THE BUSINESS CASE FOR APPRENTICESHIP IN BRITISH COLUMBIA

2023

CANADIAN APPRENTICESHIP FORUM
FORUM CANADIEN SUR L'APPRENTISSAGE

Canada

BRITISH COLUMBIA

Funding provided through the Canada-British Columbia Labour Market Development Agreement.

EXECUTIVE SUMMARY

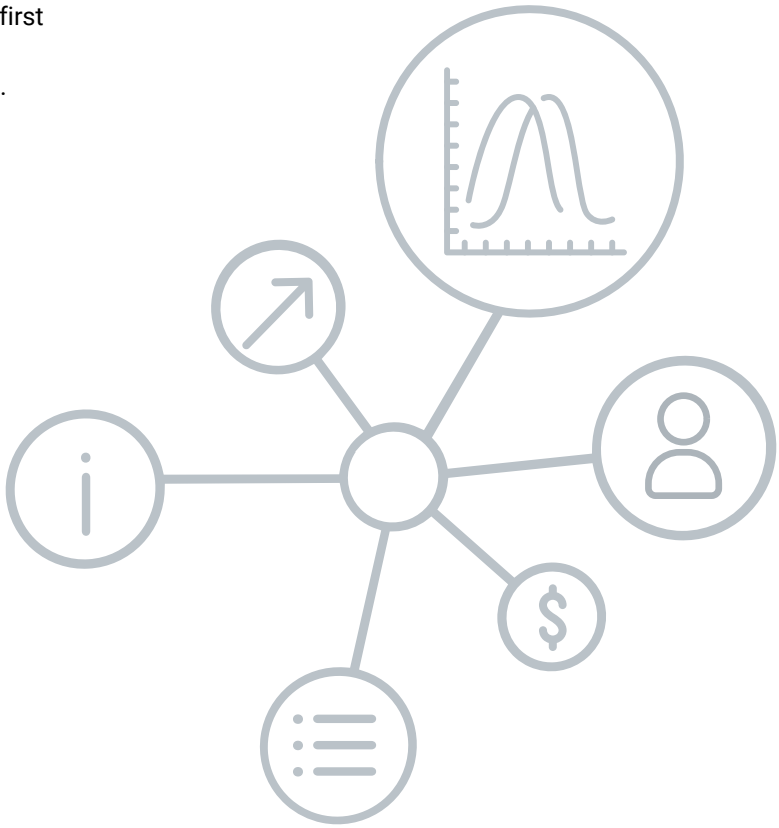
This report presents findings from the Return on Training Investment (ROTI) study for trades in British Columbia. The goal of this study was to ***assess the extent to which employers experience a positive or negative return on their investment in apprenticeship training***. The findings presented in this report are based on detailed information that was provided by 533 employers across British Columbia who employed one or more apprentices in 2022.

Results support a strong business case for employers to engage in apprenticeship training in British Columbia. The ROTI results show that there is a positive net return on investment in apprenticeship training for 12 of the 13 trades that we were able to calculate a ROTI for in this study. For every $1.00 invested in apprenticeship training, employers receive an average net return of $0.36. This ranged from an average net return of $0.35 for construction trades to $0.43 for industrial trades.

For most trades, apprentices generate positive returns for employers from Year 1 onwards. Contrary to a common myth that apprentices "cost" employers in the first year of training, data for 9 of the 12 trades where positive returns were found show positive returns throughout all years of apprenticeship. Where losses were experienced in the first year of apprenticeship training, they were minimal and positive returns were observed in year two and beyond.

There are no significant "other costs" associated with hiring and training apprentices. This research shows that the largest portion of employer costs associated with apprenticeship training is the apprentice wage and benefit costs, followed by the costs related to journeyperson time spent training and mentoring apprentices. Other costs, such as management of the apprenticeship program, wastage of materials, and cash disbursements to apprentices represented on average 1% to 3% of total costs.

In addition to the financial benefits, employers also report a range of other non-financial benefits associated with training apprentices. While the primary purpose of the study was to document the financial return associated with apprenticeship training, the surveys also collected data about other benefits experienced by employers who engage in apprenticeship training. Most employers reported positive impacts, including better retention of internally trained journeypersons and lower turnover (compared to externally hired journeypersons).



ACKNOWLEDGEMENTS

This study was conducted by the Canadian Apprenticeship Forum (CAF-FCA) in collaboration with R.A. Malatest and Associates Ltd. (Malatest) with funding provided by the B.C. Ministry of Post-Secondary Education and Future Skills. The views and opinions expressed in this report are those of its author(s) and not the official policy or position of the Government of British Columbia.

