



Study of Automation in the Ontario Food and Beverage Processing Sector

Summer/Fall 2021

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Sector

Prepared by FBO and MNP LLP

Table of Contents

Executive Summary	2
Introduction	8
Background and Study Purpose	8
Organization of Report	8
Acknowledgments.....	9
Limitations.....	9
Approach	10
Methodology	10
Research Questions	11
Summary of Research Findings	12
Barriers to Automation	12
Automation Drivers	21
Shared Learnings.....	22
Supporting the Future Adoption of Automation and Robotics Technology.....	26
Recommendations.....	29
Appendices.....	32
Appendix A – Summaries of Background Documents Reviewed.....	33
Appendix B – Primary Data Collection Tools.....	40
Appendix C – Detailed Results from Survey of Ontario Food and Beverage Processors	78
Appendix D – About MNP	91
Appendix E – About FBO.....	92

Executive Summary

Background and Study Purpose

Food and Beverage Ontario (“FBO”), in collaboration with MNP LLP (“MNP”) conducted research on the adoption of innovative automation and robotics technology (“automation”) within the food and beverage sector in Ontario (the “Sector”). More specifically, this study aims to provide a comprehensive review of the state of automation in the Sector, and identify drivers along with barriers surrounding this wave of technology adoption.

This study was catalyzed by one of the major challenges facing the Sector, namely a shortage of labour that is impeding Ontario food and beverage processors (“Processors”) to operate at their full capacity and stagnating the growth of the Sector. In response, many Processors are pursuing automation as a potential solution to this labour shortage. In addition to this, automation can support the Sector’s competitiveness and productivity. As such, this research study has been undertaken to understand the factors impacting adoption of automation in the Sector.

In the conduct of this study, the following activities were carried out:

- A review of publicly available information on the topic of automation in the Sector through past academic research, government reports, and policy briefs.
- An online survey of 36 Ontario food and beverage processors to gather perspectives on current barriers to and drivers for automation, learnings from past adoption of automation and robotics technology within the Sector, and suggestions for potential actions that can be taken to support the adoption of automation and robotics technology within the Sector.
- Facilitated focus groups, three with Ontario food and beverage companies and one with technology/service providers, SMEs, educational institutions, and consultants who support the adoption of automation in the Sector, to supplement the survey findings.

This research study was completed with the counsel of a Project Working Group comprised of members representing Ontario food and beverage companies and FBO.

Recommendations

Based on the findings from this study, MNP identified the following recommendations for increasing the adoption of automation and robotics technology in the Sector:

1. Broaden the scope and flexibility of funding programs for adoption of automation and robotics technology in the Sector
2. Facilitate increased collaboration between the Sector and Ontario post-secondary educational institutions to identify ways to address the shortage of skilled labour and training.
3. Support and build capacity for the manufacturing in Ontario of automation equipment and technology solutions for the Sector.

Each recommendation is described in greater detail in the Recommendations Section of the report.

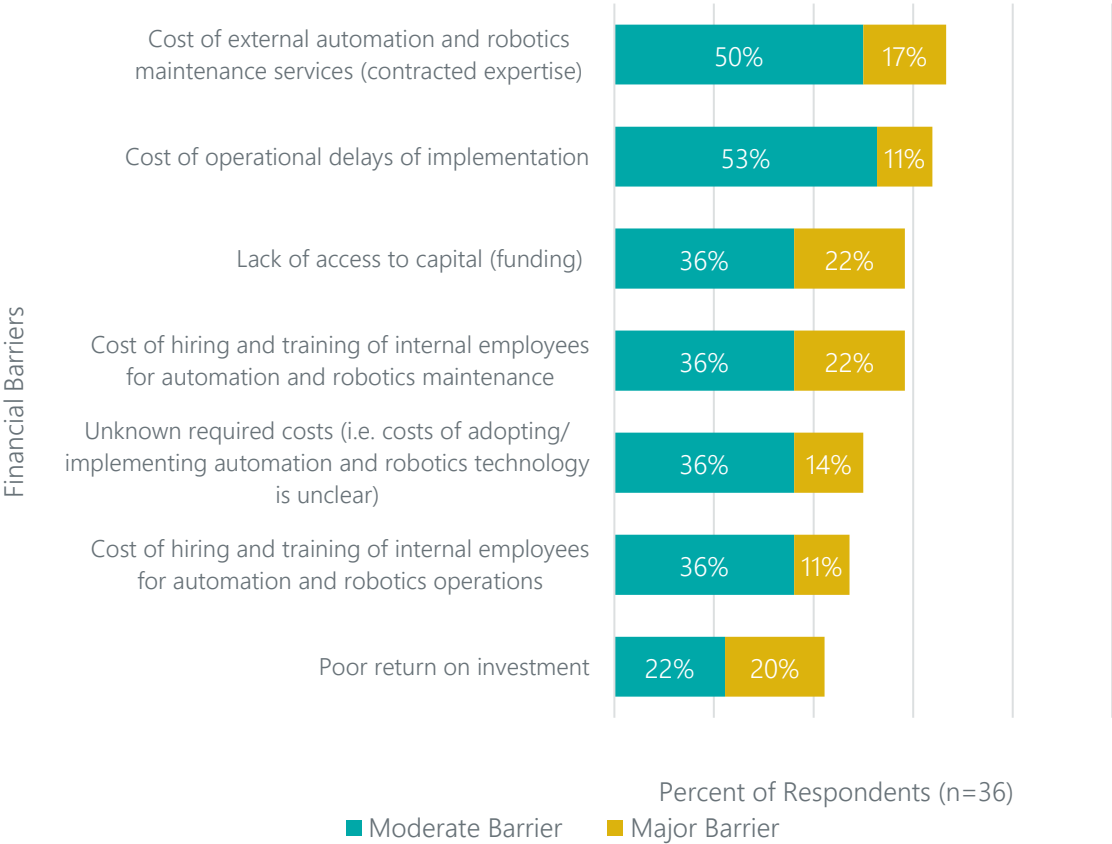
Barriers to Automation

Financial Barriers

Survey respondents were asked to rate the severity of given financial barriers in terms of the degree to which they get in the way of the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

As shown in Figure A, the four factors that were considered to be most substantial were “cost of external automation and robotics maintenance services (contracted expertise)” (67%), “cost of operational delays of implementation” (64%), “lack of access to capital (funding)” (58%), and “cost of hiring and training of internal employees for automation and robotics maintenance” (58%).

Figure A: Extent of Financial Barriers to the Adoption of Automation and Robotics Technology

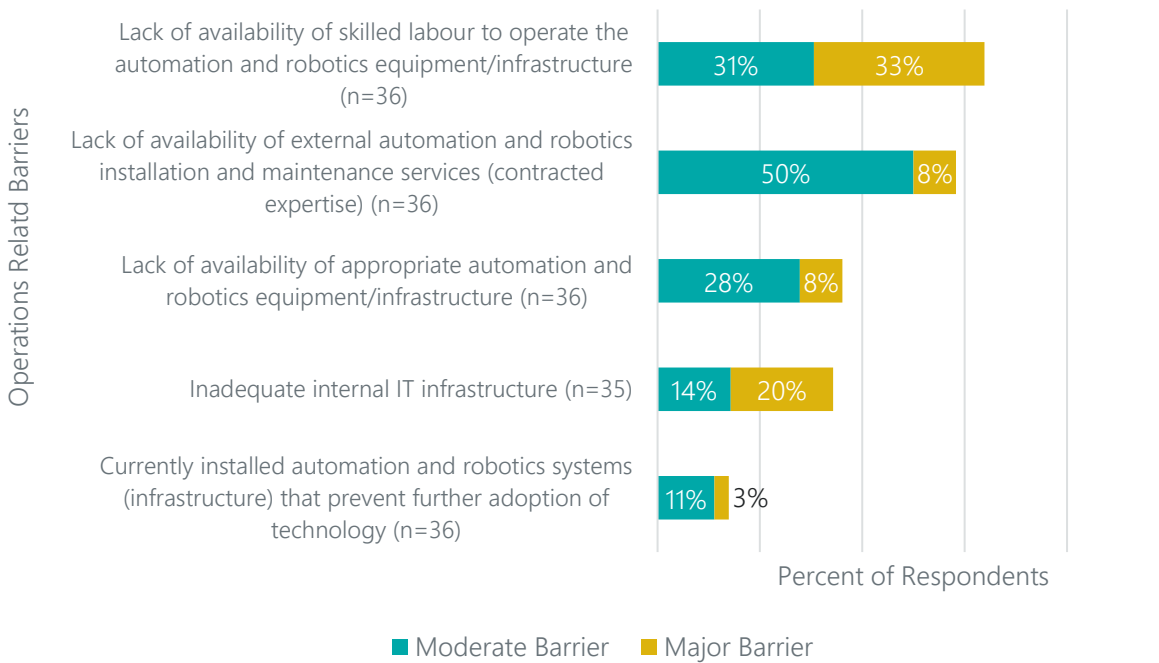


Operational Barriers

Survey respondents were asked to rate a set of given operational barriers on the extent to which they get in the way of the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

As shown in Figure B, the operational related barriers that were considered to be most substantial were “lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure” (64%) and “lack of availability of external automation and robotics installation and maintenance services (contracted expertise)” (58%).

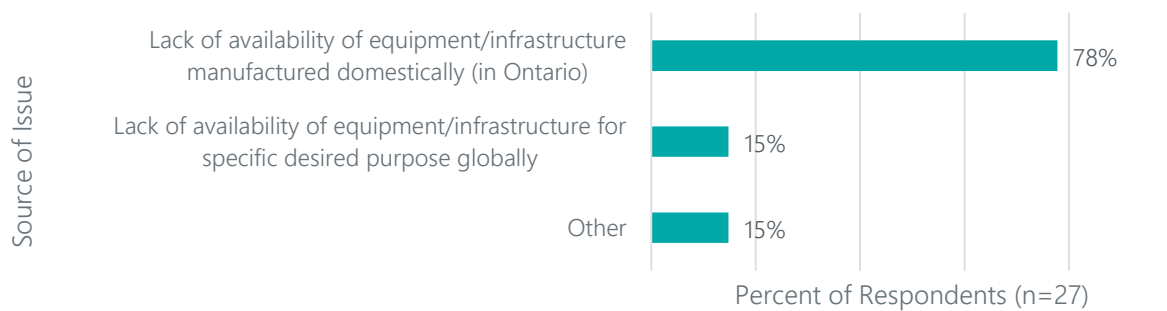
Figure B: Extent of Operations Related Barriers to the Adoption of Automation and Robotics Technology



Barriers Due to Lack of Domestic Manufacturing

Of survey respondents that rated “lack of availability of automation and robotics equipment/infrastructure” as an operational barrier, approximately 78% pointed to the dearth of equipment and infrastructure that is manufactured domestically (in Ontario) as the primary source for this barrier.

Figure C: Source of Availability of Automation and Robotics Equipment/Infrastructure



A summary of MNP’s key findings from the focus groups by type of barrier is presented below.

Barrier	Key Findings
Lack of Access to Capital (Funding)	<ul style="list-style-type: none"> Internal companies’ budgeting process, traditional financing methods such as bank loans, and government grants are some of the methods companies use to access capital for automation projects.

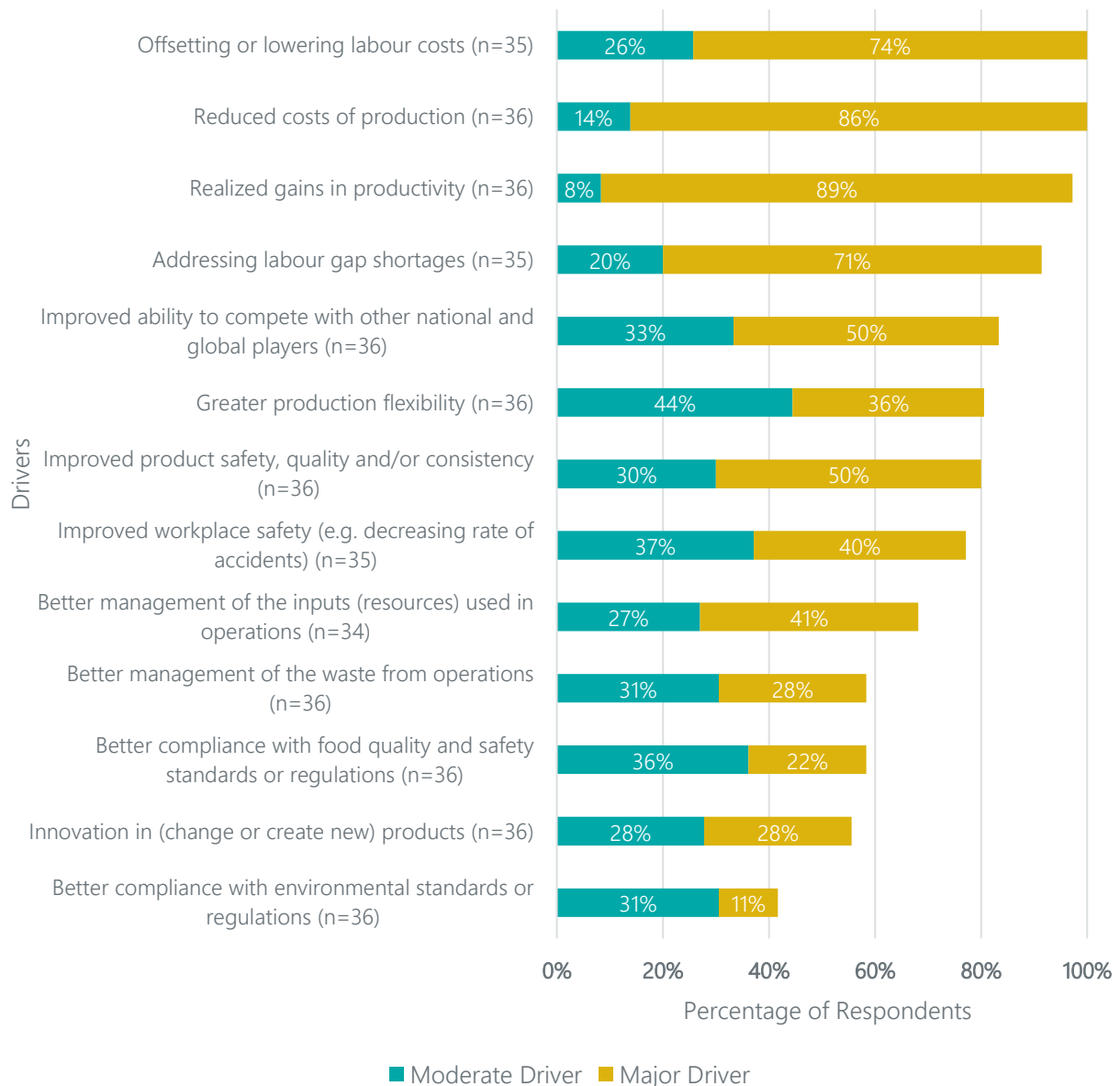
Barrier	Key Findings
	<ul style="list-style-type: none"> • There are a variety of challenges noted by Processors with accessing capital for automation projects. For example, accessibility of traditional financing is mostly dependent on reported cashflow and what companies can withstand in terms of the interest rates charged. As such, larger companies with substantial equity levels are better able to access loans while smaller companies may be constrained in this regard given that most of their available cash flow is used for business operations. • Also, obtaining government funding specific to the adoption of automation and robotics technology in the Sector has been proven difficult for Processors. • Examples of challenges with government support included having funding tied to job creation requirements, the timing of funding announcements not always aligning with Processors’ budgeting and/or investment processes, the extensive level of effort and time required to complete funding applications, and initial down payments in equipment or technology not being eligible for funding.
Lack of Availability of Contracted Expertise	<ul style="list-style-type: none"> • The lack of availability of contracted expertise generally stems from the fact that the automation equipment is manufactured internationally, primarily in Europe and the United States. As a result, automation equipment experts are also largely located abroad. • Issues with contracted expertise from abroad include limited vendor support due to the significant time differences, difficulty in aligning the availability of external expertise for equipment installation with the timing of when the equipment is arriving, and having to build up and store a significant amount of inventory to allow for the contracted expertise to come in from abroad and provide installation or maintenance support.
Lack of Skilled Labour	<ul style="list-style-type: none"> • Due to difficulties with hiring skilled labour, companies resort to hiring team members and then training them internally. This is, however, more attainable and viable for larger companies that have in-house automation subject matter experts and access to other resources. • Lack of local equipment manufacturing further complicates the issue of limited skilled labour in the Sector as individuals with the skills to operate the equipment are more likely to be from abroad.
Lack of Availability of Automation and Robotics Equipment (Infrastructure) in Ontario	<ul style="list-style-type: none"> • A variety of issues on the topic of adoption of automation could be alleviated if more of this technology along with equipment was manufactured in and sourced within Ontario. Examples of issues that could be addressed include bettered access to trainers for staff and local support with the skills required, reduction of operational delays and costs related to bringing in the equipment/technology from abroad, and better alignment between technology/equipment made in Ontario with Canadian standards and regulations.

Automation Drivers

Survey respondents were asked to rate a set of given operational, labour related and other drivers on the extent to which they encourage the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure D displays the percentage of survey respondents that rated the set of given drivers as moderate to major. The top three drivers were “offsetting or lowering labour costs” (100%), “reduced costs of production” (100%), and “realized gains in productivity” (97%).

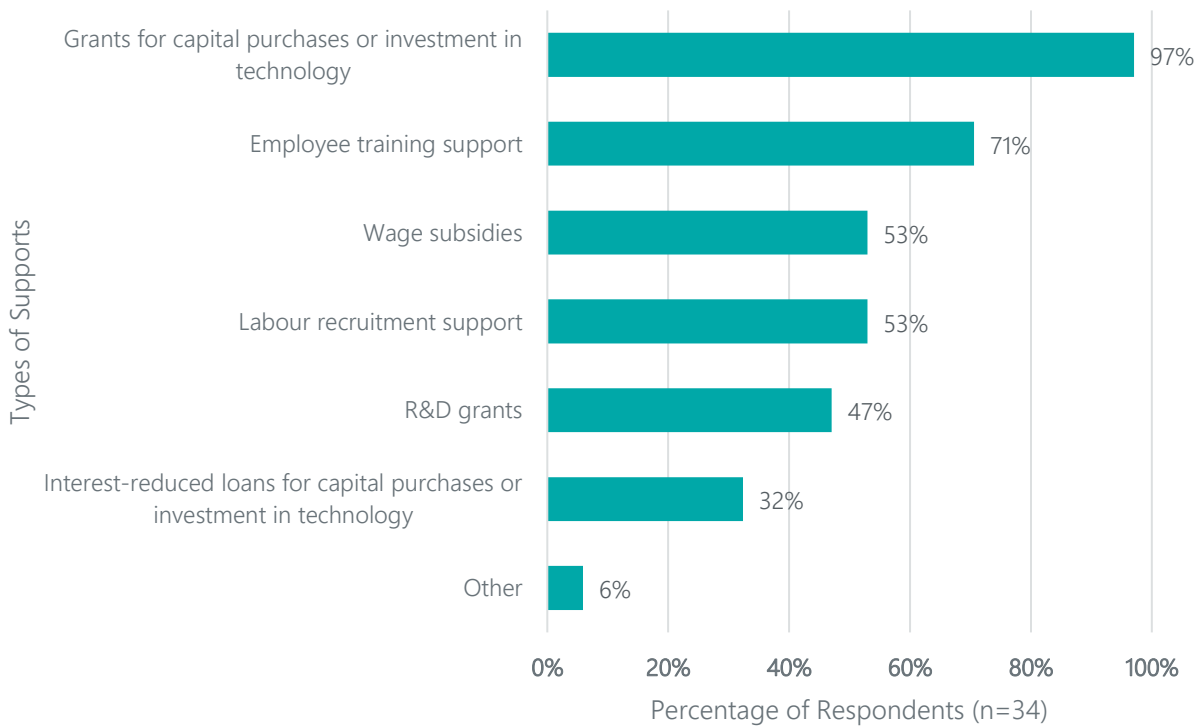
Figure D: Drivers Encouraging the Adoption of Automation and Robotics Technology



Areas of Support

Survey respondents were asked to select the types of supports they feel would be of most value when it comes to enabling the future adoption of automation and robotics technology within their food and beverage processing operations in Ontario. As shown in Figure E, the most valuable types of support for the future adoption of automation and robotics technology were “grants for capital purchases or investments in technology” and “employee training support”.

Figure E: Most Valuable Supports for the Future Adoption of Automation and Robotics Technology¹



¹ Respondents could select multiple options and thus the percentage do not sum to 100%.

Introduction

Background and Study Purpose

Food and Beverage Ontario (“FBO”), in collaboration with MNP LLP (“MNP”) conducted research on the adoption of innovative automation and robotics technology (“automation”) within the food and beverage sector in Ontario (the “Sector”). This work was funded through the Ontario Ministry of Agriculture, Food, and Rural Affairs’ (“OMAFRA”) Ontario Agri-Food Research Initiative (“OAFRI”) program.

This research was catalyzed by one of the major challenges facing the Sector, namely a shortage of labour that is impeding Ontario food and beverage processors (“Processors”) to operate at their full capacity and stagnating the growth of the Sector. In turn, many processors are pursuing automation as a potential solution to this labour shortage. In addition to this, automation can support the Sector’s competitiveness and productivity. As such, FBO undertook a research study to understand the factors impacting adoption of automation in the Sector as well as to identify and elaborate on the following:

- Barriers and drivers to the adoption of innovative automation and robotics technology in the Sector.
- The intended outcomes of, and results attained by, processors who have adopted innovative automation and robotics technology.
- The training and associated costs required for adoption of innovative automation and robotics technology.
- How barriers to the adoption of innovative automation and robotics technology can be and/or have been addressed by processors, including the types of supports that could increase adoption by processors.

The findings of this study are intended to alleviate barriers to, and support drivers of, automation and robotics adoption by the Sector.

Organization of Report

The remaining sections of the report are organized as follows:

- Section 2 outlines the approach taken in carrying out the study.
- Section 3 provides an overview of the results from the online survey and focus groups on the adoption of automation in the Sector.
- Section 4 includes recommendations for alleviating barriers to, and supporting drivers of, automation adoption by the Sector
- Appendices at the end of this report include data sources, primary data collection tools, and background information about MNP.

Acknowledgments

This study was completed with the counsel of a Project Working Group comprised of the following members:

- Ingrid van den Berg, *Director of Operations Ontario and Alberta* (Bonduelle Americas Long Life).
- Peter Twigg, *Director, Automation* (Maple Leaf Foods).
- Phillippe Murphy-Rheaume, *Manager, Government Relations and Sustainability* (Bimbo Canada).
- Jason Crawford, *Director, Membership & Industry Relations* (FBO).

MNP would like to acknowledge the contributions of the members of the Project Working Group for their cooperation in providing direction and guidance on the development of primary research tools and participation on research activities of the study.

Limitations

This report is provided for information purposes and is intended for general guidance only.

We have relied upon the completeness, accuracy and fair presentation of all information and data obtained through the various stakeholder consultations along with documents that were available for review before May 7, 2021. The accuracy and reliability of the findings and opinions expressed in this report are conditional upon the quality of this same information. Therefore, MNP cautions readers regarding their reliance on the findings and disclaims any associated liability.

Additionally, the findings and expressed opinions constitute judgments as of the date of the report and are subject to change without notice. MNP is under no obligation to advise of any such change brought to its attention which would alter those findings or opinions.

It should be noted that the opinions expressed by stakeholders consulted through this study may not be representative of the whole population of Ontario's food and beverage sector.

Approach

Methodology

MNP's research approach to carrying out this study is described below.

Secondary Research

MNP conducted a review of past academic research, government reports, and policy briefs to inform this study, including the primary data collection tools that were used.

Appendix A provides an overview of documents reviewed as part of this study.

Online Survey

MNP administered an online survey ("online survey") of Ontario food and beverage processors. A total of 36 survey respondents participated in the survey. Responses were received from processors of different sizes and engaged in a wide range of sub-sectors, reflective of the diverse nature of the food and beverage processing industry in Ontario.

