private health costs by between \$1.9 billion and \$2.2 billion.⁸⁰ Annual sales were in the range of \$150 billion.⁸¹ Since then, health care group-purchasing organizations have grown by 17 per cent.

Take advantage of strong investment position

The transportation and warehousing industry is in a particularly positive position where capital expenditures increased by 93 per cent (from \$830 million to \$1.6 billion—see Exhibit 8). Major projects, as of 2014, include a healthy allocation of \$1.1 billion to manufacturing and \$3.0 billion to infrastructure (not all of this is rails and highways but at least 80% of it is).⁸³

The province, if it chooses, is strongly situated to positively pursue greater strength in transportation and logistics.

Exhibit 8: Capital investment by sector



standards; and integrate the project within the purchasing group of each affiliated business.

⁸⁰ J. Nolle. 2002. From purchasing to supply chain in supply management, HEC Montreal.

⁸¹ Muse & Associates. March 2000. *The Role of Group Purchasing Organizations in the U.S. Health Care System*.

⁸³ Government of Saskatchewan, Ministry of the Economy. 2014. Personal communication.

Develop processing technologies that integrate systemic data

Data acquisition and integration is becoming an increasingly dominant trend in agriculture, processing, and transportation. In some ways, Saskatchewan is uniquely positioned to take advantage of this trend. Obviously it's got a strong base of primary agriculture, but it also has a strong machinery-manufacturing industry that, together with companies like SED Systems and Vecima, plays an important role already in integrating data into agriculture. International Road Dynamics is also already active on the transportation-monitoring technologies side.

Executives didn't explicitly describe this opportunity, but we did interview executives in all these companies and see overlapping sets of interest. This all fits well with what food-processing executives said they need in order to compete, and it aligns with the New Zealand case studies we presented.

CONSIDER OPTIONS BEYOND FOOD PROCESSING

This project focused on Saskatchewan's options in value-added agriculture that fit within the context of its industrial ecosystem and systemic competitiveness. Our work is constrained by the realities within the province and is narrowed to options that best build on its tangible strengths, current limits, and mid-term opportunities.

It's not for us to identify inspired future targets or balance the complex social challenges within the province. We've left that to decision makers. Here we've held ourselves to what we can find on the ground and in the data.

The evidence found and insights gathered from executives point to mid-size processing of niche products, ingredients, and intermediate goods. Success will depend on the province's ability to address its transportation challenges, invest areas that support successful companies, and develop technologists and skilled labour needed to support the sector.

This doesn't mean that the province shouldn't pursue unexpected (or currently in progress) large-scale processing

opportunities. It does mean a host of erosive forces will test the viability of such ventures. We've found lots of evidence to suggest they will face tremendous pressure to relocate due to transportation costs, skilled labour shortages, lack of services, isolation from a complementary ecosystem, inexperience within local supporting institutions, and inability of government to maintain ongoing and earnest⁸⁴ engagement.

We recognize that agri-value investments seem to be a natural step forward in building on the province's core strength in agriculture, which we identified (and still support). But as the data presented here makes clear, core strength on the supply side does not guarantee or even lead naturally toward success in value-added agriculture.

There are other options, besides further processing, that can increase the value of agriculture and its contribution to the

⁸⁴ This piece on the inability to maintain ongoing and earnest engagement will surely stick in the craw of any government-related reader. Many of the executives we interviewed raised this as an issue. The province talks about its commitment to agri-value as something new, but it's been the subject of conversation (and commitments) for more than a decade. If what it's doing now is new, what it was doing before was not earnest. Or, alternatively, what it was doing before was not ongoing.

economy. Ideally, the options chosen will embrace rather than fight against the conditions that make agriculture successful in Saskatchewan:

- Abundant supply of land for agriculture (and few people seeking alternative uses)
- Cold climate and isolated growing conditions that preserve quality, reduce pests, and limit contamination
- Ability to produce high volumes of high-quality commodity crops, one of the strongest opportunities to overcome the economic barrier of distance
- Resilience required to overcome the challenges of an immature and insufficient transportation system
- Sophisticated breeding and engineering capacity to tailor production to a wide range of growing conditions and produce a wide range of characteristics
- Integrated support from a successful and thriving agriculture machinery manufacturing sector
- Opportunity to engage neighbouring industries, like oil and gas and mining, to address environmental issues and capture stewardship opportunities

The ingredients that encourage the province's success in primary agriculture are the very barriers it struggles to overcome when trying to add value to production through processing. It also has other options in precision production, remote sensing, big data management, biotechnology, disease research, crop development and testing, synthetic genomics, environmental remediation, gene mining, gene banking, agronomic services, geospatial data, soil mapping, pest management, and water management. These options complement the character of the province and are not constrained by it.

As we've seen in the New Zealand examples, efficiency and cost savings are important and often overlooked ways to preserve value. Several of the areas suggested above reduce inputs and increase the value of outputs.

FURTHER EXPLORE IDENTIFIED OPPORTUNITIES IN SASKATCHEWAN'S AGRICULTURE PROCESSING ECOSYSTEM

Saskatchewan's existing model for developing agriculture is concentrated on high-volume, high-throughput efficiency. This is, naturally, where it has focused while exploring value-added processing. Responding to the niche-oriented, mid-sized opportunities identified by executives will be challenging.

It's true that some programs and policies are aligned with the opportunities described here. But most aren't. The work of creating the evidence needed to inspire this difficult transition starts with this project but doesn't end here.

More work must be done to flesh out the tactical and operational options available to the province. To tailor its programs to the unmet needs of processors, case studies and a greater depth of interviews inside the province will be an asset.

The best way to invest in agri-value processing, while leveraging the province's strength in primary production, is for the government to support local, competitive mid-size

companies and leverage their success to establish new markets. Even if those companies eventually choose to move outside of the province in pursuit of future growth, the investment will create markets for commodities Saskatchewan is competitive in growing.

Counterintuitively, one of the most accessible opportunities for the government is to improve, streamline, and support investment in infrastructure and related technologies.

Transportation cost is the top issue constraining companies in the province, and it's the number one reason companies from outside look elsewhere.

Strengthening Saskatchewan's transportation infrastructure, logistics capabilities, and related technologies will benefit agriculture, value-added processing, and all other export sectors in the economy.

APPENDIX A

Methodology and process

For this project, we used two solution tools. The first is Industrial Ecosystem Assessment, which has a total of 65 possible indicators. The second is Systemic Competitiveness Analysis, which also has 65 indicators. Of the 130 possible indicators, we were contracted to use 27.

To get from 130 indicators down to the right 27, we used a process that triangulates the key issues identified by executives.

In all our interviews, we ask three general questions:

- What are the key priorities of your company, and what evidence do you use to ensure this is a good plan?
- What are the roadblocks and barriers between where you stand now and where you intend to go?
- What are the issues, emerging on the horizon, good or bad, that need more attention than they've been given?

Notice that these questions aren't directed at specific issues. We wait for the executives to identify elements of interest to

our clients (like options in value-added agriculture) and follow them in.

The process of triangulation is used to take forward any issue flagged by three or more independent executives. Because we haven't directed them to discuss these issues, this is as close as we can get to "investible intelligence." This pool of investible intelligence is what we use to direct our analytical work.

The analytical work explores three paths relative to executive intelligence: 1) Were we told the truth? 2) Did executives attempt to fool us? and 3) What does the data signal is important that wasn't discussed by executives? The last bit is usually where most of the value lives in the analytical work. This is the area of strongest competition and the substance that executives are least likely to discuss openly.

It's important to recognize that this methodology means we haven't got scope to exhaustively analyze all areas related to the project. For example, there are many programs and policies pursued by government but never discussed by

companies. If executives don't mention something, we don't analyze it. This preserves the integrity of the process and, just as importantly, allows us to deliver projects in complex areas within the available budget. Exhaustive analysis would be too costly.