We would like to thank the Project Advisory Committee and the employers who completed the surveys. Their participation was critical to the success of this project.

Canada

BRITISH COLUMBIA

Funding provided through the Canada-British Columbia Labour Market Development Agreement.

CONTENTS

1.0 Introduction

1.1 Project Background

This study was commissioned to help better understand the actual economics associated with employer participation in apprenticeship training by providing an up-to-date and objective measure of the extent to which apprenticeship represents a net cost or a net benefit to employers. The Canadian Apprenticeship Forum (CAF-FCA) contracted R.A. Malatest and Associates Ltd. (Malatest) to evaluate the return on training investment (ROTI) in trades across the province of British Columbia.

It was envisioned that this study would help industry in a variety of skilled trades sectors to:

- build the business case for training
- help better understand why qualified employers (i.e., those with a journeyperson) elect to not employ apprentices
- improve policy decision-making on workplace training based on the actual experiences of skilled trades employers in British Columbia
- inform future training strategies that impact industry's ability to sustain itself and to remain competitive.

2.0 Methodology

2.1 Overview

This section provides an overview of the project methodology.

2.2 Survey Design

Informed by previous surveys, including the landmark studies completed in 2008 and 2009 by CAF-FCA (*It Pays to Hire an Apprentice*[1]), two employer surveys were developed. The first (Survey A), was designed to assess the costs and benefits of training apprentices in the selected trades and was targeted at employers in those trades across the province of British Columbia who employed an apprentice at the time of the survey. This survey took employers approximately 20 to 30 minutes to complete. There were 533 employers who completed this survey. The second survey (Survey B) was designed to assess the reasons why qualified employers (i.e., who employ journeypersons but who do not employ apprentices) do not hire apprentices. This survey took approximately 7 to 10 minutes to complete. There were 421 employers who completed this survey. Additional information about the key issues examined in the surveys is contained in section **2.4.2** of this report.

2.3 Survey Administration

Survey administration occurred from July 2022 to September 2022. A sample of employers in relevant sectors were invited to complete these surveys by email. The email outlined the purpose of the survey, the participation being requested, and instructions to complete the survey. Employers were provided with a URL and a unique ID to complete the survey online. They were also provided with a toll-free phone number should they wish to complete the survey by telephone or if they required support. Employers who did not respond to the initial email invitation were then contacted by telephone to remind them to complete the survey. The option of completing the survey by phone was offered to employers.

2.4 Analysis of Survey Data

The ROTI calculations are based on a cost-benefit analysis for a single employer that hires an apprentice. All costs and benefits were calculated per apprentice and per year of apprenticeship. As for the calculation of the net return to employers, each employer was assigned an equal weight, irrespective of the number of apprentices they employed. This was to maintain consistency with the 2008 and 2009 study as well as to help ensure that the reported benefit would be largely representative of all employers and not skewed by the influence of large employers who may have a different cost-benefit structure compared to small to medium-sized employers. A detailed discussion on the survey methodology, including data cleaning and ROTI calculations can be found in Appendix C of the 2009 report, It Pays to Hire an Apprentice.[2]

2.4.1 Data Cleaning

All financial data were inspected for extreme or nonsensical values. When it was possible to follow-up with the business, the data were corrected or confirmed. Any values that could not be confirmed or corrected were suppressed. Reported results are based on averages across trades and some variation within trades was expected. To minimize the impact of extreme values, the top and bottom 2.5% of cases were trimmed when calculating average costs and benefits. Finally, any missing data were imputed, where possible. When a business provided data on more than one, but not all apprentice levels, the "missing" apprentice levels were imputed. For example, if a business provided wage data for year one and year three apprentices, the wages for year two and four apprentices was imputed.

1 It Pays to Hire an Apprentice (ROTI) (caf-fca.org)

2 Ibid.

2.4.2 Cost-Benefit Model

The model considered the following **costs**:

- Wage and benefits
  - Estimates of full wages for apprentices, including base pay and non-compulsory or compulsory benefits (e.g., Employment Insurance (EI), Worker's Compensation, Canada Pension Plan, etc.).
- Opportunity costs
  - An estimate of costs related to the resources that apprentices require as part of their training process (e.g., journeyperson time spent training or supervising apprentices and wasted or damaged materials).
- Disbursements
  - An estimate of costs related to employer shares of costs to support the ongoing training and development of apprentices, (e.g., registration fees, tuition fees for continuing education or EI top up expenses).
- Administration
  - An estimate of the administrative costs associated with hiring and training apprentices (e.g., costs that are unique to hiring apprentices and managing their apprenticeship program but do not include regular administrative tasks such as payroll).