The online survey of Ontario food and beverage processors was open from November 20, 2020 until January 29, 2021.

The purpose of the survey was to gather perspectives from Ontario food and beverage processors on:

- Current barriers and drivers as well as learnings from past adoption of automation and robotics technology within the Sector.
- Suggestions for potential actions that can be taken to support the adoption of automation and robotics technology within the Sector.

For each of the survey questions, we have included an analysis of the responses of all survey respondents. In some cases, a summary of key differences in responses is provided by classification of organization size (measured by full time equivalents ("FTEs")):²

- Small: From 1 to 99 FTEs.
- Medium: From 100 to 499 FTEs.
- Large: Over 500 FTEs.

Appendix B – Primary Data Collection Tools includes the survey questionnaire used for this study and *Appendix C* provides a detailed profile of survey respondents.

Focus Groups

To supplement the survey findings, MNP facilitated four focus groups as part of the study. Three focus groups were conducted with 14 representatives of Ontario food and beverage companies in the form of a webinar. The fourth focus group was conducted with 14 Ontario food and beverage sector automation associates

² Innovation Science, and Economic Development Canada also has a "micro" category of 1-4 FTEs but only one respondent indicated "less than 5 FTEs" in the survey so they have been added to the "small" category.

(“Automation Associates”)³ in the form of a webinar.

The purpose of these sessions was to gather additional information regarding barriers to, drivers for, and recommendations on the adoption of automation and robotics technology within the Sector.

Appendix B – Primary Data Collection Tools includes the focus group guides used for this study.

Research Questions

The research conducted as a part of this project set out to answer the following questions:

- What are the barriers and drivers to innovative automation and robotics technology adoption by Ontario food and beverage processors? How were barriers to adoption overcome?
- Of the food and beverage processors that have adopted innovative automation and robotics in their operations, what were the original reasons for making the investments in automation? What were the outcomes of such investments?
- For the food and beverage processors that have invested in automation, how were barriers to adoption addressed?
- What type of training would be required for the adoption of these new technologies? What would be the associated costs of such training?
- How can Ontario food and beverage processors be supported to increase the adoption of automation and robotics technology?

³ Automation associates include technology/service providers, SMEs, educational institutions, and consultants who support the adoption of automation in the Sector.

Summary of Research Findings

This section of the report includes findings from the consultations with stakeholders through an online survey of 36 Processors and four focus groups with a total of 28 participants. The findings summarize key barriers, drivers, costs, outcomes, learnings, and supports related to the adoption of automation technologies by Processors in the Sector.

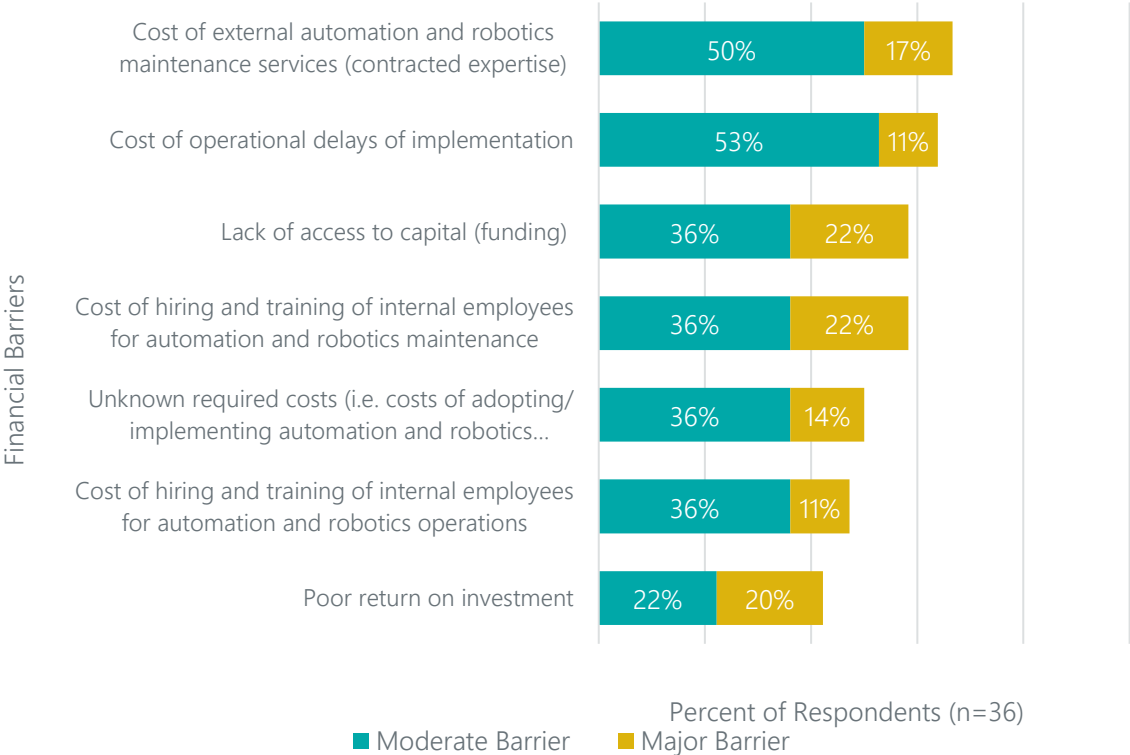
Barriers to Automation

Financial Barriers

Survey respondents were asked to rate the severity of given financial barriers in terms of the degree to which they get in the way of the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

As shown in Figure 1, the four factors that were considered to be most substantial were “cost of external automation and robotics maintenance services (contracted expertise)” (67%), “cost of operational delays of implementation” (64%), “lack of access to capital (funding)” (58%), and “cost of hiring and training of internal employees for automation and robotics maintenance” (58%).

Figure 1: Extent of Financial Barriers to the Adoption of Automation and Robotics Technology



As presented in Table 1, the extent to which certain financial barriers get in the way of automation adoption varied by organization size.

- Survey respondents from small organizations (1 to 99 FTEs) rated “cost of external automation and robotics maintenance services (contracted expertise), “lack of access to capital (funding)”, and “cost of hiring and training of internal employees for automation and robotics operations” as the most substantial financial barriers.
- Survey respondents from medium organizations (100 to 499 FTEs) rated “cost of operational delays of implementation” as the most substantial financial barrier.
- Survey respondents from large organizations (over 500 FTEs) rated “cost of external automation and robotics maintenance services (contracted expertise)” and “cost of operational delays of implementation” as the most substantial barriers.

Table 1 displays the percentage of survey respondents that rated each finance related barrier as “moderate” or “major”, by Processor size.

Table 1: Extent of Financial Barriers to Automation Adoption, by Processor Size

Financial Barrier	Small	Medium	Large	All Respondents
Cost of external automation and robotics maintenance services (contracted expertise)	73%	50%	70%	67%
Cost of operational delays of implementation	67%	60%	70%	64%
Lack of access to capital (funding)	73%	50%	50%	58%
Cost of hiring and training of internal employees for automation and robotics operations	73%	30%	20%	58%
Unknown required costs (i.e. costs of adopting/ implementing automation and robotics technology is unclear)	67%	50%	30%	50%
Cost of hiring and training of internal employees for automation and robotics maintenance	67%	50%	50%	47%
Poor return on investment	47%	30%	50%	42%

Note: Extent of the barrier was rated as “minor,” “moderate,” or “major.” Percentages listed above refer to survey respondents that rated “moderate” or “major.” Please note that survey respondents that did not indicate their employment size in the survey are not reflected in the “Small,” “Medium” and “Large” columns but are reflected under “All respondents”.

Focus Groups Insights: Lack of Access to Capital

Focus group participants were asked a series of follow up questions related to the financial barrier of lack of access to capital.

Within focus groups with Processors, participants expressed a variety of challenges with accessing capital for automation projects. In general, Processors outlined that capital for automation projects can be attained through a company’s internal budgeting process and through different types of funding mechanisms (e.g., bank loans or government grants). They also shared that another way to implement automation projects, as an alternative to purchasing capital infrastructure, included the leasing of capital infrastructure.

With regards to government grants, Processors shared a number of barriers limiting their effectiveness and accessibility. Some of the main issues included:

- **Job Creation Requirements.** Processors shared that requirements for job creation within grants for automation implementation can be difficult to meet because the goal of automation is not usually job creation, but rather to increase productivity and competitiveness. Further, the Sector is currently facing a substantial labour shortage making this requirement more difficult to meet.
- **Timing of Grant Announcements.** The general practice for when the future release of grants is announced is not sufficiently early to allow Processors to adequately plan for them. Processors shared that project approvals and budgeting usually takes place about a year or more in advance of adoption. The current timing of announcements tends to mean that Processors are unable to factor grants into the development of the business case for investment in automation during the approval process internal to their companies (i.e., advanced notice regarding the availability of grants could help support the approval of automation projects). Processors acknowledged that while they may not be successful in ultimately being awarded the grant they apply for, greater clarity in terms of timelines (e.g., regular grant announcements and consistent application timeframes) would allow for better alignment between companies' internal investment decision making processes and government funding availability.
- **Time Required to Complete Grant Applications.** Processors shared that grant applications can be time-consuming endeavours, requiring substantial resources and collaboration amongst specialized staff (e.g., external grant writers or engineers). Processors also noted that the extent of resources required to apply for grants could be prohibitive for smaller companies looking to implement automation (i.e., preventing them from applying). They explained that granting applications that do not require having to hire grant writing consultants would alleviate accessibility barriers to funding.
- **New Spending is Only Eligible for Funding.** Processors shared that in some cases they need to order equipment before they can secure funding via grants. In these cases, manufacturers' requirements of substantial upfront deposits during the initial stages of purchasing automation infrastructure, as well as the lengthy lead time before the equipment becomes available and is shipped to processing facilities (e.g., 9 months), means that considerable spending is taking place prior to the awarding of grants. Processors disclosed that this timing becomes even more of an issue when grants specify that funds only apply to spending that takes place after the award (i.e., spending that takes place before a grant is awarded is ineligible). It was also noted that during the process of purchasing and implementing automation infrastructure, some changes can take place with respect to what was initially proposed within grant applications. However, because the funding programs do not always allow much flexibility, Processors may be left with the constraints of not being able to make changes to their original grant application.
- **Requirements for "Innovative or Novel" Technology.** Some Processors shared that the types of automation equipment eligible for funding can be a limiting factor as some grants only apply to "innovative or novel" technology. It was noted that although the implementation of some automation projects could be very beneficial to companies, the perceived lack of "innovative or novel" features prevents them from being eligible for needed funding.
- **Inconsistency Across Provinces and Grants.** Some Processors noted the issue of inconsistency across Canada, provincially and federally, in terms of the timing of funding announcements and the related requirements. It was also suggested that there is a lack of a provincial granting framework, which would help alleviate inconsistencies.

Processors also shared their perspectives on some challenges that exist with securing loans for automation projects. Processors noted that the accessibility of traditional avenues of standard lending organizations is dependent on cashflow and what companies can withstand in terms of the interest rates charged. It was also raised that larger companies with substantial equity levels are better able to access loans while smaller companies may be limited given that most of their available cash flow is used for business operations.

Processors further shared that, in general, developing the business case to justify the investment in automation can be difficult to put together as a precursor to applying for a loan. They noted the difficulties are related to predicting all the benefits of implementing the automation technology and to capturing the projected return on investment. One Processor suggested looking into Quebec's model of providing a variety of loans including no interest, low interest, as well as forgivable loans. In addition to this, the idea of a loan that is paid back upon the arrival of equipment was also raised.

As introduced above, the current structures and availability of grants and loans do not always align with Processors' budgeting and/or investment processes. Processors shared on what they called "sequencing challenges" which arise from the various timelines and processes that intersect when considering internal company milestones (e.g. project approval, budgeting), external funding requirements (e.g. government grants or bank loans), and steps towards acquisition of automation infrastructure from manufacturers (e.g. large deposits during initial stages or coordination the leasing of infrastructure). Internally, for Processors to secure company funds for automation projects, processing related staff must present early on the case for investing in infrastructure to their company's finance teams. Automation project approvals and the annual budgeting process cannot currently plan around the irregular announcement of grants.

Automation Associates also provided their observations on Processors' access to capital for the adoption of automation in the Sector. Automation Associates echoed issues raised by Processors relating to misalignment of sequencing between internal company timelines and timing for funding and approvals of grants. Automation Associates also agreed with Processors that issues related to access to capital are more substantial for smaller companies. When highlighting the inconsistencies and varying requirements across grants, Automation Associates noted that the best option can be to hire grant writers. The related suggestion was that while grant writers take a significant share of the awarded funds, they know the rules best and alleviate Processors of the additional work required by grants. Automation Associates also noted that when creating the case for adopting automation, Processors can be constrained by timeframes of approximately one year. This shorter-term view can overlook the full ROI of adopting automation. Additionally, one participant stated that automation funding over 2 million dollars often turns into a loan, creating further barriers for Processors.

An example of funding shared within the focus group with Automation Associates was the Canadian Manufacturers & Exporters' (CME) Technology Assessment Program which offers \$25,000 toward technology readiness assessments to provide an overview of areas needing improvements.⁴

Operational Barriers

Survey respondents were asked to rate a set of given operational barriers on the extent to which they get in the way of the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

As shown in Figure 2, the operational related barriers that were considered to be most substantial were "lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure" (64%) and "lack of availability of external automation and robotics installation and maintenance services (contracted

⁴ Canadian Manufacturers & Exporters, Technology Assessment Program. Available at: https://cme-mec.ca/technology_assessments/

expertise)"(58%).

Figure 2: Extent of Operations Related Barriers to the Adoption of Automation and Robotics Technology

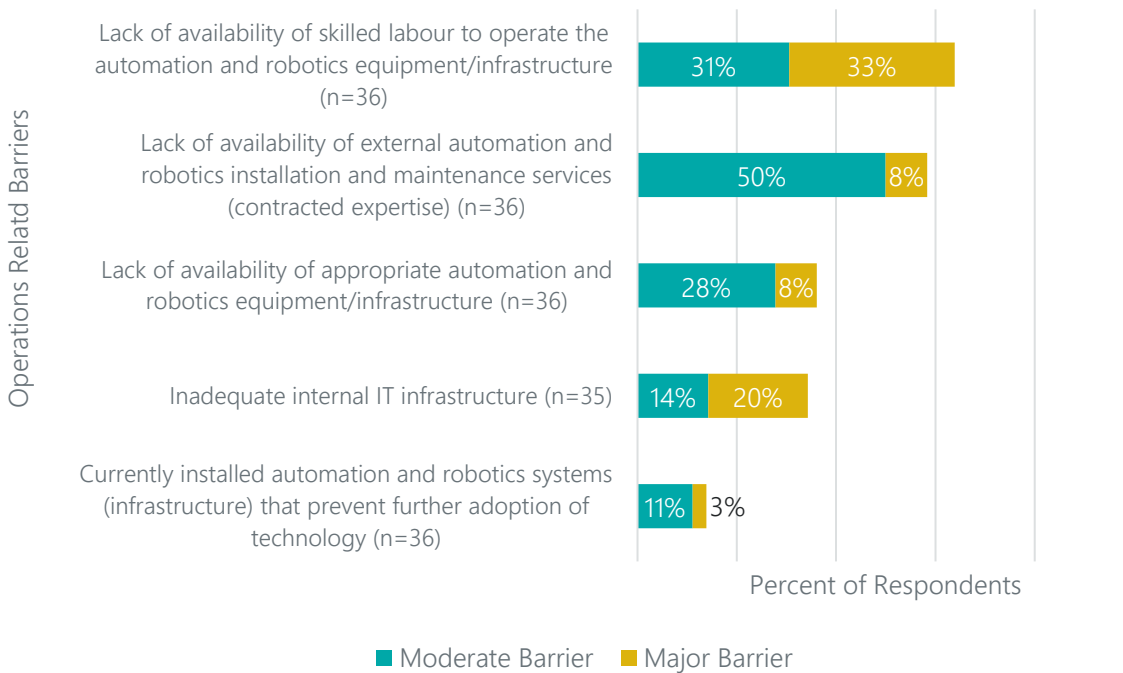


Table 2 displays the percentage of survey respondents that rated each finance related barrier as “moderate” or “major”, by Processor size. As shown, the extent of operations related barriers to automation adoption were similar across organizations of different sizes.

Table 2 Extent of Operations Related Barriers to Automation Adoption, by Processor Size

Operations Related Barrier	Small	Medium	Large	All respondents
Lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure	67%	50%	70%	64%
Lack of availability of external automation and robotics installation and maintenance services (contracted expertise)	67%	30%	70%	58%
Lack of availability of appropriate automation and robotics equipment/infrastructure	47%	30%	30%	36%
Inadequate internal IT infrastructure	50%	20%	30%	34%
Currently installed automation and robotics systems (infrastructure) that prevent further adoption of technology	13%	10%	20%	14%

Note: Extent of the barrier was rated as either “minor,” “moderate,” or “major.” Percentages listed above refer to survey respondents that rated “moderate” or “major.” Please note that survey respondents that did not indicate their employment size in the survey are not reflected in the “Small,” “Medium” and “Large” columns but are reflected under “All respondents”.

Focus Groups Insights: Lack of Skilled Labour

Focus group participants were asked a series of follow up questions related to the operational barrier of lack of available skilled labour to operate the automation and robotics equipment/infrastructure.

When asked about their experience with finding skilled labour to operate the automation and robotics technology, Processors that participated in the focus groups noted that due to difficulties with hiring skilled labour, companies resort to hiring team members and then training them internally. However, Processors elaborated that this is more attainable for larger facilities with an in-house automation subject matter expert that can onboard staff. In contrast, they noted that training in-house can be cost prohibitive for smaller companies who are more likely to try to hire skilled staff as a result. Processors also shared that they try to hire individuals through co-ops (i.e., short-term work placements that take place while individuals are completing their education) or when they have recently completed school and providing them with training. Processors further pointed out the issue of retention once staff are trained due to the small pool of skilled labour available within the Sector.

Processors highlighted a larger structural issue in the Sector causing the skilled labour shortage: a lack of local equipment manufacturing. They explained that with automation equipment being manufactured internationally, often in Europe, individuals with the skills to operate the equipment are more likely to be from abroad. It also means that local academic institutions in Ontario are geographically removed from where the automation equipment is manufactured, creating an additional barrier. Processors added that automation equipment can be very customized to meet companies' needs, further limiting the local individuals that bring needed knowledge.

When asked within focus groups about the skills that are most difficult to find, Processors shared that while staff may be trained on the day to day operations of automation equipment, issues arise when something breaks down as troubleshooting tends to be a weakness. This can result in the need to bring in experts from outside of Canada, creating another layer of cost, inefficiency, and complexity because more specialized skills are not available locally. According to Processors, there also exists a challenge in finding staff that can fully understand and diagnose programmable logic controller ("PLC") issues as well as those with electromechanical skill sets. In addition, there are various brands of PLC, all which require specific knowledge on how to program and troubleshoot, making purchasing equipment for companies difficult.

Within the focus group with Automation Associates, participants echoed many of the sentiments shared by Processors regarding the lack of available skilled labour to operate automation technology in the Sector. They reiterated issues related to the limited supply of skilled labour, and the resulting need to train staff with the required skills, as well as retention issues.

Automation Associates also commented on the disconnect between academia and the Sector. They shared the observation that there is a lack of alignment between the required skills to maintain/service automation technology and the training that Ontario's educational institutions provide. It was noted that collaboration between academia and the Sector could help bridge the disconnect. Examples of related issues included difficulties with filling co-op roles within the area of automation (e.g., government funding for recruiters/intermediaries helping fill spots with students) and updating teaching curriculum so it is better aligned with the skilled labour needs of the automation technology in the Sector.

Focus Groups Insights: Lack of Contracted Expertise

Focus group participants were also asked a series of follow up questions related to the operational barrier of finding external (contract) expertise to install and maintain automation and robotics

Within the focus groups, and as raised earlier, Processors expressed that the issues generally stem from the fact that the automation equipment is manufactured internationally, largely in Europe and the United States. As a result, automation equipment experts are also largely located abroad.

Processors shared that vendor support hours are often limited due to the significant time differences, making it difficult to get timely help. Furthermore, aligning the availability of external expertise for installation with the timing of when equipment is arriving can be challenging, especially when equipment is delayed. In addition to not having the expertise locally to set up automation equipment and to provide training on maintenance, some Processors noted that they do not have access to specialized tools. The cascading effect of limited access to external expertise includes the need to build up and store a significant amount of inventory, in addition to the cost and inefficiency of having to wait for them to have availability and travel to the plant. Processors shared that, if possible, remote troubleshooting and diagnosing can be valuable.

Processors highlighted other issues relating to external expertise in the context of what was available prior to COVID-19 relative to what is accessible during the ongoing pandemic. Associated complications include additional delays for flying or the inability to travel for external experts living abroad. Processors explained that the added limitations in access to these supports has caused projects to be delayed and progress is slower than prior to the pandemic.

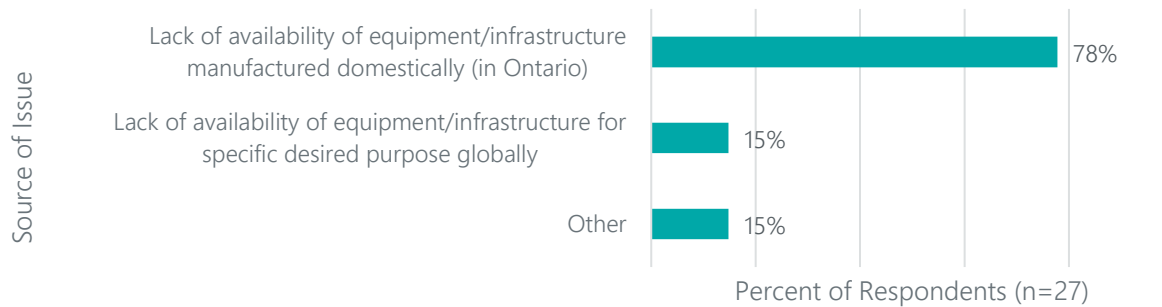
There were several recurring themes between the focus groups held with Processors and the focus group held with Automation Associates on the topic of external expertise. For example, Automation Associates agreed that a key issue is the need to align local technical services with the automation equipment being shipped from abroad.

Automation Associates shared that the uniqueness and complexity of the automation projects can be quite broad which can lead to a narrow pool of experts with adequate training for a given situation. It was also noted that it can be more difficult to find an expert to understand a given automation system due to how it is implemented, demonstrating the importance of setting up a robust automation platform in the beginning to keep options open in terms of service providers. Automation Associates also explained that automation projects within the Sector tend to have more than one entity actively involved compared to other sectors making for more complex situations, speculating that this may contribute to difficulties with finding maintenance services.

Barriers Due to Lack of Domestic Manufacturing

Turning back to the survey, respondents that rated “lack of availability of automation and robotics equipment/infrastructure” as an operational barrier were then asked to elaborate on the issue. As shown in Figure 3, approximately 78% of survey respondents pointed to the lack of equipment and infrastructure that is manufactured domestically (in Ontario) as the primary concern.