Benefits were estimated by calculating the revenue generated by or that were attributable to the apprentice. In most cases, employers reported charge-out rates and an estimate of average annual revenue associated with each apprentice was calculated based on the total annual average chargeable hours of work. It should be noted, however, that while many employers could easily compute a charge-out rate for their apprentices, some were unable to estimate this. Any employers who could not provide a charge-out rate were asked to estimate a total cost if they were to replace the work that was done by the apprentice.

Return on Training Investment (ROTI) is a ratio of benefits to costs that tells us what the return is for every $1 invested in training (e.g., the benefit for every $1 of cost).

2.4.3 ROTI Validation

In January 2023, after completion of the surveys and generating preliminary ROTI results, a series of validation sessions were organized with relevant stakeholders. The goal of these validation sessions was to examine and verify the ROTI results. In total, six focus group validation sessions were hosted with 29 participants. Participants included employers, employer association representatives and other apprenticeship stakeholders. Participants were presented with findings from the ROTI analysis and asked to comment on the findings.

2.4.4 Limitations of the Data

Survey A also collected information on additional benefits that are not easily quantifiable. Although those benefits have been captured in the survey responses, they cannot be accounted for in the ROTI calculations.

Results are based on small samples of data and must be interpreted with some caution. Furthermore, while the data were collected from the manager or supervisor who was best positioned to comment on the apprentice, the person completing the survey may not have had access to the full range of cost data for the apprentice. In this context, the results of the survey were not corroborated by financial records that could provide further insights into actual costs and benefits. Similarly, benefits related to grants and tax credits may be underestimated, as the individuals who completed the survey may not have been the same individuals who apply for tax credits and grants. Lastly, the surveys were completed between May and September and many Canadian Apprenticeship Service intermediaries did not launch their programs until October or November, so this grant was largely available after the survey period. Notwithstanding these concerns, employers spent considerable time on these surveys, and this does suggest that many respondents did consult other staff and/or review financial documents when completing them.

It should be noted that while 21 trades were selected for the ROTI analysis, small sample sizes for several trades meant that we could not present detailed ROTI data for all 21 trades. Sufficient data to present the detailed results were obtained from 13 trades but the overall ROTI estimate included data from all 21 trades. Sample sizes were too small to provide ROTI breakdowns by employer size or region.

3.0 Summary of Business Characteristics and Reported Apprentice Characteristics

3.1 Overview

This section summarizes the key characteristics of the employers based on the number of apprentices and journeypersons they hire and their geographic location. Employers also described the demographic backgrounds of their apprentices.

3.2 Reported Employer Demographics

The surveys were completed by 533 employers who had an apprentice (Survey A) and 421 who did not have an apprentice (Survey B). **Table 3.1** shows that data on the costs and benefits of hiring apprentices were collected from employers who reported on over 3,000 apprentices. As shown in the table, trades were categorized as construction trades, industrial trades, and service trades to allow for comparisons across different sectors. It should be noted that the goal of the study was to obtain a minimum of 15 valid surveys in each trade area. There were several trades, however, for which this target was not met. While data for these trades, which included bricklayer, cook, boilermaker, electric powerline and cable worker, gasfitter, steamfitter/pipefitter and mobile crane operator, were included in the overall findings, specific trade ROTI calculations are not presented due to the small sample sizes for these trades.

Table 3.1 Survey Responses by Trade

Trade	Employers	Journey-persons	Apprentices
Construction Trades	**245**	**3,571**	**2,065**
Carpenter	61	874	560
Construction Electrician	43	1,217	669
Industrial Mechanic (Millwright)	21	547	207
Plumber	39	474	319
Sheet Metal Worker	18	214	145
Refrigeration and Air Conditioning Mechanic	63	245	165
Industrial Trades	**148**	**1,880**	**412**
Heavy Duty Equipment Technician/ Mechanic	44	809	186
Industrial Electrician	63	465	132
Machinist	25	327	22
Welder	16	279	72
Service Trades	**95**	**787**	**464**
Motor Vehicle Body Repairer	17	188	105
Automotive Service Technician	63	551	319
Hairstylist	15	48	40
Other trades (small samples sizes)	**45**	**1,065**	**218**
Bricklayer	6	18	9
Cook	6	27	10
Boilermaker	2	3	2
Electric Powerline and Cable Worker	7	571	12
Gasfitter	7	44	40
Steamfitter/ Pipefitter	7	147	100
Mobile Crane Operator	10	255	45
Partsperson	0	0	0
TOTAL	**533**	**7,303**	**3,159**

Source: BC ROTI Survey A.

Data were received from employers in all regions of province (see **Table 3.2**).

Table 3.2 Location of Survey Respondents

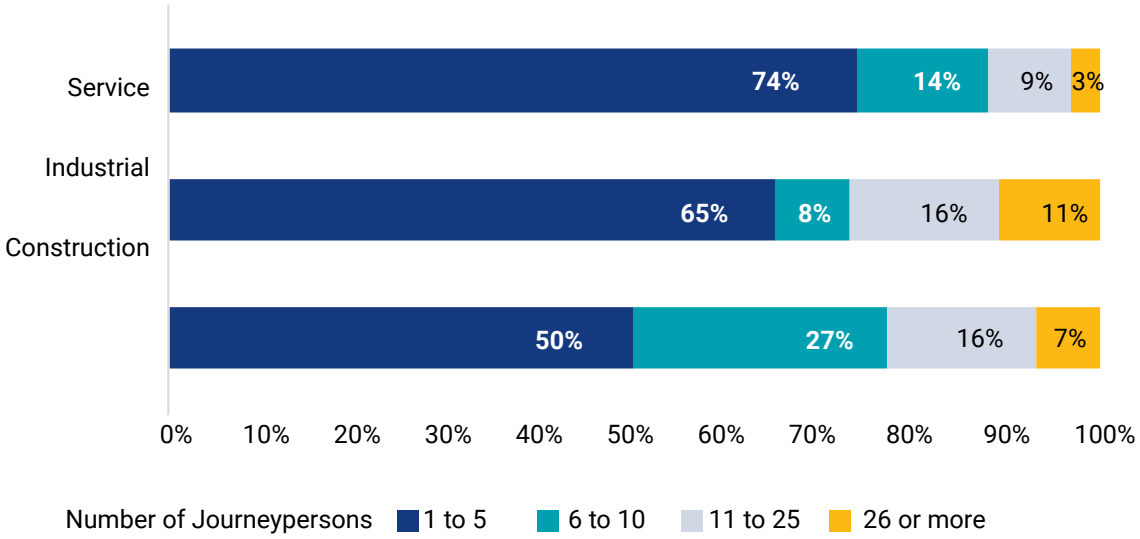
Region	Employers with Apprentices			Employers without Apprentices
	Construction	Industrial	Service	
Metro Vancouver / Lower Mainland / Fraser Valley / Southwest	51%	52%	40%	46%
Thompson-Okanagan	24%	23%	16%	12%
Vancouver Island / Coast	35%	26%	33%	21%
Kootenays	15%	10%	11%	6%
Cariboo	13%	8%	6%	6%
Nechako	11%	5%	2%	2%
Northeast	15%	5%	3%	5%
North Coast	9%	6%	3%	4%
Number of employers	**245**	**148**	**140**	**421**

Note: Percentages may sum to greater than 100% due to respondents having multiple locations throughout BC.

Source: BC ROTI Survey A.

As highlighted in **Figure 3.1**, employer size ranged from small companies with only one or a few journeypersons to larger companies with 25 or more journeypersons.

Figure 3.1 Employer Size (based on number of journeypersons)



Source: BC ROTI Survey A, Construction n=245; Industrial n=148; Service n=140

3.3 Reported Apprentice Demographics

Employers who hire apprentices were asked to comment on the demographic characteristics of the apprentices they currently employ. Specifically, they were asked about the age and gender identity of their apprentices and whether any of their apprentices were members of various equity priority groups.

Employers who responded to the survey reported that most of their apprentices were men (81%), and this did not differ by trade (except for the hairstylist trade). Most apprentices (59%) were between the ages of 20 and 24 at the time they were hired. Smaller proportions of apprentices (23%) were older (25-29 years old) at the time they were hired and some (10%) were younger (16-19 years old). A small proportion (5%) were over the age of 30 when they were hired (see **Table 3.3**).

Table 3.3 Employer Reported Average Age of Apprentices

Age	Percentage of Apprentices
20-24	59%
25-29	23%
16-19	10%
30+	5%

Note: Ages reflect when the employers initially hired the apprentices.