Figure 3: Source of Availability of Automation and Robotics Equipment/Infrastructure



Focus Groups Insights: Lack of Availability of Automation and Robotics Equipment (Infrastructure) in Ontario

Processors that participated in focus groups validated these survey findings and provided insights on the availability, or lack thereof, of automation equipment manufactured in Ontario. They shared that several issues stem from the fact that a majority of automation equipment is manufactured abroad (e.g., from the United States as well as European countries such as the Netherlands and Italy). Overall, Processors pointed out that a variety of issues could be alleviated if more automation equipment was manufactured in Ontario, which would help cultivate the existence of an ecosystem between Processors and equipment manufacturers, as is the case in other jurisdictions. More specific details as shared during the focus groups were:

- **Availability of Support.** Processors stated that if automation equipment was manufactured domestically, it would facilitate access to trainers for staff (i.e., automation equipment manufactured abroad is made in alignment with international regulatory standards and control systems, which are not always taught in North American schools). Ultimately it would help address the issue of not being able to find contractors to help with setting up and servicing automation infrastructure. The larger presence of local support, and the resulting improvement in accessibility, could also encourage smaller Processors to adopt automation.
- **Operational Delays and Costs.** Processors expressed that operational delays could arise when automation equipment is shipped in from abroad, causing delays for project implementation and impacting regular operations. In addition to this, replacement parts can also take weeks to be shipped in when they break down, also impacting regular plant operations. In some cases, Processors shared that to mitigate potential downtime, they keep their own inventory of replacement parts, which adds further costs to the maintenance of automation equipment. They also noted that in addition to the opportunity cost of downtime in the plant, some Processors keep a substantial amount of inventory of their own products to ensure they meet their obligations.
- **Customization and Alignment of Standards.** Processors pointed out that automation equipment sourced from abroad is either off the shelf or difficult along with being expensive to customize. They

shared that manufacturing in Ontario could better enable customization by minimizing the cost and making it more accessible for manufacturers that are closer geographically. Processors also expressed that domestic manufacturing would help ensure control systems and standards of automation equipment are in alignment with Canadian regulations. Currently, the need arises to invest money into bringing equipment up to Canadian standards when it is sourced internationally. Processors also shared that in the absence of domestic manufacturing, the Sector does not have first access to cutting edge automation technology (i.e. the first access to automation technology goes to those abroad).

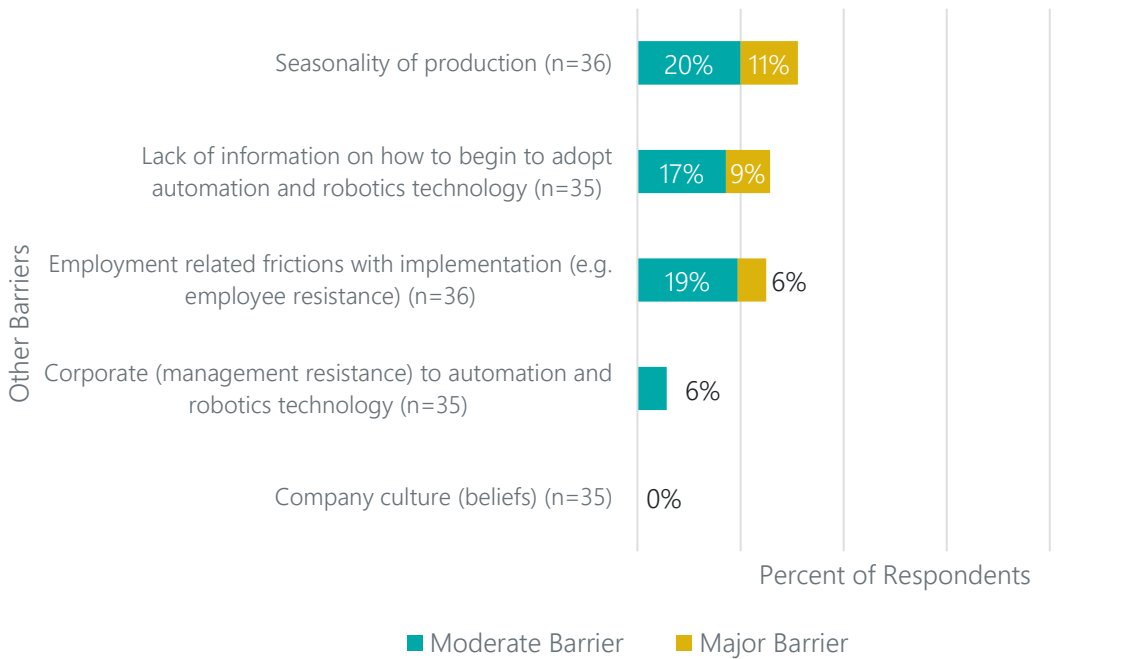
While manufacturing automation equipment could alleviate the issues listed above, Processors acknowledged that the current costs of manufacturing in Canada are relatively higher.

Other Barriers

Survey respondents were asked to rate a set of other barriers on the extent to which they get in the way of the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure 4 shows other moderate and major barriers as rated by survey respondents.

Figure 4: Extent of Other Barriers to the Adoption of Automation and Robotics Technology

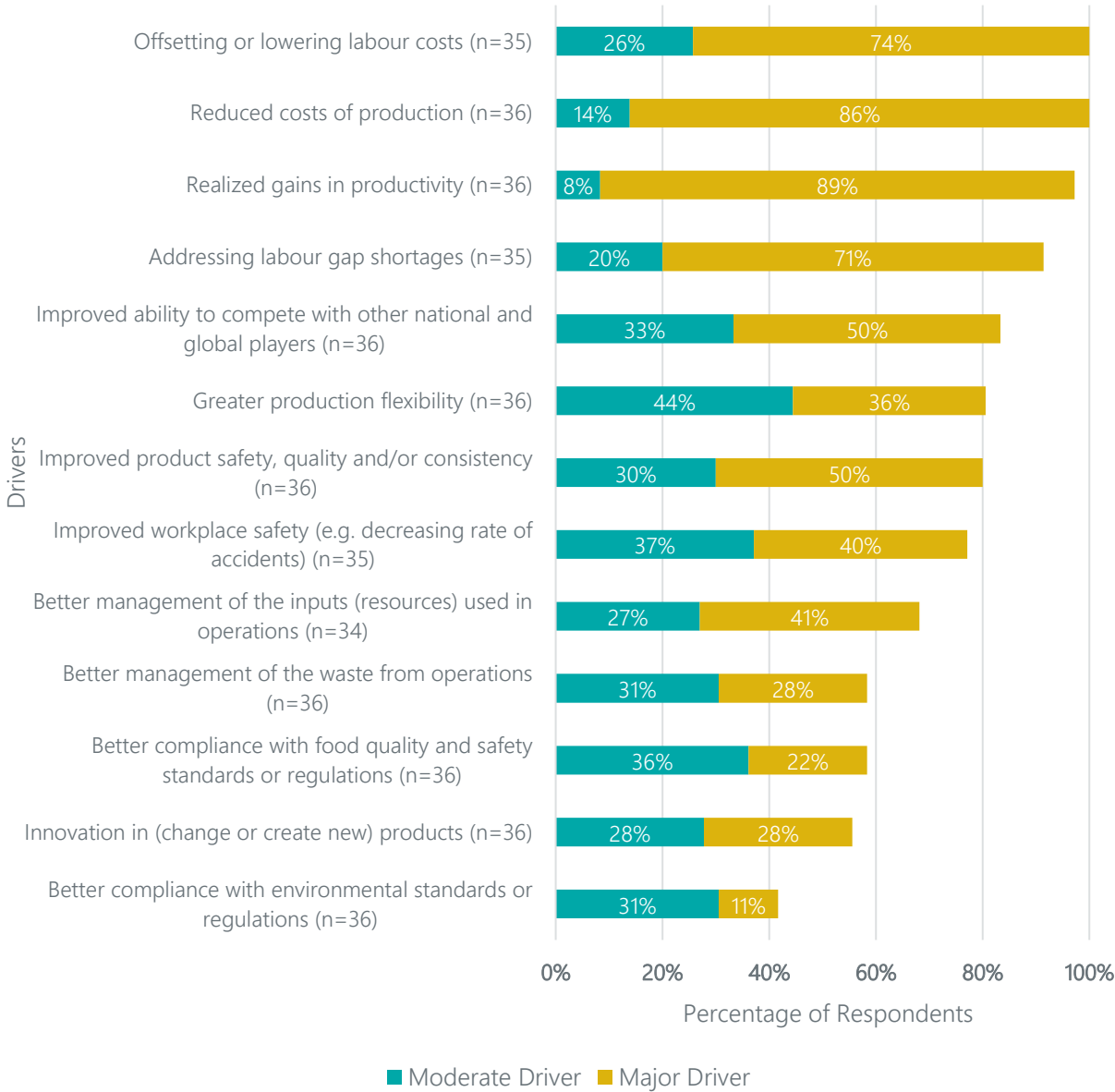


Automation Drivers

Survey respondents were asked to rate a set of given operational, labour related and other drivers on the extent to which they encourage the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure 5 displays the percentage of survey respondents that rated the set of given drivers as moderate to major. The top three drivers were "offsetting or lowering labour costs" (100%), "reduced costs of production" (100%), and "realized gains in productivity" (97%).

Figure 5: Drivers Encouraging the Adoption of Automation and Robotics Technology



Shared Learnings

This section of the report outlines learnings shared by companies that have adopted new automation and robotics technology within their food and beverage processing operations in Ontario. These learning were augmented with findings from focus groups with Processors and Associates. The learnings relate to:

- Types and methods of training of employees required for the adoption of new automation and robotics technologies
- Costs associated with the adoption of new automation and robotics technologies.
- Supports that aided in overcoming barriers to adoption of automation and robotics technology.
- Goals set out for and related outcomes along with key learnings from the adoption of automation and robotics technology.



Training

Survey respondents were asked to indicate what type of training for established and newly hired employees was required for the technologies last adopted.

As shown in Figure 6 and Figure 7, the most common type of training for both established and newly hired employees is on "operations" and "maintenance".

Figure 6: Training Required for Established Employees while Adopting New Technologies⁵

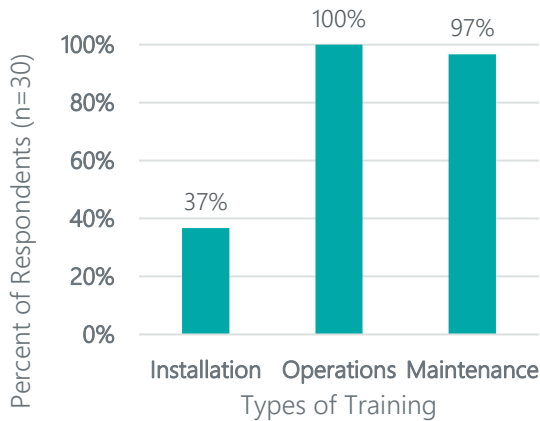
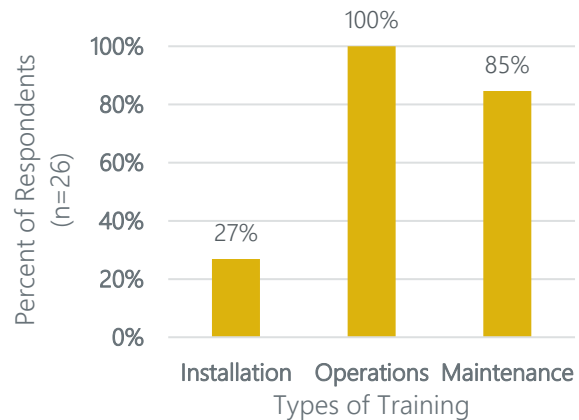
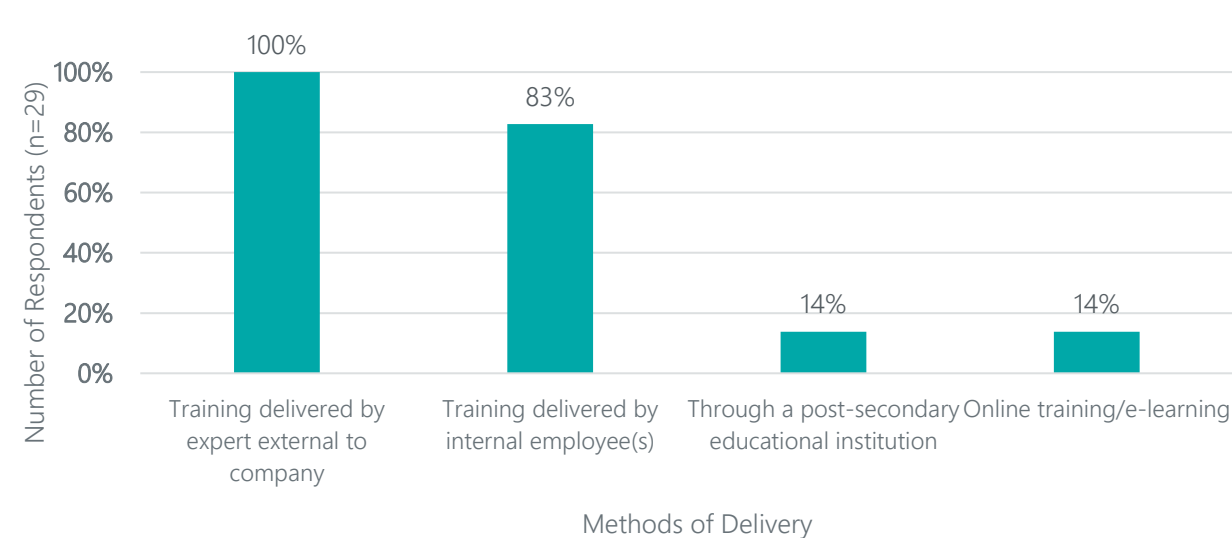


Figure 7: Training Required for Newly Hired Employees while Adopting New Technologies⁶



Survey respondents were then asked to indicate how the required training for the adoption of automation and robotics was provided. As shown in Figure 8, the most common methods to deliver the required training were by experts external to the company (100%) and "training delivered by internal employees" (83%).

Figure 8: Methods Used to Deliver Staff Training⁷



⁵ Respondents could select multiple options and thus the percentage do not sum to 100%.

⁶ Ibid.

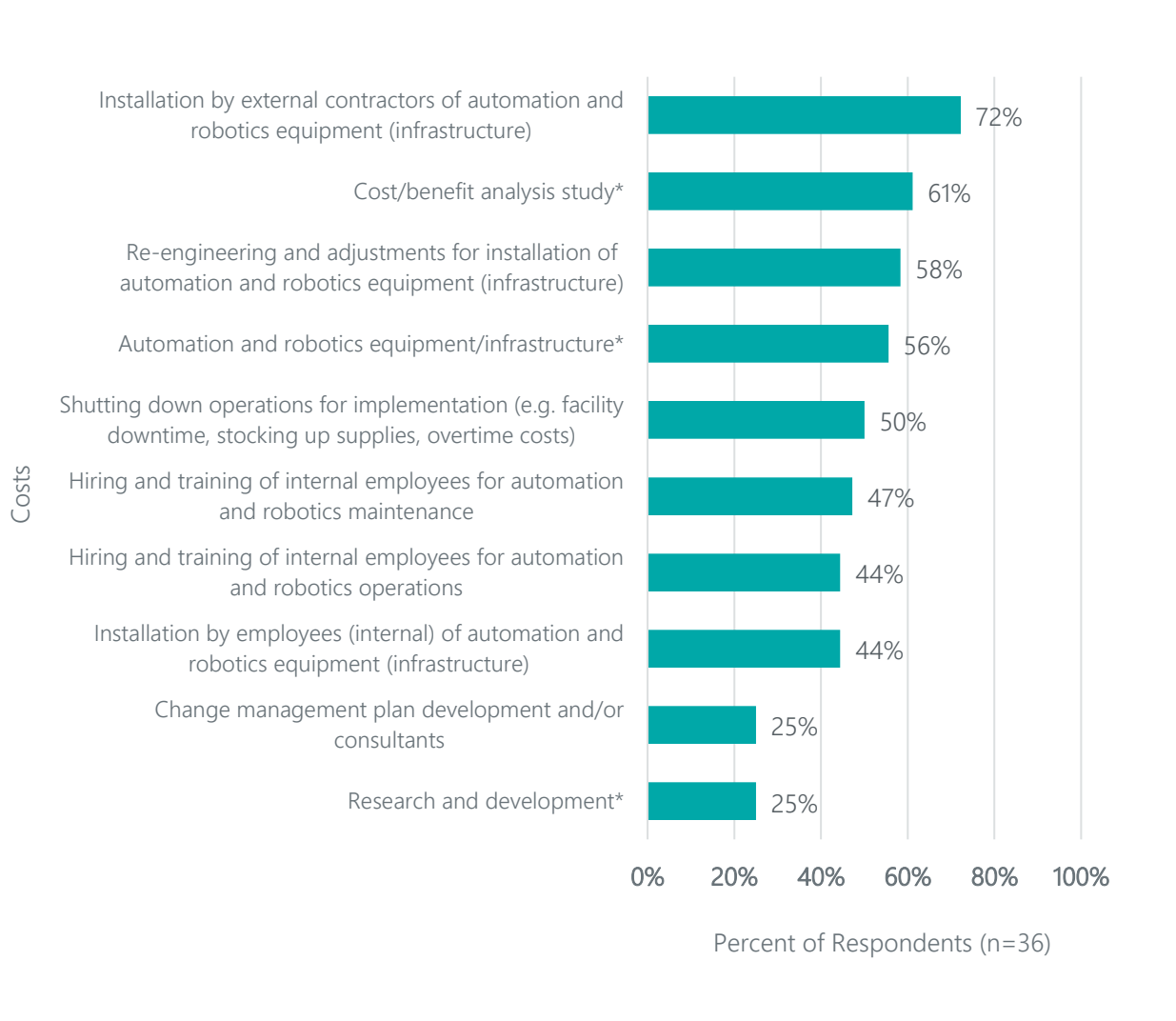
⁷ Ibid.

Costs

Survey respondents were asked to indicate what types of costs were associated with the adoption of new automation and robotics technologies.

As shown in Figure 9, the most common types of costs were “installation by external contractors of automation and robotics equipment/infrastructure”, “cost/benefit analysis study”, and “re-engineering and adjustments for installation of automation and robotics equipment (infrastructure)”.

Figure 9: Costs Associated with the Adoption of New Automation and Robotics Technologies



* Initial costs that generally take place before the implementation of automation equipment.

Focus Group Insights: Costs Associated with the Adoption of Automation and Robotics

Processors were asked to comment on the top cost drivers associated with automation and robotics adoption. The most commonly cited cost drivers were paying for contractors to install the system and train staff (especially if the contractor is from outside of the region), the software and hardware, and the upgrade and adjustments of existing infrastructure required for the new automation and robotics technologies (e.g., systems, electrical, concrete). They further raised how certain spare parts could sometimes take weeks to arrive at their facilities, significantly impacting production, increasing idle time, and lowering cost recovery.

One processor raised how the adoption of automation and robotics can be quite costly in the case of perishable goods (i.e., inventories are constrained by short shelf life). As such, they must have staff and contractors lined up to work 24 hours a day, seven days a week for the installation, as they cannot put operations on hold for extended periods.

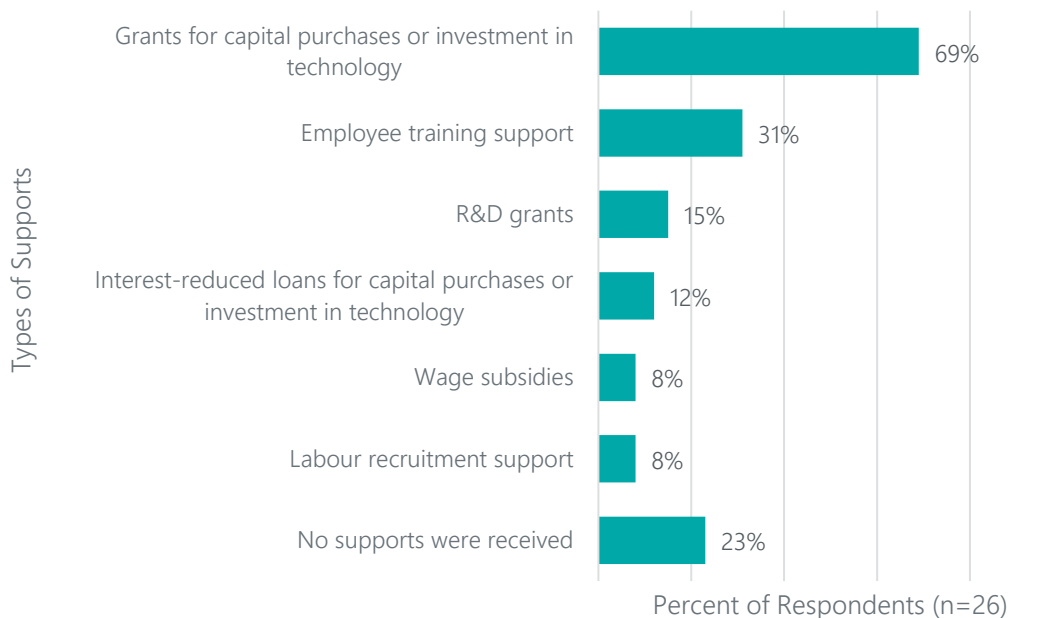
Processors were also asked what percentage share of the overall costs of automation was typically related to staff training. Processors generally agreed that this represented around 10-15% of total project costs.

Automation Associates were also prompted to comment on the top costs associated with automation and robotics adoption in the Sector. They raised how not all Processors place sufficient effort in upfront planning required for automation (i.e., identifying the best technology solution that meets the specific needs of their facilities and gathering information from vendors on equipment and service costs to build accurate project budgets). Related to upfront planning, was investing in a main control/IT infrastructure system before automating. Several Automation Associates raised how many Processors begin to automate without having a proper control/IT infrastructure system in place, which typically results in additional costs in the long term.

Areas of Support

Survey respondents were asked to select the supports that aided their company in overcoming barriers to the adoption of automation and robotics technology. As shown in Figure 10, the supports most selected were “grants for capital purchases or investment in technology” and “employee training support”.

Figure 10: Supports that Aided Companies in Overcoming Barriers to the Adoption of Automation and Robotics Technology



Of the survey respondents that indicated they had received supports when adopting automation and robotics technology, 88% shared that grants were the most helpful.⁸ For respondents that specified the purpose of the grants, the most common intent was for capital expenditures. The second and third most helpful supports cited by respondents to this question were staff training and loans or interest free loans.

Focus Groups Insights: Employee Training Support

Processors were asked to describe the type of employee training support that was of particular value to their company. Processors shared the importance of training both before and after the installation of automation equipment. Processors explained that staff training before implementing automation equipment helps mitigate issues by equipping staff with how to identify any problems before they arise. Processors shared that this training could take place by having staff operators go out to the equipment vendor/manufacturer or by having a technician from the vendor/manufacturer visit their facilities.

Processors also noted that ongoing internal and external training is valuable for maintaining automation equipment. Overall, Processors acknowledged that training is a costly and crucial part of the implementation

⁸ (n=17) of survey respondents.

of automation equipment and that these costs are not always eligible for funding support. An idea raised was to have a way to share learnings and best practices related to the implementation of automation among Sector representatives. An example was shared of funding for staff training that was made available through the Yves Landry Foundation, which was for “manufacturers in south, central and eastern Ontario to receive up to \$100,000 to offset the costs of training expenses.”⁹

On the topic of employee training support for Processors, Automation Associates discussed various perspectives on the importance of training and its effectiveness. Automation Associated acknowledged that training can be costly and that it is not always adequately budgeted for within automation implementation projects.

Automation Associates also shared that effective change management and training are crucial to ensure the success of the implementation of automation equipment. They explained that this includes the involvement of staff throughout the different phases of implementation to demonstrate the improvements offered by automation. Also, by working to have employees own the process, there is greater commitment toward making the associated changes, mitigating the potential that the implementation does not attain all intended goals.

Focus Groups Insights: Other Incentives and Supports

Processors were asked to share their perspectives on any other incentives or areas of supports that would help overcome barriers to the adoption of automation. The following summarizes the main areas Processors discussed:

- Collaboration with Academia. Participants spoke to a need for further collaboration with post-secondary educational institutions as an opportunity to expand upskilling, training, and recruitment of skilled labour. They shared that, in partnership with post-secondary institutions, more students’ interest can be garnered towards pursuing required skills, optimizing in turn the future of the workforce for automation in the Sector.
- Eligibility for Funding and Funding Amounts. Processors shared that more funding is needed on a per-project basis. It was also noted that because of the required skillsets, funding amounts offered per employee are not enough, and the current funding levels should be reviewed. Further, the point was made that widening funding eligibility requirements to include training could further help businesses adopt automated technologies.
- Other Financial Incentives. Other financial supports raised by Processors that would help overcome barriers to the adoption of automation included tax breaks and accelerated depreciation. It was noted that tax breaks could be easier to implement, and they could be used as a reward for companies investing in automation.

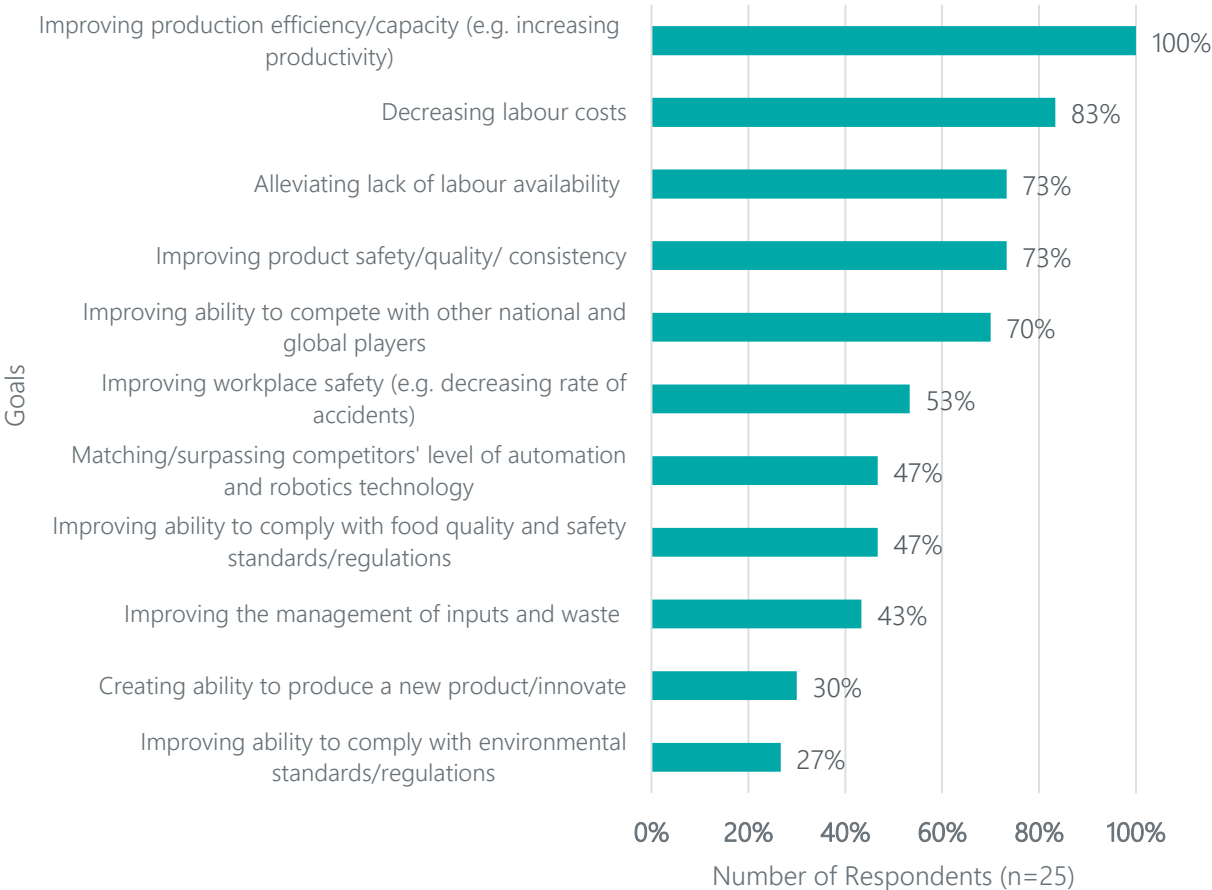
⁹ Manufacturing Automation, Yves Landry Foundation offers up to \$100K in training support to Ontario manufacturers. Available at: <https://www.automationmag.com/8817-yves-landry-foundation-offers-up-to-100k-in-training-support-to-ontario-manufacturers/>

Goals, Outcomes, and Key Learnings

Survey respondents were asked to indicate their goals across different areas such as operations, and the workforce, for their company's adoption of automation and robotics technology.

As shown in Figure 11, the most selected goals were "improving production efficiency/capacity (e.g. increasing productivity)" and "decreasing labour costs".

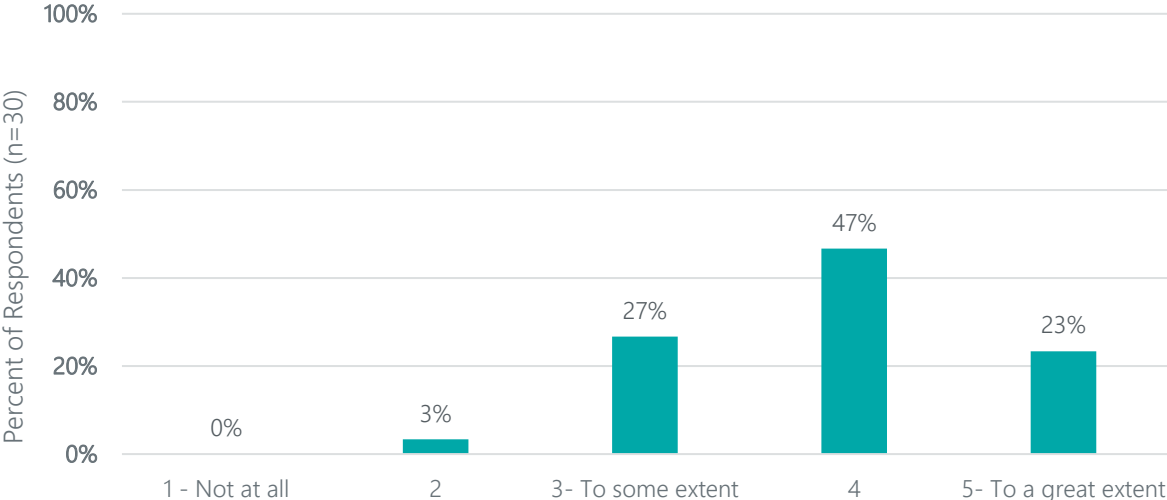
Figure 11: Companies' Goals for Adoption of Automation and Robotics Technology¹⁰



¹⁰ Respondents could select multiple options and thus the percentage do not sum to 100%.

Survey respondents were then asked to indicate to what extent their expectations from the adoption of automation and robotics technology were met. As shown in Figure 12, 70% of survey respondents indicated that their expectations were fulfilled.

Figure 12: Extent to Which Expectations of Adopting Automation and Robotics Technology Have Been Met

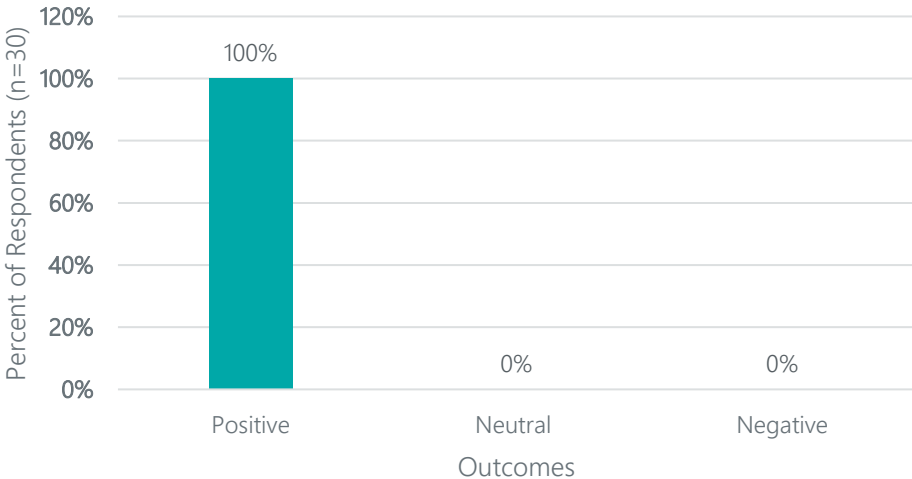


When asked about other benefits that resulted from their company's adoption of automation and robotics technologies, 43% of respondents (n=7) indicated that they had experienced an increase in their operational capacity. About one-third of respondents (29%) also experienced benefits such as improved product quality, better employee retention, reduced costs, and decreased waste.

Survey respondents were also asked to indicate and describe the overall outcomes of adopting automation and robotics technology. As shown in Figure 13, all survey respondents noted a positive outcome.

In terms of specific outcomes, 71% of survey respondents reported increases in efficiency and productivity and 43% of respondents stated that automation had helped them address labour challenges and issues in their facilities.

Figure 13: Overall Outcomes of Adopting Automation and Robotics Technology



When asked about key learnings from adopting automation and robotics technology, almost half (47%) of respondents commented on insights related to the operations and maintenance staff for automation and robotics equipment.¹¹ Some respondents noted the importance of implementing the appropriate training for staff while others shared that reliance on external expertise can be a hindrance, especially during the initial implementation of automation and robotics technology.

Several respondents (37%) also spoke about the steep learning curve that companies are faced with when implementing new technology and the need to conduct substantial research and preparatory/planning work before putting in place automation and robotics.

Survey respondents were asked what their company considers to be best practices in terms of processes and obtaining information on automation and robotics technology. Respondents shared a wide variety of information sources, notably:

- Equipment suppliers (e.g. vendor training programs, equipment demos).
- Third party support (e.g. contractors, consultants, technology experts).
- Other companies in the industry.
- Research.
- Industry associations.
- Trade magazines.

¹¹ (n=19)

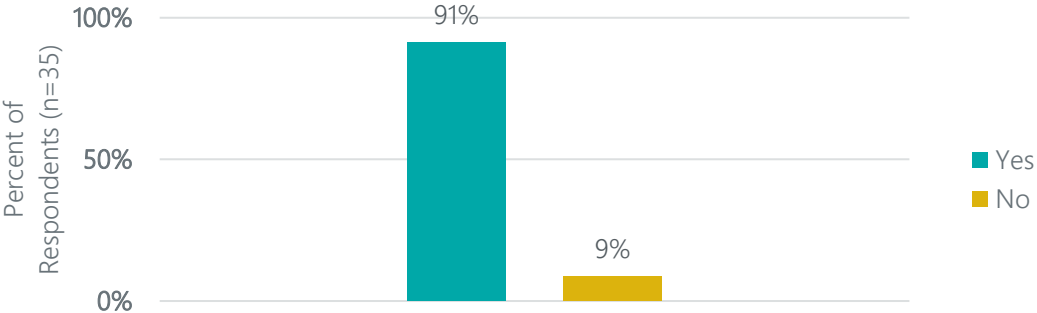
Supporting the Future Adoption of Automation and Robotics Technology

This section outlines the findings related to companies' intent to adopt new automation and robotics technology in the future along with the supports that they feel would be of most value when it comes to supporting their adoption.



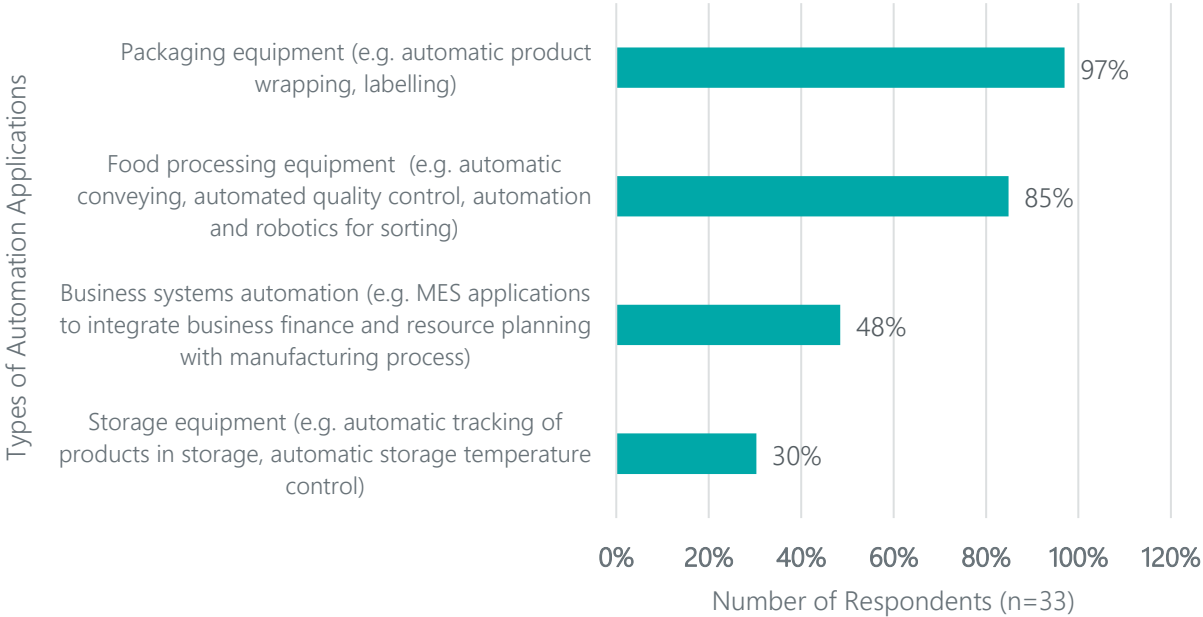
Survey respondents were asked to indicate if their company intends to pursue the further adoption of automation and robotics technology in the next three years. As shown in Figure 14, the vast majority (91%) intend to pursue further automation and robotics technology.

Figure 14: Intention to Pursue Further Automation and Robotics Technology in the Next Three Years



Survey respondents were then asked to describe how automation and robotics technology that is being pursued in the next three years will be applied. The two most common applications were “packaging equipment” and “food processing equipment”.

Figure 15: Automation Application Types that Companies Intend to Pursue in the Future¹²

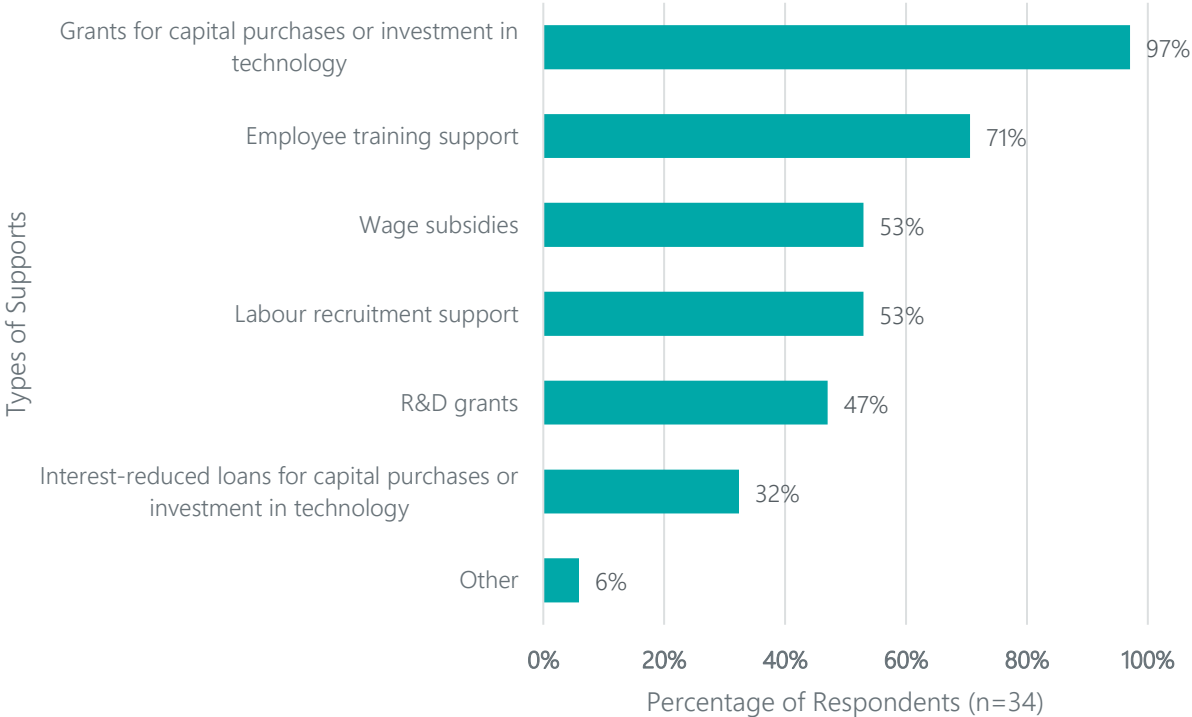


¹² Respondents could select multiple options and thus the percentage do not sum to 100%.

Survey respondents were asked to select the types of supports they feel would be of most value when it comes to supporting the future adoption of automation and robotics technology within their food and beverage processing operations in Ontario.

As shown in Figure 16, the most valuable types of support for the future adoption of automation and robotics technology were “grants for capital purchases or investments in technology” and “employee training support”.

Figure 16: Most Valuable Supports for the Future Adoption of Automation and Robotics Technology¹³



When asked about actions that can be taken by stakeholders (e.g. government, Food and Beverage Ontario, other partners) to support the adoption of innovative automation and robotics technology, most respondents (over 75%, n=13) spoke to the need for financial incentives from the government. Most of these respondents noted that this was to offset the high upfront cost of the capital investment that automation and robotics technology requires.

¹³ Respondents could select multiple options and thus the percentage do not sum to 100%.

Recommendations

Based on the findings, MNP identified the following recommendations for increasing the adoption of automation and robotics technology in the Sector:

1. Broaden the scope and flexibility of funding programs for adoption of automation and robotics technology in the Sector
2. Facilitate increased collaboration between the Sector and Ontario post-secondary educational institutions to identify ways to address the shortage of skilled labour and training.
3. Support and build capacity for the manufacturing in Ontario of automation equipment and technology solutions for the Sector.

Each recommendation is described in greater detail below.

RECOMMENDATION 1

Broaden the scope and flexibility of funding programs for the adoption of automation and robotics technology in the Sector.

Several Processors noted difficulties with obtaining government funding specific to the adoption of automation and robotics technology in the Sector. For example, Processors commented on how a major criterion for many government funding programs is job creation, but that for companies trying to introduce technology to improve their competitiveness and productivity, the creation of jobs is not always applicable. In addition, Processors indicated that sustained labour shortages make it difficult to find workers for position that are currently available.

Further, some Processors commented that, although they applied for funding support for the purchase of new technology to automate facilities, they could not get support because their technology was not considered “innovative or novel”. Processors also shared that more funding is needed on a per-project basis.

Against this backdrop, possible ways to improve funding for the purposes of furthering the adoption of automation and robotics technology in the Sector include:

- Extend the advance notice of the launch of funding programs in concert with timeframes to align better with companies’ internal investment decision-making processes.
- Allow for upfront investments in technology (which can range between 30% and 50% of total project costs) to be eligible even if they are made before the launch of the funding programs.
- Engage in the evaluation of established funding programs, reconsidering the ROI calculation for the objectives defined for those programs, exploring their accessibility to applicants, along with the sufficiency of financial support for automation investments in the Sector as well as the potential for efficiency gains when it comes to the amount of time and effort required to complete funding applications.
- Broaden the scope of eligible activities for funding to include activities such as employee training support and IT infrastructure reconfiguration.

RECOMMENDATION 2

Facilitate increased collaboration between the Sector and post-secondary institutions to identify ways to address the gaps in skilled labour and training.

According to MNP's consultations with Processors and Associates, lack of skilled labour to operate the automation and robotics equipment was one of the most substantial barriers to adoption. Further collaboration between the Sector and post-secondary educational institutions was raised by Processors as an opportunity to expand upskilling, training, and recruitment of skilled labour. This collaboration could lead to exploring ways to build on the capacity of centres such as the Institute of Food Processing Technology that focus on identifying and meeting the needs of the Sector by providing education, training, research and technical expertise.¹⁴ Examples of other benefits included the opportunity to fulfill co-op roles for students within the area of automation and the aligning of teaching curriculums to better address the Sector's needs.

In addition, Processors shared that, in partnership with post-secondary institutions, more students' interest can be garnered towards pursuing education and training to meet the demands for skillsets that will optimize the future of the workforce for automation in the Sector. These efforts could also be supported by leveraging existing programs like Taste Your Future, which are focused on raising the awareness of the Ontario food and beverage sector as an employment destination.¹⁵

RECOMMENDATION 3

Support and build capacity for Ontario-made equipment manufacturing and technology solutions for the Sector

According to MNP's consultations with Processors and Associates, the lack of appropriate automation and robotics equipment along with infrastructure manufactured in Ontario was a significant barrier for the Sector. Given this gap, many Processors opt to source their automation equipment from abroad, mainly from jurisdictions like the US, Netherlands, and Italy.

Processors raised several issues from having their automation equipment manufactured abroad. These issues included delays when the technology (equipment) is shipped from abroad, additional costs required to bring in service providers from overseas for equipment installation, training, and maintenance, difficulty in customizing technology solutions, and limited equipment vendor support hours due to the significant time differences with foreign vendors. Processors shared that the COVID-19 Pandemic has exacerbated these issues.

Furthermore, Processors also noted that the lack of availability and cost of external automation and robotics maintenance services (contracted expertise), which are significant barriers to automation, largely stem from the fact that automation equipment is manufactured abroad.

Building capacity for Ontario-made equipment manufacturing and technology solutions for the Sector is a complex task, but could be supported through:

- Fostering collaboration among Sector stakeholders, Ontario equipment suppliers, academic institutions, various government and other research and commercialization partners, all toward bettering the establishment and growth of Ontario-made equipment for the Sector.

¹⁴ Craig Richardson Institute of Food Processing Technology. Available here: <https://www.conestogac.on.ca/research/applied-research/centres/ifpt>

¹⁵ Taste Your Future. Available here: <https://tasteyourfuture.ca/>

- Identifying and leveraging the capacity and strengths of Ontario-based equipment manufacturers and technology solution service providers that currently service or are interested in servicing the Sector.
- Creating strong incentives for establishing and growing Ontario-made equipment manufacturing for the Sector (e.g., through tax and regulatory reform).¹⁶

¹⁶ CME. Manufacturing Ontario's Future: Leveraging Ontario's Manufacturing Sector to Drive Ontario's Economic Success. Available here: <https://cme-mec.ca/wp-content/uploads/2018/12/CME-ON-Manufacturing-Strategy-Final-compressed.pdf>

Appendices



Appendix A – Summaries of Background Documents Reviewed

Title of Report/Publication	Author	Date	Summary
1. Smart Factories Need Smarter Equipment	Stratus	2020	This paper provides an overview of Edge Computing platforms that offer new revenue and cost reduction opportunities for machine and equipment manufacturers. Edge computer is considered to be “any computing that takes place outside the data center”. The paper emphasizes that Edge computing should be a focus for new automation systems as it “delivers all the characteristics and capabilities necessary for machine and equipment manufacturers to enhance their current designs and transition to the delivery of even smarter equipment” by consolidating their current software into one, single program, upgrading control applications, adding analytics and digital transformations, and supporting OT/IT convergence. These changes will result in overall cost reductions, new revenue opportunities, simplicity, and autonomy.
2. Niagara’s Agribusiness Sector: Towards a More Resilient Innovation Cluster	Brock University (Niagara Community Observatory)	2019	This paper provides a multidimensional analysis of the agribusiness sector in Niagara, Ontario. The paper provides evidence that the agribusiness sector is indeed growing, and is one of the primary pillars of the region’s economy. The paper additionally highlights some of the challenges faced by the region, including lock-ins, organizational thinness, and internal fragmentation. The paper suggests globalization and technology as disruptive forces to leverage to keep the economic sector strong and resilient. The paper lastly recommends building connections with other sectors, such as manufacturing, to maximize the synergies of the value chain.
3. Responding to Automation	The Conference Board of Canada	2020	Approximately one in five Canadian employees are in occupations that are at a high risk of automation, with few to no options to transition into low-risk occupations without a great deal of retraining. The top five industries in which these occupations are most concentrated are accommodation and food services, manufacturing, retail trade, construction, and health care and social assistance. The brief finds that workers who identify as Indigenous, female, youth (age 15-24) or racial minorities are disproportionately represented in the top five occupations at risk of automation.

Title of Report/Publication	Author	Date	Summary
4. Automation and Job Transformation in Canada: Who's at Risk?	Statistics Canada	2020	The paper reports that due to significant development of AI applications, coupled with the COVID-19 pandemic, significant concerns about the role of humans in the future workforce have been brought to light. However, the paper notes that the risk of automation-related job transformation is not distributed equally across different groups of workers, and additionally, that a high risk of automation does not necessarily imply a high risk of job loss, but may instead imply a certain degree of job transformation. Results from the paper also show that 10.6% of Canadian workers were at "high risk" (i.e. probability of 70% or higher) of job transformation in the year 2016. The paper notes that workers who are older, have no post-secondary credentials, have low literacy or numeracy proficiency, have low employment income, who are employed part-time, or who are employed in the manufacturing sector are at the highest risk of automation-related job transformation.
5. Technology Readiness Assessment of Automation and Robotics in the Food and Beverage Processing Sector in Canada	Government of Canada	2020	This government assessment provides a comprehensive study of automation, and identifies major drivers of automation to be labor cost and availability, cost savings, productivity, efficiency, product quality and safety, and scale and culture. The report stresses the importance of automation, and states that "food and beverage processing operations in Canada were most frequently ranked as a top priority in terms of future investment across all segments of analysis".
6. Toward Realizing Robotic Potential in Future Intelligent Food Manufacturing Systems	Innovative Food Science and Emerging Technologies (IFSET)	2020	This paper provides a comprehensive overview of the robotic potential of food manufacturing plants. The authors found that at present, food handling and packaging set up is "limited in capacity and output" due to manual processing. The authors also highlight the possibilities of robotic manufacturing, while discussing limitations of robotics in the food and agriculture sectors, including augmented intelligence, food safety and hygiene, controlled environments, and cost-effective production cycles.
7. Report from Canada's	Government of	2020	This report discusses some of Canada's economic development strategies for the agri-food

Title of Report/Publication	Author	Date	Summary
Economic Strategy Tables: The Innovation and Competitiveness Imperative	Canada		industry. The report states that as the “world’s population is projected to rise to 10 billion in 2050, there are huge opportunities to supply the growing global demand for protein” and encourages Canada to be a strong competitor. The report suggests that Canada should “seize this opportunity” by becoming a leader in innovation and a supplier to high-value markets. However, the report also notes that this growth would require overcoming internal regulatory barriers that hinder innovation, such as lagging investment, lack of firm leadership, and restricted access to workers. However, despite this, it is anticipated that investment in innovation would boost the overall competitiveness of Canada’s agri-food sector through increased automation and digitization.
8. Canada’s Farm Labor Shortage is Costing Billions and Expected to Rise: Report	Reuters	2019 – Updated in 2020	Reuters provides an industry report of Canada’s farm labor shortage, which is expected to double by 2029 to 123,000 workers, which is the equivalent of one in three jobs. The report notes that farmers in Canada often face challenges recruiting labor due to the high degree of manual labor, long hours, and seasonality of the type of work. The report additionally found that in 2017, the sector was short 16,500 workers, which cost approximately \$2.9 billion in lost revenues.
9. Made in Canada: Growing Canada’s Value-Added Food Sector	Senate of Canada	2019	This report by the Senate of Canada notes that the “untapped potential of Canada’s value-added food sector presents an opportunity to increase international and interprovincial trade, inspire innovation, and break down barriers to economic growth across the country”. The report also notes that though the food processing sector is one of Canada’s biggest employers, there are still five key opportunities that present potential for growth. These opportunities include: government development of a global marketing program, regulatory updates to close the export gap, government support of research, development, and innovation, government support in breaking down barriers to growth, and government resolution of the current labor shortage.
10. SARS-COV-2 CORONAVIRUS: emphasis on automation in food industry	Tolipova, B.	2020	This article analyzes the impact of COVID-19 on the food industry, and discusses the role of automation in reducing costs and aiding in the development of the industry. The article finds that the main factors hindering the further development of the food processing industry are weak material and technical base, underdeveloped infrastructure, low levels of technology, high production costs, and a lack of private financial resources for development. The article

Title of Report/Publication	Author	Date	Summary
			also finds that the advantages of automation in the food processing industry include increased labor productivity, a secured peak of production, increased security of food products, improved quality of packaging, reduced costs, and expanded production volumes without structural changes.
11. 2020 Management Issues Survey	Alan Arcand	2020	This report is used to report back on the findings of manufacturing issues and challenges survey and does not provide any specific industry recommendations. The following survey report offers essential insights into manufacturers' existing condition, their expectations, and the industry's challenges. This survey report provides an overview of the Canadian manufacturing industry as a whole. It focuses on providing details on the sector's economic and business conditions, the impacts of COVID-19, tax and regulatory policy challenges, the adoption of technology in the industry, climate and environmental policies, labour and training challenges, and trade & global business development.
12. Manufacturing Our Future: Leveraging Manufacturing for Long-Term Canadian Prosperity	No author listed	June 2020	<p>The following report suggests that the government must work with the manufacturing industry to implement a three-phase recovery and growth strategy. The strategy is designed to help the Canadian manufacturing sector recover from the short-term losses caused by the COVID-19 pandemic and help it prosper in the long term. The strategy centers around the following three steps:</p> <ul style="list-style-type: none"> • Respond (Short-term actions): The government must refine and expand support programs and introduce consumer spending incentives. • Recover (Medium Term Actions): Efforts will be needed to help in the sector's economic recovery. This includes improving government procurement, supporting investment in manufacturing, and launching a "Made in Canada" campaign to promote local products. • Prosper (A Canadian Manufacturing Strategy): To ensure the long-term prosperity of the sector, efforts must be placed on addressing historical challenges, improving the value-chains, and leveraging the natural assets to aid in economic development. <p>While the report focuses on a wide range of actions and issues needing support, the report provides some specific technology and automation implementation actions. These</p>

Title of Report/Publication	Author	Date	Summary
			<p>recommendations include (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Expand programs aimed at technology awareness and assessments, environmental performance, and other investment and productivity-enhancing activities. • Increase technology adoption and creation through tax-based investment incentives. • Canada establish a manufacturing business leadership school that will develop the industry's future leaders by focusing on innovation and technology, global competition, and growth. • Grow the domestic skilled labour pool by improving the engagement of youth, women, and under-represented groups in manufacturing. This must include strengthening education in science, technology, engineering, and math (STEM) fields and implementing a national apprenticeship strategy <p>Create a virtual showroom for Canadian process technology companies to showcase their products as part of the Manufactured Right Here strategy.</p>
<p>13. Manufacturing Ontario's Future: Leveraging Ontario's Manufacturing Sector to Drive Ontario's Economic Success</p>	<p>Mathew Wilson and Alex Greco</p>	<p>Unclear. I believe it was developed in 2018.</p>	<p>This report outlines the "Industries 2030 Ontario" strategy, which focuses on Ontario's manufacturing sector's critical needs by helping them in the industry's sustainable growth and continued prosperity. The strategy's primary goal is to grow Ontario's manufacturing outputs to \$600 billion by 2030 (up from \$300 billion). The strategy will focus on (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Creating a competitive business environment in Ontario that, through tax and regulatory reform and lower electricity prices, reduces business costs and encourages growth and production. • Addressing current skill shortages, improve technical skills training of youth and increase support for industry-led training and skills-development initiatives. • Introduce policies and support programs that drives both foreign and domestic investment and assists companies with scale-up, technology adoption, and product commercialization.

Title of Report/Publication	Author	Date	Summary
			<p>The report's priority actions focus on reducing the cost of doing business, strengthening the labour pool, and supporting investment, technology adoption, and industry growth. The recommendations related to increasing the adoption of technologies include (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Create an investment support program to risk-share company investments in advanced manufacturing technologies. • Create manufacturing hubs and demonstration centres that connect technology companies with manufacturers across Ontario. • Fund the relaunch of the Technology Visits Program to increase manufacturing executives' education and exposure to advanced manufacturing technologies. • Increase direct investments in high-potential firms by creating a provincial risk-sharing funding program aimed at improving productivity and accelerating the commercialization of innovative products. <p>Implement a Patent Box system to reward commercialization and production of goods and advanced technologies in Ontario.</p>
14. We're Hiring: Manufacturing Workforce Survey Report	Mathew Wilson and Matt Poirier	2019	<p>The following report recommendations were created through the Workforce Survey results. The results indicated that the industry was facing significant labour challenges, which led to the development of the CME Skills Strategy. This strategy focuses on three key objectives (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Create 150,000 new full-time jobs for youth in manufacturing. • Double employer investments in workforce training. • Increase economic immigrants to 500,000 a year. <p>The report points out that automation and technology are often touted to solve the industry's labour shortage. However, survey respondents stated that automation is a small piece of the puzzle, as automation usually requires significant upskilling, which further exacerbates finding qualified staff. According to the report, this exact issue is precisely why the strategy calls for the doubling of employer investment in workforce training. The report makes the following</p>

Title of Report/Publication	Author	Date	Summary
			<p>suggestions to double this investment (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Create an Employer Training Tax Credit. <p>Help Employers Expand Work-Integrated Learning Offerings.</p>
15. Canadian Manufacturers and Exporters 2021 Ontario Pre-Budget Submission	No author listed	2021	<p>The following report acts as a submission to the Ontario provincial government. It provides a set of recommendations for the government and CME to work on and implement to help the sector recover from the pandemic's impacts and position it for future success and prosperity. Recommendations focus on the following three themes:</p> <ul style="list-style-type: none"> • Support Investment and Growth • Creative a Competitive Business Environment • Support Innovation and Commercialization. <p>Specific actions designed to increase the adoption of technology and to support innovation include (the following passage is taken verbatim from the report):</p> <ul style="list-style-type: none"> • Implement a Patent Box system to reward commercialization and production of goods and advanced technologies in Ontario. • Raise the current Ontario R&D tax credit from 4.5 percent to 10 percent for base expenditures and to 20 percent for incremental expenditures as a further inducement to encourage innovative activities in the province. <p>Continue to invest in physical infrastructure that supports manufacturing operations and economic expansion, including high-speed internet, rail, pipelines, highways, and transit.</p>

Appendix B – Primary Data Collection Tools

This section of the appendix includes the data collection tools used within the collection of primary data including:

- Online Survey of Ontario Food and Beverage Processors.
- Presentation Deck for Focus Group with Ontario Food and Beverage Processors.
- Presentation Deck for Focus Group with Ontario Food and Beverage sector Associates.



Survey of Ontario Food and Beverage Processors

The following document outlines the questions asked within the online survey of Ontario food and beverage processors.

Communique

[Food and Beverage Ontario](#) in collaboration with [MNP LLP](#), an independent consulting firm, are undertaking a research project on the adoption of automation and robotics technology within the food and beverage processing sector in Ontario ("the Sector"), funded by the Ontario Ministry of Agriculture, Food and Rural Affairs' ("OMAFRA's") Ontario Agri-Food Research Initiative Program. As such, we are seeking your perspective on:

- Current barriers and drivers as well as learnings from past adoption of automation and robotics technology within the Sector.
- Suggestions for potential actions that can be taken to support the adoption of automation and robotics technology within the Sector.

Your participation will help with:

- Developing recommendations on how to support the adoption of automation and robotics technology within the Sector.
- Aggregating key learnings and best practices on implementing automation and robotics technology within the Sector.

The survey is open now until the end of day Thursday December 3rd.

Link to survey: <https://form.simplesurvey.com/f/s.aspx?s=f82047c6-b759-464c-9edd-9525b951ce0f>

If you have any questions regarding this study and participating in this survey, please do not hesitate with contacting us by replying to this e-mail.

Thank you in advance for your time.

Jason Crawford

Introduction to the Survey

Introduction

Food and Beverage Ontario (“FBO”) in collaboration with MNP LLP (“MNP”), an independent consulting firm, are undertaking a research project on the adoption of automation and robotics technology within the food and beverage processing sector in Ontario (“the Sector”). This research project is examining the training required and the costs associated with automation and robotics technology adoption as well as the outcomes for processors that have already adopted these technologies in their operations.

As such, we are seeking the perspectives of Ontario food and beverage processors on:

- Current barriers and drivers for the adoption of automation and robotics technology within the Sector.
- Learnings from past adoption of automation and robotics technology within the Sector.
- Suggestions of potential actions that can be taken to support the adoption of automation and robotics technology within the Sector.

This research study is being funded by the Ontario Ministry of Agriculture, Food and Rural Affairs’ (“OMAFRA’s”) Ontario Agri-Food Research Initiative Program.

Your participation in this survey is voluntary. MNP will maintain the confidentiality of all collected information, with the results only being reported in a summary format.

Please complete the survey prior to the end of day Thursday December 3rd.

If you have any questions regarding this study and participating in this survey, please contact Jason Crawford (Director, Membership & Industry Relations at Food and Beverage Ontario) at jcrawford@foodandbeverageontario.ca.

Thank you in advance for your participation.

Who should complete this survey?

An Owner, President, Chief Executive Officer, General Manager, or someone familiar with your company’s adoption of automation and robotics technology within your Ontario food and beverage processing operations.

What is involved with this survey?

The survey should take approximately 35 minutes to complete, depending on the breadth of your response.

If you need to stop the survey partway through (to consult with others in your organization) and complete it later, please follow the instructions at the bottom of each page.

If you have questions or difficulties regarding the survey tool, please contact Barbara Szymczyk, MNP, at Barbara.Szymczyk@mnp.ca or 778.374.2138.

What about confidentiality?

MNP will maintain confidentiality with individual responses not being shared with any other party and organizations including OMAFRA. The results will be reported in a summary format, with any identifying information of the respondent removed.

MNP is committed to maintaining the security and accuracy of the personal information we collect to provide the highest level of service to our clients. Our privacy policy adheres to both the guidelines and principles underlying the Personal Information Protection and Electronic Documents Act, as well as our own

commitment to ensuring that clients are comfortable providing us with personal information. The MNP Privacy Policy can be viewed at <http://www.mnp.ca/en/privacy-policy>.

Who is MNP?

MNP is one of the largest accounting and consulting firms in Canada. National in scope and local in focus, MNP has proudly served individuals and public and private companies for more than 65 years. For more information, visit www.mnp.ca.



Classification Questions

The following are background questions that relate to your role and your company.

1. *[Ask all respondents]* What is the name of your organization? *Please specify.*

2. *[Ask all respondents]* What is your position within the company? *Check all that apply.*

- CEO or President
- Owner
- Senior Executive (for example, a Vice President, or an Executive Director)
- Manager or Supervisor
- Production or Operations Personnel
- Other (please specify: _____)

3. *[Ask all respondents]* Which of the following North American Industry NAICS codes would you use to describe the company's products? *Check all that apply.*

- Animal food manufacturing
This includes the manufacturing of food and feed for animals, including pets.
- Grain and oilseed milling
This includes the milling of grains and oilseeds, refining and blending fats and oils, and making breakfast cereal products.
- Sugar and confectionery product manufacturing
This includes the manufacturing of sugar and confectionery products.
- Fruit and vegetable preserving and specialty food manufacturing
This includes the manufacturing of frozen fruits and vegetables, frozen entrées and side dishes of several ingredients except seafood, and fruits and vegetables preserved by pickling, canning, dehydrating and similar processes.
- Dairy product manufacturing
This includes the manufacturing of dairy products. Those primarily engaged in manufacturing substitute products are included.
- Meat product manufacturing
This includes the manufacturing of meat products.
- Seafood product preparation and packaging
This includes the canning of seafood, including soup, smoking, salting and drying seafood, preparing fresh fish by removing heads, fins, scales, bones and entrails, shucking and packing fresh shellfish, processing marine fats and oils, and freezing seafood. Floating factory ships that are engaged in shipboard processing of seafood are also included.
- Bakeries and tortilla manufacturing
This includes the manufacturing of bakery products, except cookies and crackers. Establishments

classified in this industry may sell to commercial or retail customers, for consumption outside the premises.

- Beverage product manufacturing

This includes the manufacturing of beverages products

- Other food product manufacturing

This includes other industry groups, mainly in the manufacturing of food (e.g. snack food, coffee, tea, concentrates, syrups, condiments, and spices and other miscellaneous food products).

- Other (please specify): _____

4. *[Ask all respondents] Which of the following describes your company? Check all that apply.*

- My company has its own production facility
- My company is considered a co-packer or private label manufacturer
- My company uses the services of a co-packer or private label manufacturer
- My company is an importer of food and beverage products
- My company is a distributor of food and beverage products
- My company is a re-packer of food and beverage products
- My company operates out of a commercial kitchen
- Other (please specify): _____

5. *[Ask all respondents] Which of the following describes your company's ownership structure? Please check one.*

- Private corporation
- Public corporation
- Sole proprietorship
- Unincorporated partnership
- Other (please specify): _____

6. *[Ask all respondents] How many food and beverage processing facilities does your company have in Ontario? Please check one.*

- 0 facilities
- 1 facility
- 2 facilities
- 3 facilities
- 4 or more facilities

7. *[Ask all respondents] Does your company have food and beverage processing facilities outside of Ontario, but in Canada? Please check one.*

- Yes
- No
- Don't know

8. *[If "Yes" to question above]* How many food and beverage processing facilities does your company have outside of Ontario, and in the rest of Canada? *Please check one.*

- 0
- 1
- 2
- 3
- 4
- 5 or more facilities

9. *[Ask all respondents]* What were your company's approximate total sales revenue for Ontario food and beverage processing operations during the last fiscal year (2019)? *Please select one. (M= Million)*

- Under \$250,000
- Between \$250,000 and \$500,000
- Between \$500,000 and \$999,999
- Between \$1M and \$4.9M
- Between \$5M and \$9.9M
- Between \$10M and \$24.9M
- Between \$25M and \$49.9M
- Between \$50M and \$99.9M
- Between \$100M and \$499.9M
- Over \$500M

a. *[Ask all respondents]* Please add any clarifying comments below.

10. *[Ask all respondents]* How many staff (as full-time equivalents, and not including contract employees) did your company employ as part of the Ontario food and beverage processing operations during the last fiscal year (2019)? *Please select one.*

- Less than 5 FTE
- 5 to 24 FTE
- 25 to 49 FTE
- 50 to 74 FTE
- 75 to 99 FTE
- 100 to 199 FTE
- 200 to 499 FTE
- 500 to 999 FTE
- 1,000 or more FTE

11. *[Ask all respondents]* How would you describe innovative automation and robotics technology within the context of food and beverage processing? *Please describe.*

Barriers and Drivers

For the purposes of the following questions, we are interested in gathering information for your food and beverage processing operations based in Ontario only.

For the purposes of this survey “innovative automation and robotics technology” refers to:

- Automated equipment integration for food processing, packaging and storage (e.g. robotic sorting, automated quality control, and automated guided vehicles).
- Business systems automation (e.g. MES applications to integrate business finance and resource planning with manufacturing process).

12. *[Ask all respondents]* Please rate each of the following factors on the extent to which you see them to be barriers that get in the way of the adoption of automation and robotics technology for your food and beverage processing operations in Ontario.

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
FINANCIAL				
Cost of hiring and training of internal employees for automation and robotics <u>operations</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of hiring and training of internal employees for automation and robotics <u>maintenance</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of external automation and robotics maintenance services (contracted expertise)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of operational delays of implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor return on investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of access to capital (funding)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unknown required costs (i.e. costs of adopting/ implementing automation and robotics technology is unclear)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OPERATIONS				
Lack of availability of appropriate automation and	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
robotics equipment/infrastructure				
Lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lack of availability of external automation and robotics installation and maintenance services (contracted expertise)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate internal IT infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Currently installed automation and robotics systems (infrastructure) that prevent further adoption of technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER FACTORS				
Employment related frictions with implementation (e.g. employee resistance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Corporate (management resistance) to automation and robotics technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seasonality of production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of information on how to begin to adopt automation and robotics technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Company culture (beliefs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify): _____ <i>[Follow up question only appears if minor/moderate/major are selected]</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. *[If respondent chose "Minor Barrier", "Moderate Barrier", or "Major Barrier" as rating for "Lack of availability of appropriate automation and robotics equipment/infrastructure"]* Which of the following best describes the issue of availability of appropriate automation and robotics equipment/infrastructure? *Please select all that apply.*

- Lack of availability of equipment/infrastructure manufactured domestically (in Ontario)
- Lack of availability of equipment/infrastructure for specific desired purpose globally
- Other (please specify): _____

14. *[Ask all respondents]* Please rate each of the following factors on the extent to which you see them to be drivers that encourage the adoption of automation and robotics technology for your food and

beverage processing operations in Ontario? Check all that apply.

Factors	Rating of Factors			
	Not Applicable	Minor Driver	Moderate Driver	Major Driver
OPERATIONS				
Greater production flexibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Realized gains in productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced costs of production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better management of the inputs (resources) used in operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better management of the waste from operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved product safety, quality and/or consistency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LABOUR				
Improved workplace safety (e.g. decreasing rate of accidents)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offsetting or lowering labour costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Addressing labour gap shortages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER				
Better compliance with environmental standards or regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better compliance with food quality and safety standards or regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Innovation in (change or create new) products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved ability to compete with other national and global players	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify): _____ <i>[Follow up question only appears if minor/moderate/major are selected]</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Shared Learnings

For the purposes of the following questions, we are interested in gathering information for your food and beverage processing operations based in Ontario only.

For the purposes of this survey “innovative automation and robotics technology” refers to:

- Automated equipment integration for food processing, packaging and storage (e.g. robotic sorting, automated quality control, and automated guided vehicles).
- Business systems automation (e.g. MES applications to integrate business finance and resource planning with manufacturing process).

15. *[Ask all respondents]* When did your company last adopt new automation and robotics technology within your food and beverage processing operations in Ontario? *Please select one.*

- 0–1 years ago
- 2–3 years ago
- 3–4 years ago
- 5–10 years ago
- Over 10 years ago
- My company has not adopted automation and robotics technology *[If respondent chooses this option, skip down to “Supporting Adoption of Automation” section of questions]*

16. *[Ask all that have adopted new automation technology]* How would you describe the state of your company’s adoption of automation and robotics technology within your food and beverage processing operations in Ontario? *Please select one.*

- 1- Minimally automated
- 2-
- 3- Partially automated
- 4-
- 5- Highly automated

a. *[Ask all respondents]* Please explain.

17. *[Ask all that have adopted new automation technology]* What type of automation and robotics technology did your company adopt within your food and beverage processing operations in Ontario? *Check all that apply.*

- Food Processing Equipment
(e.g. automatic conveying, automated quality control, automation and robotics for sorting)
- Packaging Equipment
(e.g. automatic product wrapping, labelling)

- Storage Equipment
(e.g. automatic tracking of products in storage, automatic storage temperature control)
- Business Systems Automation
(e.g. MES applications to integrate business finance and resource planning with manufacturing process)
- Other (please specify): _____

18. [Ask all that have adopted new automation technology] What type of employee training was required for the adoption of these new technologies? Check all that apply.

Training of established employees for automation and robotics equipment/infrastructure:

- Installation
- Operations
- Maintenance

Training of newly hired employees for automation and robotics equipment/infrastructure:

- Installation
- Operations
- Maintenance

Other

- Other (please specify): _____
- No training was required

19. [Ask all that indicate there was training in the preceding question] How was this required training for the adoption of automation and robotics provided? Check all that apply.

- Through a post-secondary educational institution
- Training delivered by internal employee(s)
- Training delivered by expert external to company
- Online training/e-learning
- Other (please specify): _____

20. [Ask all that have adopted new automation technology] What types of costs were associated with the adoption of new automation and robotics technologies? Check all that apply.

Initial Costs

- Cost/benefit analysis study
- Research and development
- Automation and robotics equipment/infrastructure

Implementation Costs

- Change management plan development and/or consultants
- Shutting down operations for implementation (e.g. facility downtime, stocking up supplies, overtime costs)
- Re-engineering and adjustments for installation of automation and robotics equipment (infrastructure)
- Installation by external contractors of automation and robotics equipment/infrastructure)
- Installation by employees (internal) of automation and robotics equipment (infrastructure)
- Hiring and training of internal employees for automation and robotics operations

- Hiring and training of internal employees for automation and robotics maintenance

Other

- Other (please specify): _____

21. *[Ask all that have adopted new automation technology]* Did any of the following supports aid your company in overcoming barriers to adoption of automation and robotics technology? *Check all that apply.*

Financial

- Grants for capital purchases or investment in technology
- Interest-reduced loans for capital purchases or investment in technology
- R&D grants

Labor

- Labour recruitment support
- Employee training support
- Wage subsidies

Other Supports

- Other (please specify): _____

22. *[If respondent indicates having received support within question above]* Of the supports that were accessed, which were the most helpful in overcoming barriers to adoption? *Provide up to the top three types of support that were of the most benefit to your company.*

1) _____

2) _____

3) _____

23. *[Ask all that have adopted new automation technology]* What were the original goals for your company's adoption automation and robotics technology? *Check all that apply.*

OPERATIONS

- Improving product safety/quality/ consistency
- Improving production efficiency/capacity (e.g. increasing productivity)
- Improving the management of inputs and waste

LABOUR

- Alleviating lack of labour availability
- Decreasing labour costs
- Improving workplace safety (e.g. decreasing rate of accidents)

OTHER

- Improving ability to comply with food quality and safety standards/regulations
- Improving ability to comply with environmental standards/regulations
- Improving ability to compete with other national and global players
- Matching/surpassing competitors' level of automation and robotics
- Creating ability to produce a new product/innovate

Other (please specify): _____

24. *[Ask all that have adopted new automation technology]* Reflecting on what you hoped to achieve through the adoption of automation and robotics technology, to what extent were these expectations met? *Please select one.*

- 1 – Not at all
- 2
- 3 – To some extent
- 4
- 5 – To a great extent

a. *[Ask all respondents]* Please explain.

25. *[Ask all that have adopted new automation technology]* Were there any other benefits in addition to your company's goals that resulted from the adoption of automation and robotics technology? If so, please describe.

26. *[Ask all that have adopted new automation technology]* Which of the following best describe the overall outcomes of adopting automation and robotics technology? *Please select one.*

- Positive
- Neutral
- Negative

a. *[Ask all respondents]* Please explain.

27. *[Ask all that have adopted new automation technology]* What have been some key learnings from your company's adoption of automation and robotics technology?

28. *[Ask all that have adopted new automation technology]* What does your company consider to be best practices in terms of processes and information sources for adopting automation and robotics technology?

For the purposes of the following questions, we are interested in gathering information for your food and beverage processing operations based in Ontario only.

For the purposes of this survey “innovative automation and robotics technology” refers to:

- Automated equipment integration for food processing, packaging and storage (e.g. robotic sorting, automated quality control, and automated guided vehicles).
- Business systems automation (e.g. MES applications to integrate business finance and resource planning with manufacturing process).

29. *[Ask all respondents]* Does your company intend to pursue the further adoption of automation and robotics technology in the next three years?

- Yes *[Show question 30]*
- No *[Skip to question 31]*

30. *[If “Yes” to above question]* For which of the following applications does your company intend to pursue automation and robotics technology? *Check all that apply.*

- Food Processing Equipment
(e.g. automatic conveying, automated quality control, automation and robotics for sorting)
- Packaging Equipment
(e.g. automatic product wrapping, labelling)
- Storage Equipment
(e.g. automatic tracking of products in storage, automatic storage temperature control)
- Business Systems Automation
(e.g. MES applications to integrate business finance and resource planning with manufacturing process)
- Other (please specify): _____

31. *[Ask all respondents]* Which of the following supports do you feel would be of most value when it comes to supporting the adoption of automation and robotics technology?

Financial

- Grants for capital purchases or investment in technology
- Interest-reduced loans for capital purchases or investment in technology
- R&D grants

Labor

- Labour recruitment support
- Employee training support
- Wage subsidies

Other

- Other (please specify): _____

32. *[Ask all respondents]* Are there any other potential actions that can be taken by stakeholders (e.g. government, Food and Beverage Ontario, other partners) to support the adoption of innovative automation and robotics technology among food and beverage processing companies in Ontario?

33. *[Ask all respondents]* Do you have any other comments related to the adoption of innovative automation and robotics technology among food and beverage processing companies in Ontario?

Presentation Deck for Focus Groups with Ontario Food and Beverage Processors

The following document includes the presentation deck projected during the online focus groups held with Ontario food and beverage processors.



Study of Automation in the Ontario Food and Beverage Processing Sector

Overview of the Barriers and Drivers of Automation and Robotics in the Ontario Food and Beverage Processing Sector

Focus Group

March, 2021



A dark blue presentation slide. In the top right corner is the MNP logo in white. In the center-left, the word "Introductions" is written in a large, white, sans-serif font, with a thin white horizontal line underneath it.



Introductions

- MNP LLP
- Food and Beverage Ontario
- Focus group participants:
 1. First name
 2. Name of your organization
 3. Role

3





Project Background

Study Scope



Food and Beverage Ontario (“FBO”) in collaboration with MNP are undertaking a research project on the adoption of automation within the food and beverage processing sector in Ontario.

This study aims to address:

-  Barriers to automation in the sector
-  What has led companies to invest in automation (drivers)
-  The types and costs of training required for adoption of new technologies
-  Supports for Ontario food and beverage processors to increase the adoption of automation and robotics technology

This work is being funded by the Ontario Ministry of Agriculture, Food and Rural Affairs’ (“OMAFRA’s”) Ontario Agri-Food Research Initiative (“OAFRI”) Program.

Project Background

Stakeholder Engagement



Understanding the experiences and views of Ontario food and beverage processors and subject matter experts on the topic of automation is key to the success of this project.

The study aims to gather this input through:



Online survey of Ontario food and beverage processors *(Completed)*



Focus groups

Focus Group Overview

Logistics



The focus group will build on the results of the online survey.



We will present the key findings of our survey and go through a set of open-ended discussion questions to further dive into specific topics of this study.



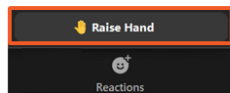
The session will conclude with a "final reflections" segment, at which point you will be able to provide any closing remarks.



Due to time constraints, please feel free to comment on the questions that resonate most with you.



In order to answer our questions throughout the focus group, please use the raise your hand function and we will call on you when it is your turn.



Raise Hand

yes

no

go slower

go faster

more

Barriers to Automation

Survey Highlights: Financial Barriers

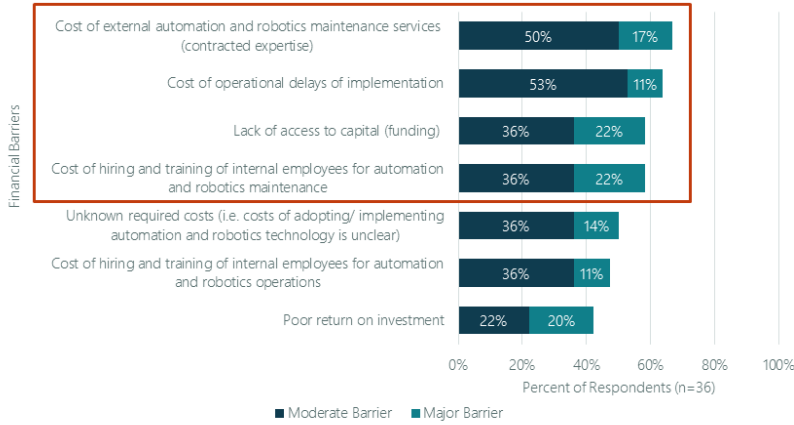
Please rate each of the following factors on the extent to which you see them to be barriers that get in the way of the adoption of automation and robotics technology for your food and beverage processing operations in Ontario.

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
FINANCIAL				
Cost of hiring and training of internal employees for automation and robotics <u>operations</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of hiring and training of internal employees for automation and robotics <u>maintenance</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of external automation and robotics maintenance services (contracted expertise)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of operational delays of implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor return on investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of access to capital (funding)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unknown required costs (i.e. costs of adopting/ implementing automation and robotics technology is unclear)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Survey Highlights: Financial Barriers



Extent of Financial Barriers to the Adoption of Automation and Robotics Technology



Question:
What has been your company's experience with accessing capital (funding) for the adoption of automation?

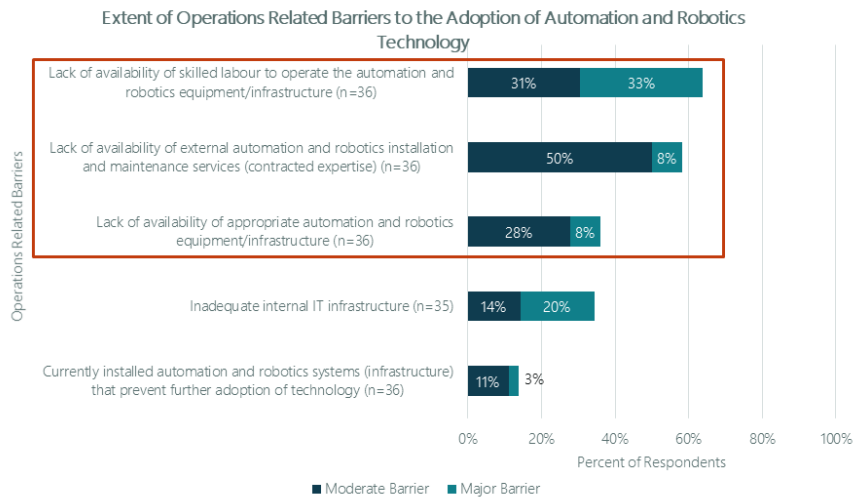
Survey Highlights: Operational Barriers



Please rate each of the following factors on the extent to which you see them to be barriers that get in the way of the adoption of automation and robotics technology for your food and beverage processing operations in Ontario.

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
OPERATIONS				
Lack of availability of appropriate automation and robotics equipment/infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of availability of external automation and robotics installation and maintenance services (contracted expertise)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate internal IT infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Currently installed automation and robotics systems (infrastructure) that prevent further adoption of technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

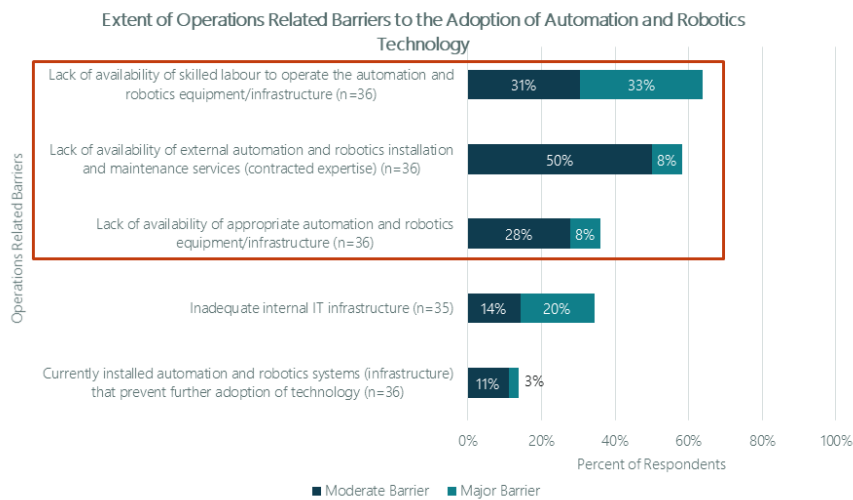
Survey Highlights: Operational Barriers



Questions:

- What has been your company's experience with finding skilled labour to operate the automation and robotics technology?
 - *In relation to "lack of...skilled labour" what types of skills are most difficult to find?*

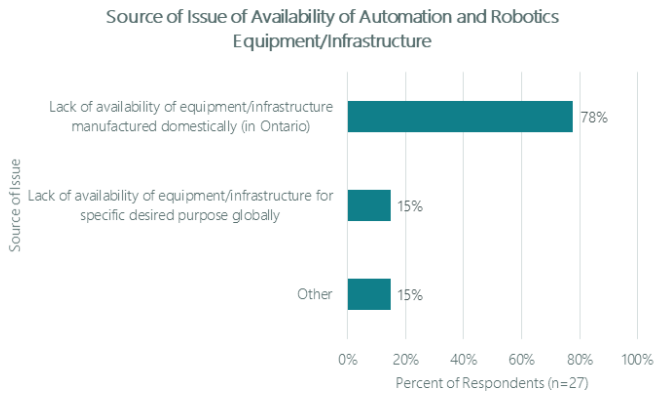
Survey Highlights: Operational Barriers



Question:

What has been your experience with finding external (contract) expertise to install and maintain the automation and robotics?

Survey Highlights: Operational Barriers



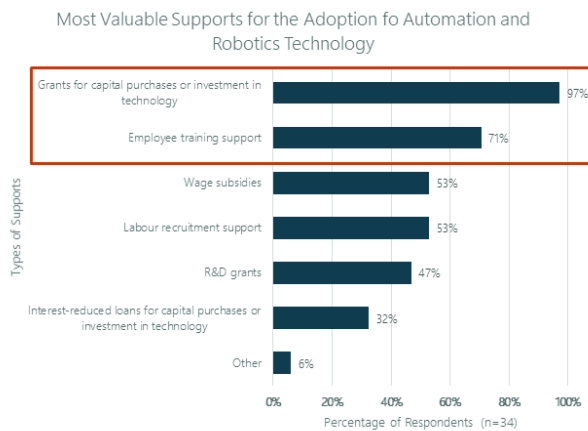
Question:
What issues (if any) would be alleviated if there was more availability of equipment (infrastructure) manufactured in Ontario?



Areas of Support

Costs Associated with the Adoption of Automation

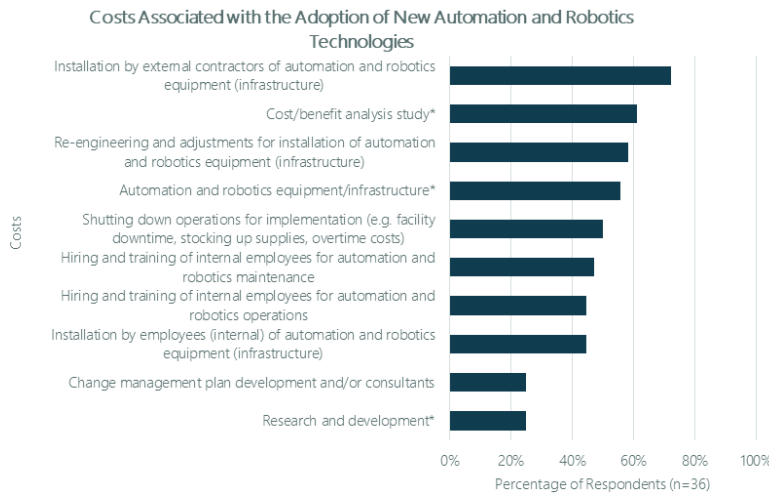
Survey Highlights: Areas of Support



Question:
What are some examples of employee training support that were of particular value to your company?

Question:
Are there any other financial incentives/supports that would help overcome barriers to the adoption of automation and technology?

Survey Highlights: Costs Associated with the Adoption of Automation



Question:
Overall, what were the top three costs associated with the adoption of automation and robotics?

Question:
Approximately, what percentage share of the overall costs were related to training of staff?

Reflections in Closing

Closing Thoughts

Question:

Do you have any final comments on how the:

- Ontario government,
- Food and Beverage Ontario, and
- other relevant stakeholders ...

... could better support the adoption of automation and technologies in the Ontario food and beverage sector?

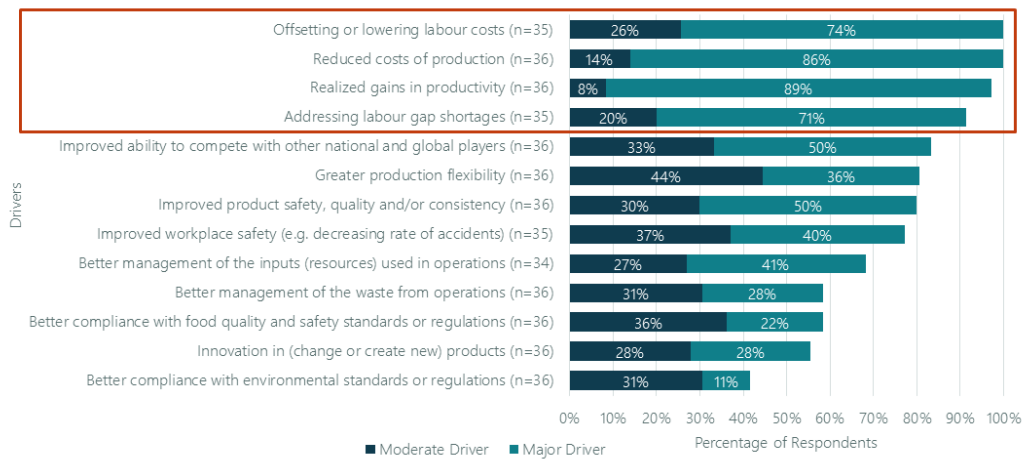
19



Appendix

Survey Highlights: Drivers

Drivers Encouraging the Adoption of Automation and Robotics Technology



Presentation Deck for Focus Group with Ontario Food and Beverage Sector Automation Associates

The following document includes the presentation deck shared during online focus group held with Ontario food and beverage automation associates.



Study of Automation in the Ontario Food and Beverage Processing Sector

Overview of the Barriers and Drivers of Automation and Robotics in the Ontario Food and Beverage Processing Sector

Focus Group

March, 2021



A dark blue presentation slide with the MNP logo in the top right corner and the word "Introductions" in white, sans-serif font on the left side, underlined.



Introductions

- MNP LLP
- Food and Beverage Ontario
- Focus group participants:
 1. First name
 2. Name of your organization
 3. Role

3





Project Background

Study Scope

MNP

Food and Beverage Ontario (“FBO”) in collaboration with MNP are undertaking a research project on the adoption of automation within the food and beverage processing sector in Ontario.

This study aims to address:

-  Barriers to automation in the sector
-  What has led companies to invest in automation (drivers)
-  The types and costs of training required for adoption of new technologies
-  Supports for Ontario food and beverage processors to increase the adoption of automation and robotics technology

This work is being funded by the Ontario Ministry of Agriculture, Food and Rural Affairs’ (“OMAFRA’s”) Ontario Agri-Food Research Initiative (“OAFRI”) Program.

Project Background

Stakeholder Engagement



Understanding the experiences and views of Ontario food and beverage processors and subject matter experts on the topic of automation is key to the success of this project.

The study aims to gather this input through:



Online survey of Ontario food and beverage processors *(Completed)*



Focus groups

Focus Group Overview

Logistics



The focus group will build on the results of the online survey.



We will present the key findings of our survey and go through a set of open-ended discussion questions to further dive into specific topics of this study.



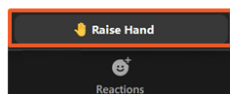
The session will conclude with a "final reflections" segment, at which point you will be able to provide any closing remarks.



Due to time constraints, please feel free to comment on the questions that resonate most with you.



In order to answer our questions throughout the focus group, please use the raise your hand function and we will call on you when it is your turn.



Barriers to Automation

Survey Highlights: Financial Barriers

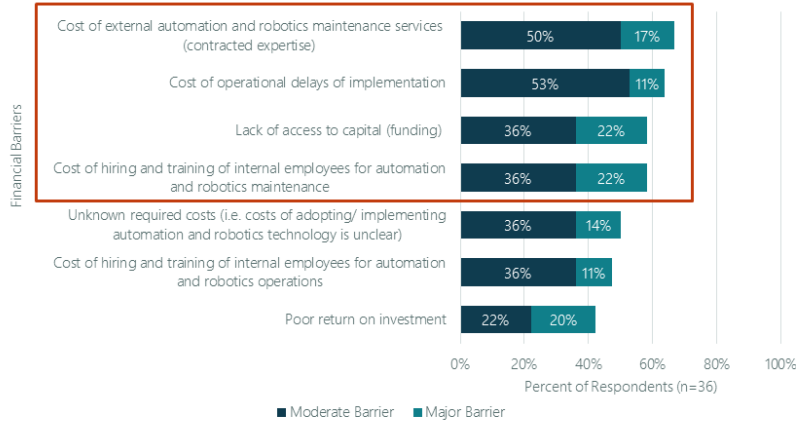
Please rate each of the following factors on the extent to which you see them to be barriers that get in the way of the adoption of automation and robotics technology for your food and beverage processing operations in Ontario.

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
FINANCIAL				
Cost of hiring and training of internal employees for automation and robotics <i>operations</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of hiring and training of internal employees for automation and robotics <i>maintenance</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Cost of operational delays of implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor return on investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of access to capital (funding)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unknown required costs (i.e. costs of adopting/ implementing automation and robotics technology is unclear)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Survey Highlights: Financial Barriers



Extent of Financial Barriers to the Adoption of Automation and Robotics Technology



Question:
In working with Ontario food and beverage companies, what have you observed from their efforts in accessing capital (funding) for the adoption of automation?

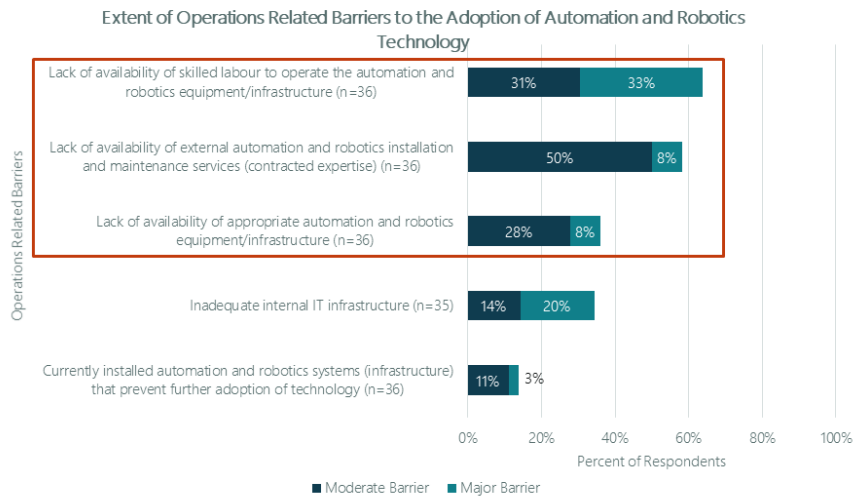
Survey Highlights: Operational Barriers



Please rate each of the following factors on the extent to which you see them to be barriers that get in the way of the adoption of automation and robotics technology for your food and beverage processing operations in Ontario.

Factors	Rating of Factors			
	Not Applicable	Minor Barrier	Moderate Barrier	Major Barrier
OPERATIONS				
Lack of availability of appropriate automation and robotics equipment/infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of availability of skilled labour to operate the automation and robotics equipment/infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of availability of external automation and robotics installation and maintenance services (contracted expertise)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate internal IT infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Currently installed automation and robotics systems (infrastructure) that prevent further adoption of technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

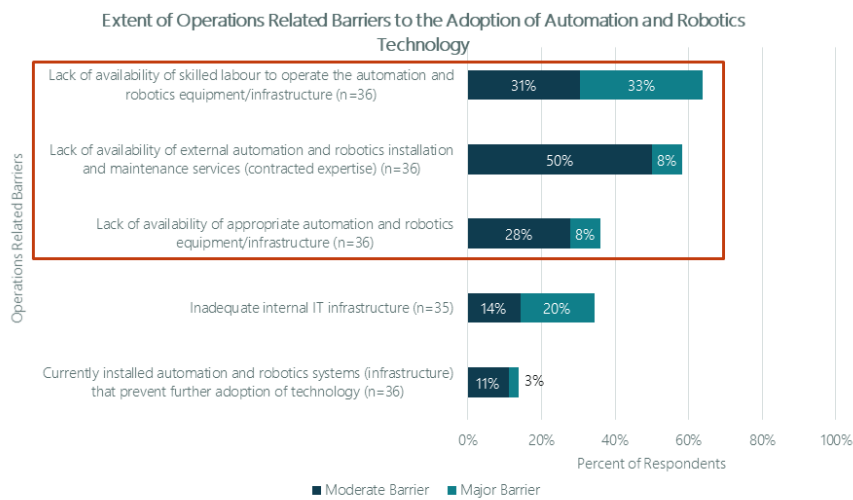
Survey Highlights: Operational Barriers



Questions:

- Please comment on the availability of skilled labour to operate the automation and robotics technology in the sector.
 - *What types of skills seem to be in most demand?*
 - *What type of related training do you provide?*

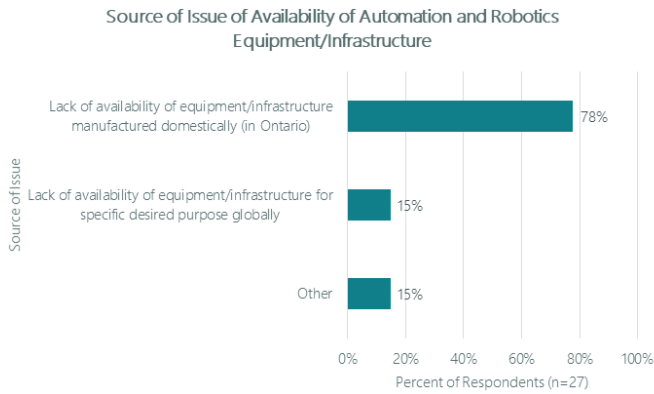
Survey Highlights: Operational Barriers



Question:

In working with Ontario food and beverage companies, what have you observed from their efforts in finding external (contract) expertise to install and maintain the automation and robotics?

Survey Highlights: Operational Barriers

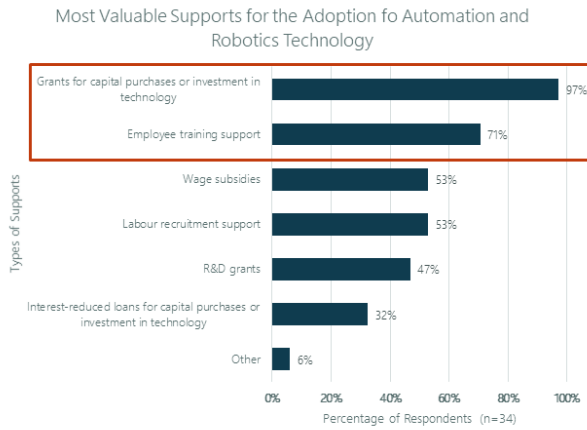


Question:
What issues (if any) would be alleviated if there was more availability of equipment (infrastructure) manufactured in Ontario?



Areas of Support

Survey Highlights: Areas of Support



Question:

What are some examples (if any) of employee training support that you have provided to Ontario food and beverage companies?

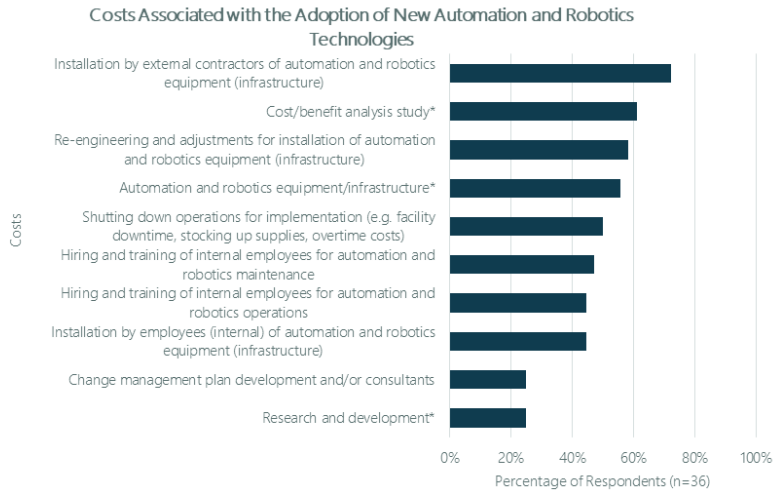
Question:

Are there any other financial incentives/supports that would help overcome barriers to the adoption of automation and technology in the sector?



Costs Associated with the Adoption of Automation

Survey Highlights: Costs Associated with the Adoption of Automation



Question:
Overall, what have you seen to be the top three costs associated with the adoption of automation and robotics?



Reflections in Closing

Closing Thoughts

Question:

Do you have any final comments on how the:

- Ontario government,
- Food and Beverage Ontario, and
- other relevant stakeholders ...

... could better support the adoption of automation and technologies in the Ontario food and beverage sector?

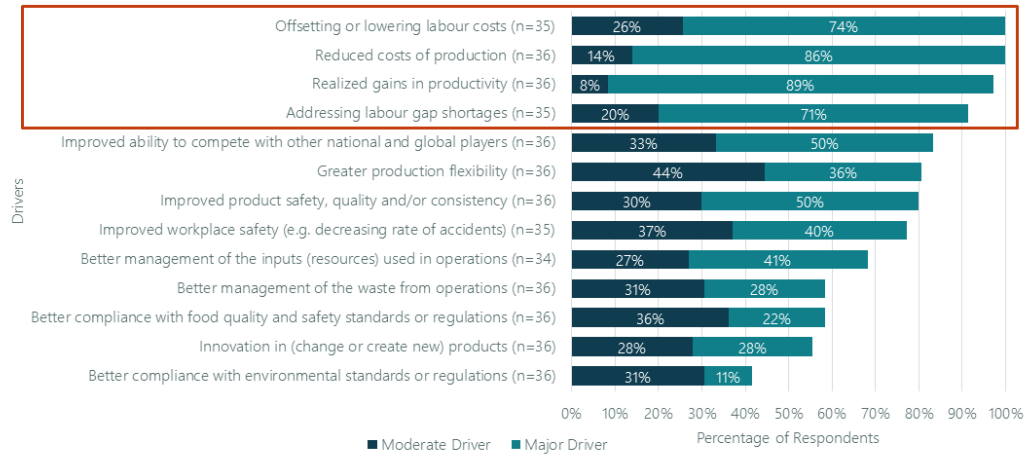
19



Appendix

Survey Highlights: Drivers

Drivers Encouraging the Adoption of Automation and Robotics Technology

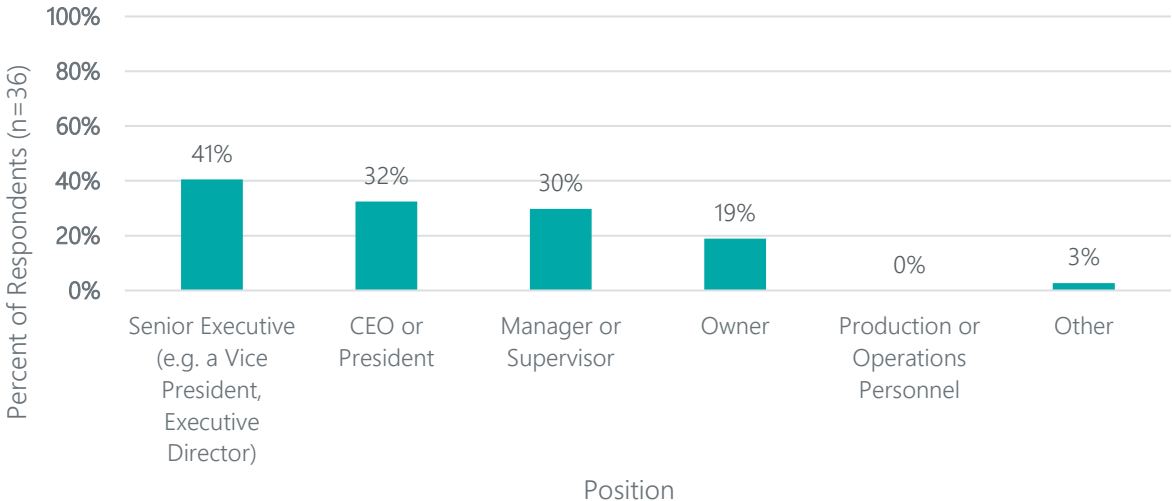


Appendix C – Detailed Results from Survey of Ontario Food and Beverage Processors

Profile of Survey Respondents

In total, participation in the survey included 36 survey respondents involved in the Sector. Figure 17 below provides a breakdown of respondents' position(s) within their respective companies is provided below. From most frequent to least, the positions represented by respondents were senior executives (41%), CEOs or presidents (32%), managers or supervisors (30%), and owners (19%). There were no production or operations personnel that completed the survey.

Figure 17: Position within Company ^{17,18}

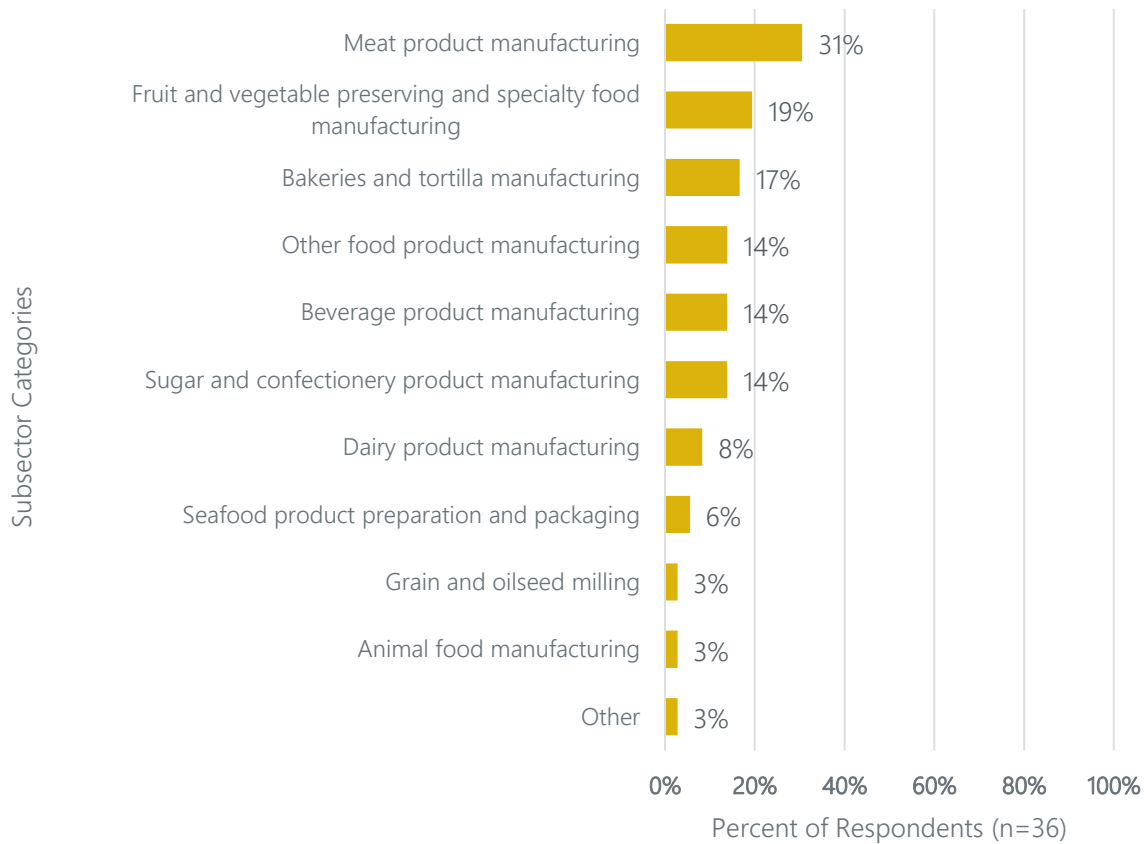


¹⁷ Respondents could select multiple options and thus the percentages do not sum to 100%.

¹⁸ The respondent that selected "Other" (3%) identified their area of work as "Government Relations".

There were a variety of subsectors represented by survey respondents.¹⁹ As shown in Figure 18 below, processors representing meat product manufacturing made up the largest subset of respondents, with almost a third selecting this category (31%). Between 14% and 19% of respondents selected the following categories: sugar and confectionary, beverages, bakeries and tortilla, fruit and vegetable, and/or other food products²⁰. Finally, between 3% and 8% of respondents selected dairy product manufacturing, seafood product preparation and packaging, grain and oilseed milling, animal food manufacturing, or “other”.²¹

Figure 18: Percent of Companies Representing each Subsector^{22,23}



¹⁹ North American Industry Classification System (NAICS) were used as categories for subsectors. Available at: <https://www.statcan.gc.ca/eng/subjects/standard/naics/2017/v3/introduction>

²⁰ “Other food product manufacturing” within the survey was defined as “... other industry groups, mainly in the manufacturing of food (e.g. snack food, coffee, tea, concentrates, syrups, condiments, and spices and other miscellaneous food products).”

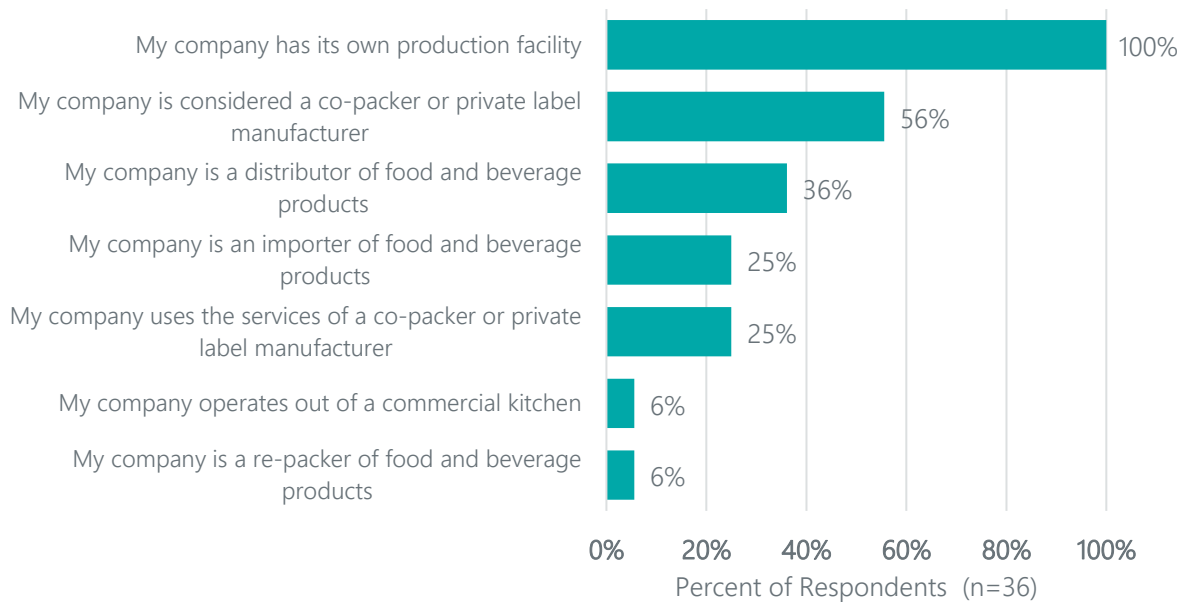
²¹ The respondent who selected “other” specified the processor as “[p]ackaged ice product manufacturer, packager and distributor.”

²² Respondents could select multiple options and thus the percentages do not sum to 100%.

²³ “Other food product manufacturing” within the survey was defined as “... other industry groups, mainly in the manufacturing of food (e.g. snack food, coffee, tea, concentrates, syrups, condiments, and spices and other miscellaneous food products).”

Figure 19 outlines the different types of processors represented by survey respondents. All respondents reported that they have their own production facility (100%) and over half of respondents (56%) were co-packers or private label manufacturers. Over one-third of respondents (36%) were distributors in the Sector and a quarter of respondents (25%) were importers of food and beverage products and/or used services of a copacker or private label manufacturer. Finally, 6% of respondents identified as operating out of a commercial kitchen or as a re-packer of food and beverage products.

Figure 19: Types of Companies ²⁴



In terms of company ownership, most respondents (83%) were from private corporations with the remainder being from public corporations (14%) and a co-op (3%). This breakdown is summarized in Figure 20 below.

As shown in Figure 21, a majority of respondents (58%) reported that their company has one processing facility. The remaining 42% of respondents' companies had two or more facilities.

²⁴ "Other food product manufacturing" within the survey was defined as "... other industry groups, mainly in the manufacturing of food (e.g. snack food, coffee, tea, concentrates, syrups, condiments, and spices and other miscellaneous food products)."

Figure 20: Company Ownership
(n=36)

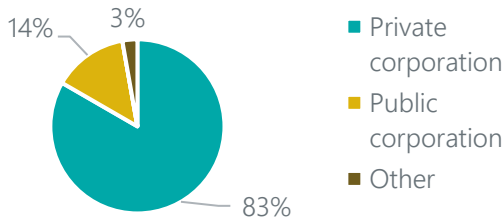


Figure 21: Number of Processing Facilities in Ontario (n=36)

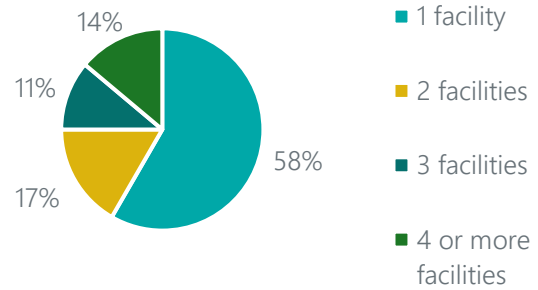


Figure 22 below, shows most respondents' companies (69%) did not have processing facilities outside of Ontario (i.e. 31% of respondents had processing facilities only in Ontario). Figure 23 below shows that of the companies that had processing facilities outside of Ontario (n=11), more than half (55%) had 5 or more facilities. The remainder (45%) had one or two facilities outside of Ontario.

Figure 22: Facilities Outside of Ontario
(n=35)

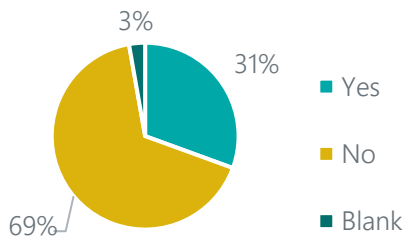
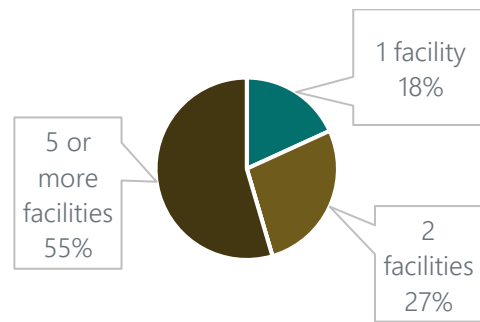
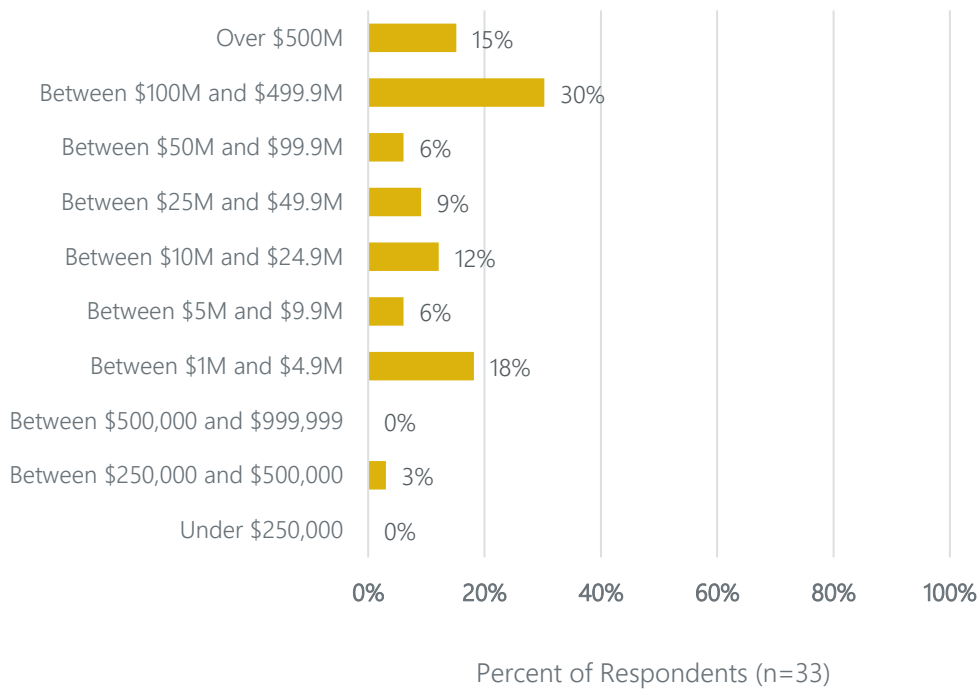


Figure 23: Number of Facilities Outside of Ontario (in Canada) (n=11)



When asked about annual revenues for their Ontario food and beverage processing operations, most respondents (97%) indicated having revenues of over 1 million dollars during fiscal 2019. Over half (51%) of respondents reported revenues between 1 and 99 million dollars and 45% of respondents reported revenues of 100 million dollars or more. Figure 24 below includes the full breakdown for each of the revenue categories included in the survey.

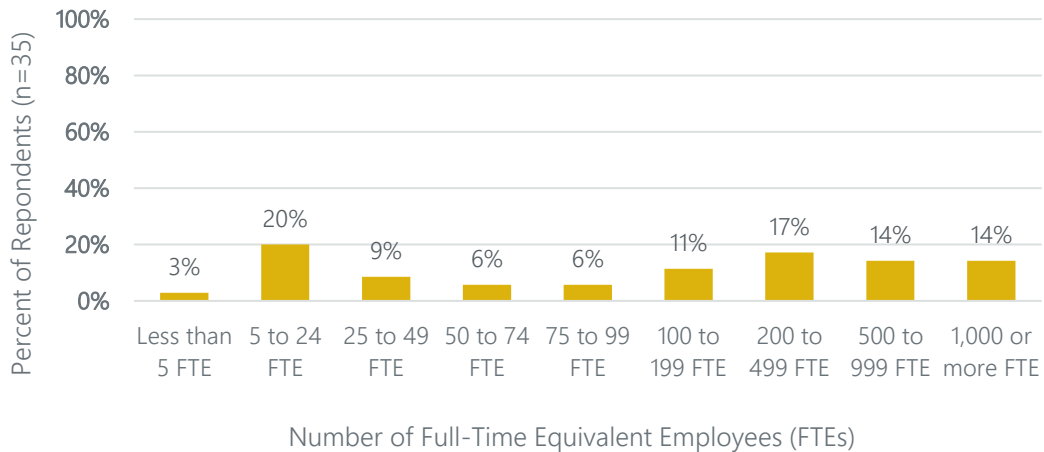
Figure 24: Company Revenue from Ontario Operations (FY 2019)



As shown in Figure 24 above, over half of respondents (58%) reported that their company has one processing facility. The remaining 42% of respondents' companies had two or more facilities.

Figure 25 below shows the wide representation and relatively even distribution of full-time equivalent (FTE) ranges by respondents' companies.

Figure 25: Number of Staff Employed in Ontario Operations

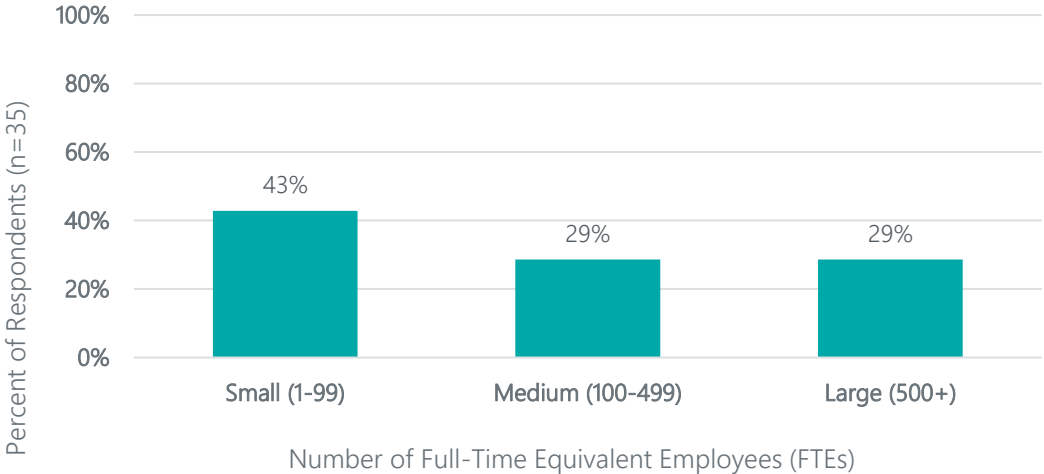


The size classification of survey respondents was developed to align with categories of company size used by Federal agencies such as Innovation Science, and Economic Development Canada. These classifications categorizing the size of respondents' companies is as follows:²⁵

- Small: From 1 to 99 FTEs.
- Medium: From 100 to 499 FTEs.
- Large: Over 500 FTEs.

Figure 26 below outlines the percentage of respondents within each of the three size categories. The largest category was that of companies classified as "small" with 43 of respondents falling into this group, while 29% were classified into each of the "medium" and "large" groups.

Figure 26: Size of Companies based on Staff Employed in Ontario Operations

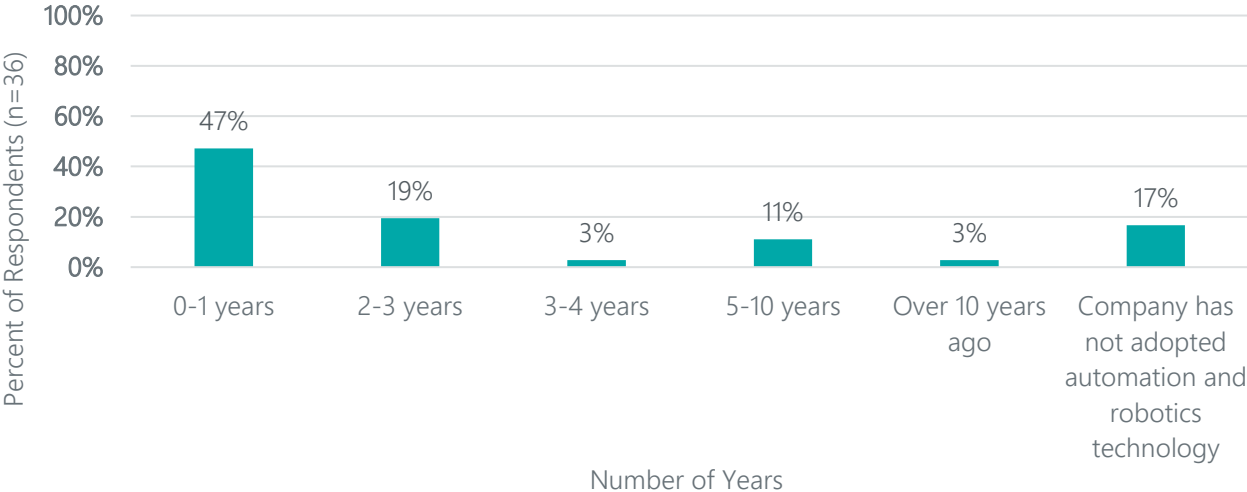


Survey respondents were asked to indicate when did their company last adopt new automation and robotics technology within their food and beverage processing operations in Ontario.

²⁵ Innovation Science, and Economic Development Canada also has a "micro" category of 1-4 FTEs but only one respondent indicated "less than 5 FTEs" in the survey so they have been added to the "small" category.

Figure 27 displays the percentage of survey respondents by when they last adopted new automation and robotics technology. Approximately half of survey respondents (47%) indicated they last adopted new automation and robotics technology in the past 0-1 years.

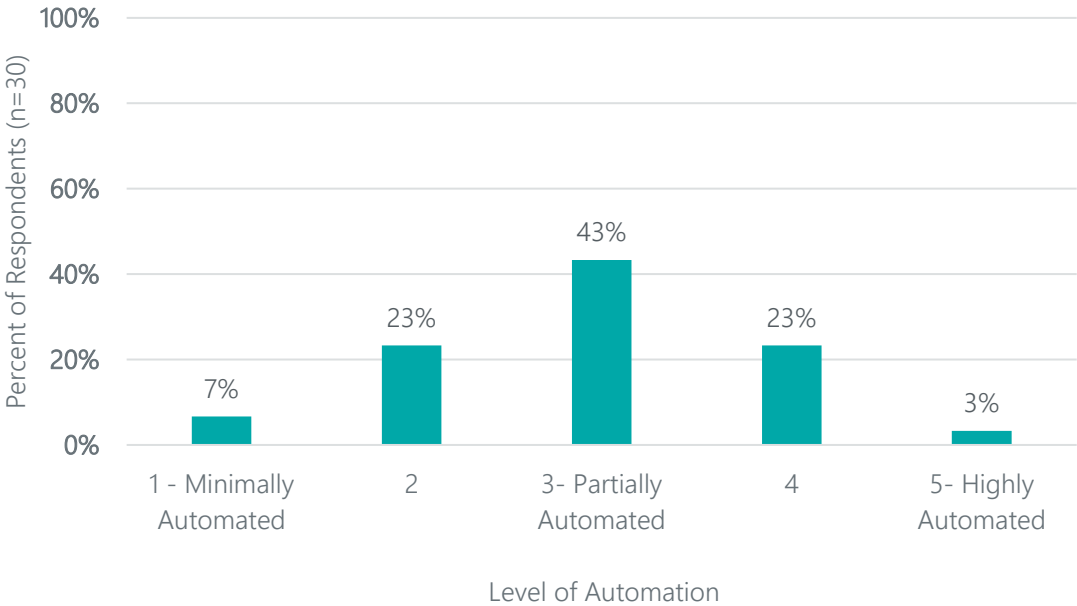
Figure 27: Adoption of New Automation and Robotics Technology



Survey respondents were asked to indicate the state of their company's adoption of automation and robotics technology within your food and beverage processing operations in Ontario.

As shown in Figure 28, 43% of survey respondents indicated their company was partially automated with only 3% indicated they were highly automated.

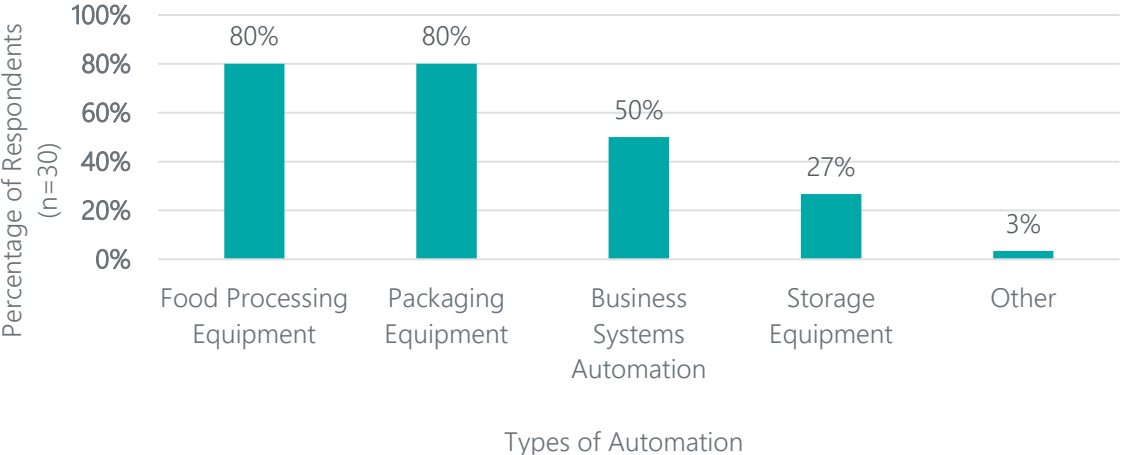
Figure 28: State of Company's Adoption of Automation and Robotics Technology



Survey respondents were asked to indicate what type of automation and robotics technology did their company adopt within your food and beverage processing operations in Ontario.

As shown in Figure 29, the most commonly adopted automation and robotics technology were food processing equipment (80%) and packaging equipment (80%).

Figure 29: Types of Automation and Robotics Technology Adopted²⁶



²⁶ Respondents could select multiple options and thus the percentage do not sum to 100%.

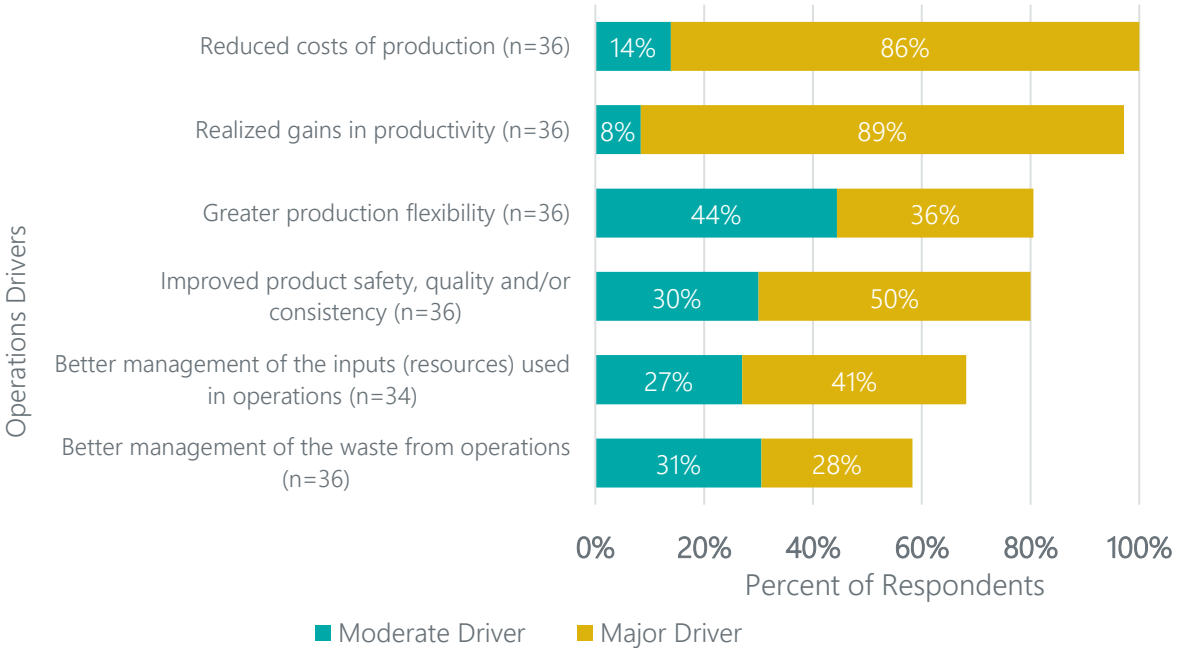
Automation Drivers

Operational Drivers

Survey respondents were asked to rate a set of given operational drivers on the extent to which they see them to be drivers that encourage the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure 30 displays the percentage of survey respondents that rated the set of operational drivers as moderate to major. The major operational drivers were “reduced costs of production” (100%), “realized gains in productivity” (97%), and “greater production flexibility” (80%).

Figure 30: Extent of Operations Related Drivers to the Adoption of Automation and Robotics Technology

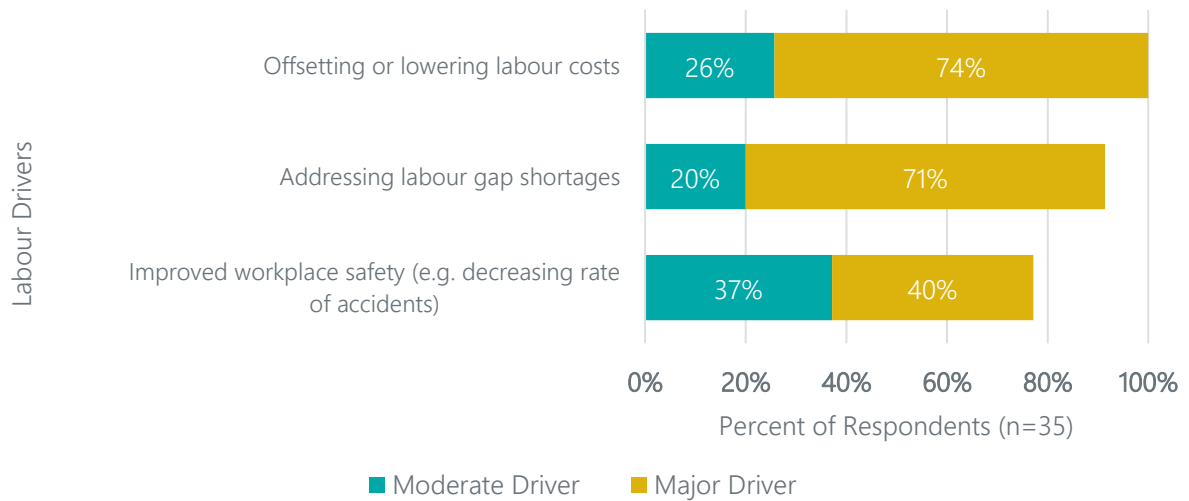


Labour Related Drivers

Survey respondents were asked to rate a set of given labour drivers on the extent to which they see them to be drivers that encourage the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure 31 displays the percentage of survey respondents that rated the set of labor drivers as moderate to major.

Figure 31: Extent of Labour Related Drivers to the Adoption of Automation and Robotics Technology

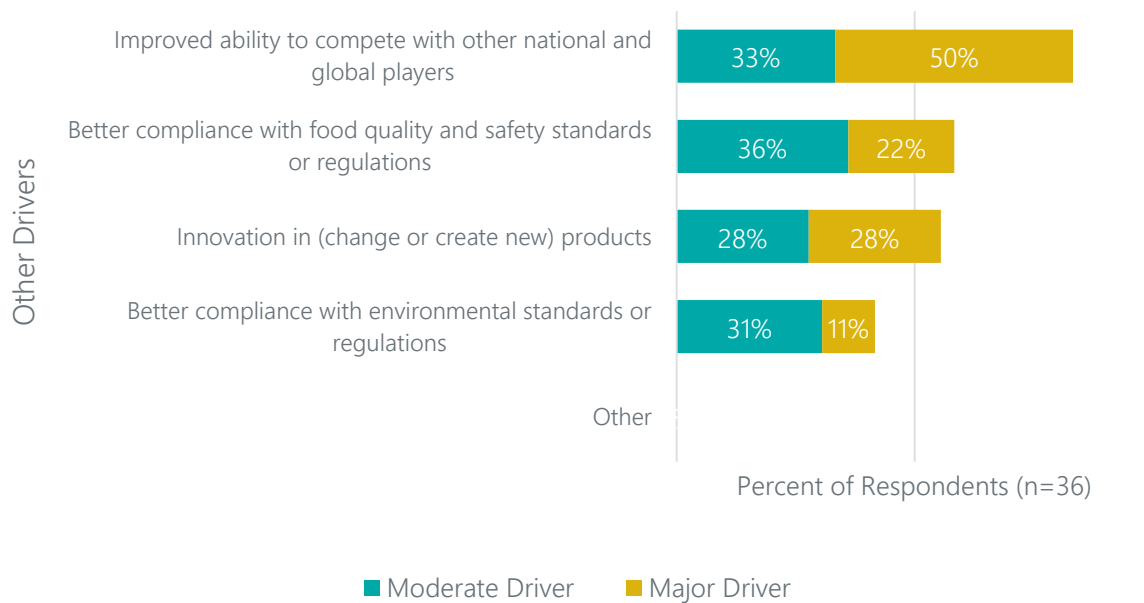


Other Drivers

Survey respondents were asked to rate a set of other types drivers on the extent to which they see them to be drivers that encourage the adoption of automation and robotics technology for their food and beverage processing operations in Ontario.

Figure 32 displays the percentage of survey respondents that rated the set of other drivers as moderate to major. The major “other” driver was “improved ability to compete with other national and global players” with 88% of survey respondents rating it either a moderate or major driver.

Figure 32: Extent of Other Drivers to the Adoption of Automation and Robotics Technology

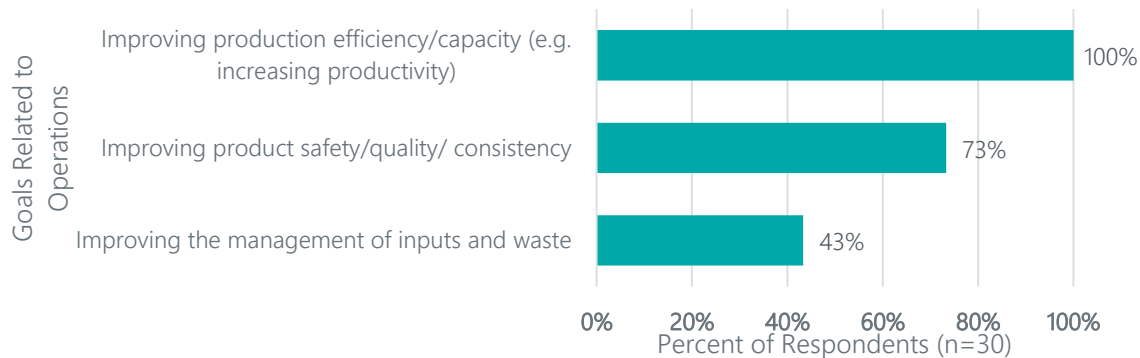


Shared Learnings

Survey respondents were asked to indicate what were their operational related goals for their company's adoption automation and robotics technology.

Figure 33 displays the percentage of survey respondents that selected the given operational related goals. The most common operational related goal was "improving production efficiency/capacity (e.g. increasing productivity)".

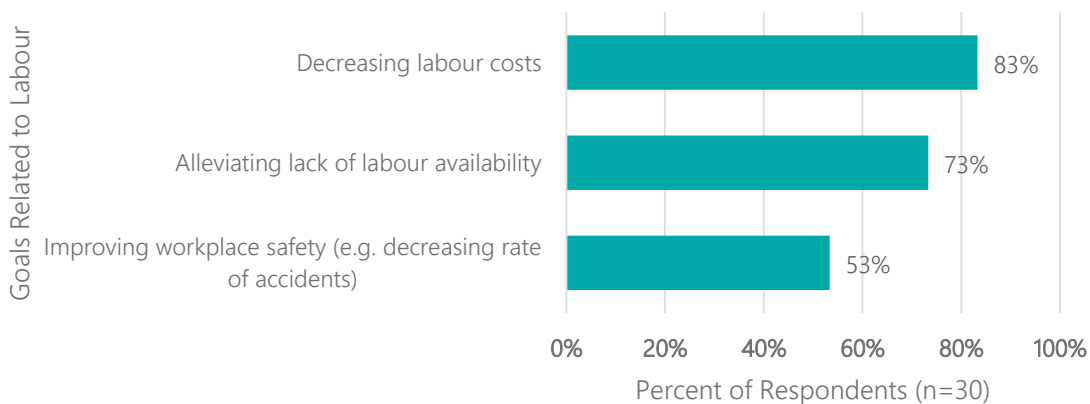
Figure 33: Companies' Goals for Adoption of Automation and Robotics Technology Related to Operations²⁷



Survey respondents were asked to indicate what were their labour related goals for their company's adoption automation and robotics technology.

Figure 34 displays the percentage of survey respondents that selected the given labour related goals.

Figure 34: Companies' Goals for Adoption of Automation and Robotics Technology Related to Labour²⁸



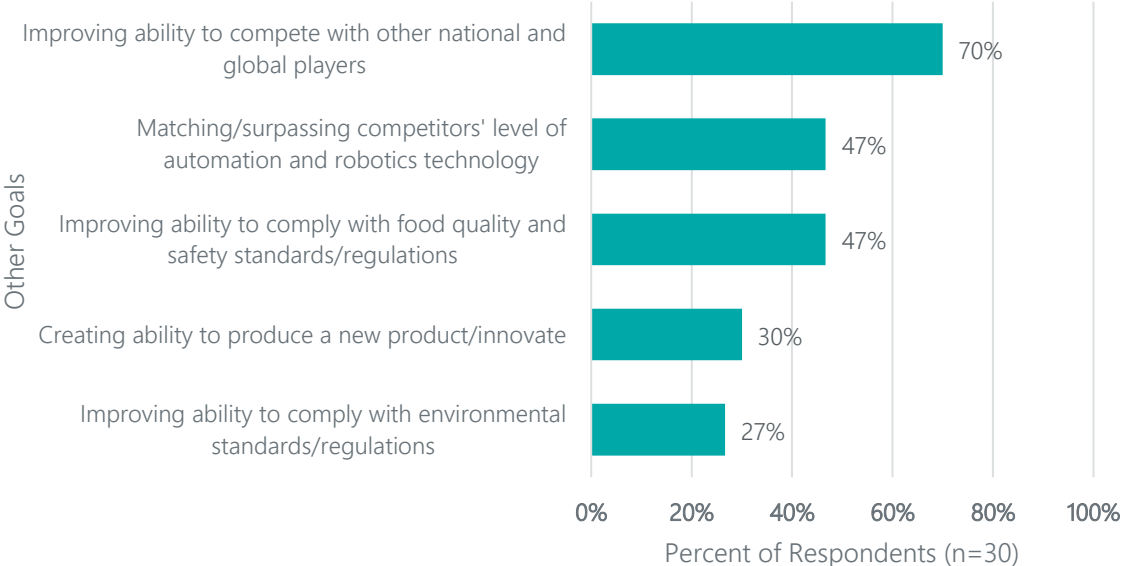
²⁷ Respondents could select multiple options and thus the percentage do not sum to 100%.

²⁸ Ibid.

Survey respondents were asked to indicate what were other types of goals for their company's adoption automation and robotics technology.

Figure 35 displays the percentage of survey respondents that selected the other given goals. The most common goal within this set of given goals was "improving ability to compete with other national and global players".

Figure 35: Companies' Other Goals for Adoption of Automation and Robotics Technology²⁹



²⁹ Respondents could select multiple options and thus the percentage do not sum to 100%.

Appendix D – About MNP

MNP is the fastest growing chartered accountancy and business advisory firm in Canada. Founded in 1958, MNP has grown from a single office in Manitoba to more than 65 offices and 3,600 team members across Canada. MNP is a member of Praxity AISBL, a global alliance of independent firms, which enables us to access a broad range of sector specific expertise worldwide.

At MNP, our professionals are the driving force behind our success. They continue to demonstrate our culture and values which is integral to the way we conduct business, both internally and externally. As such, MNP is proud to be recognized as one of the 50 Best Employers in Canada by Maclean's magazine.



MNP has a Food and Beverage Manufacturing Practice, which consists of a team of dedicated members that have a successful track record of conducting industry studies, market research studies, and economic impact engagements in the food and beverage manufacturing sector. Our team consults on a range of agri-food related topics and has carried out assignments across Canada for businesses, industry associations, and government.

Appendix E – About FBO

Food and Beverage Ontario (“FBO”) is the provincial professional leadership organization for food and beverage processors across Ontario.

Established in 2003 as the Alliance of Ontario Food Processors, FBO has evolved into the organization of choice for members of the processing community - a community that contributes over \$42 billion annually and is the number one employer in Ontario.

Governed by an industry-led Board of Directors and support from a dedicated staff team, FBO is a powerful advocate and facilitator of success for all categories of Ontario processor business. Our goal at FBO is to promote and support a competitive Ontario industry locally and within the global marketplace.

FBO’s focus is on the success, prosperity and growth of the food and beverage processing sector. We work collaboratively with our colleagues and partners across the agriculture and food sector.

For more information about FBO, please visit: <https://www.foodandbeverageontario.ca/about-fbo>