Source: BC ROTI Survey A, Q25; n=448

When asked about whether apprentices represented any equity priority groups, many employers were unsure, likely because they do not collect or track this information. Overall, approximately 27% of employers reported that some of their current apprentices identified as being from a visible minority group.[3] About one-in-five employers (19%) reported that some of their current apprentices identify as Indigenous Peoples. Finally, only a small proportion of employers (5%) reported that at least one of their current apprentices identified as being a person with a disability (see **Table 3.4**). These employer reported percentages are higher than what is typically observed in the apprentice population across Canada.[4]

Table 3.4 Employer Reported Equity Group Representation Among Apprentices

Equity Group	Percentage of Apprentices
Visible minorities	27%
Indigenous Peoples	19%
Persons with disabilities	5%

Source: BC ROTI Survey A, Q27-29; n=448

3 "Visible minority" was the term used in the survey because it is the term used by Statistics Canada: https://www12.statcan.gc.ca/census-recensement/2021/ref/98-500/006/98-500-x2021006-eng.cfm.

4 For context and information about the representation of equity groups in the apprentice population see page 6 of this report: Canada Overview Report 2015 (publications.gc.ca) Women form about half the population of Canada but make up 13.7% of apprentices. Visible minority apprentices (8.2%) make up less than half their share of the population Canada-wide. Indigenous apprentices accounted for 6.3% of all apprentices in 2015. This is a slightly higher representation than their share of the Canadian population.

4.0 Return On Training Investment Findings

4.1 Overview

This section presents findings from the cost-benefit and ROTI analysis. The overall results are outlined as well as the results by sector. The sectors are construction, industrial, and service. Please note that within tables throughout this section, some totals may not add up exactly due to rounding (i.e., some totals appear to be off by about +/- $1).

Overall, the average ROTI was $1.36 for every $1.00 invested in training, or a net benefit of $0.36. When only trades with a positive return are considered (i.e., excluding hairstylists), the average return was $1.42 for every $1.00 invested. **Table 4.1** indicates the return for each trade. As noted previously, the survey yielded sufficient data to calculate the ROTI for 13 trades.

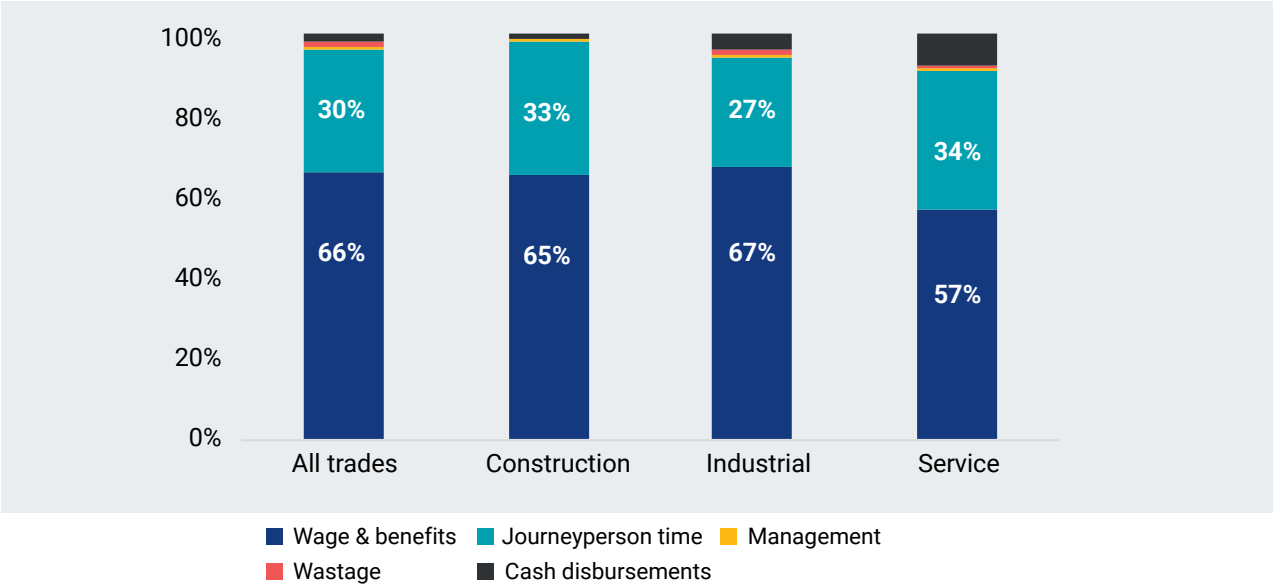
Table 4.1 Summary of ROTI Findings

Trade	Average ROTI
Motor Vehicle Body Repairer	$1.91
Sheet Metal Worker	$1.72
Welder	$1.61
Industrial Mechanic (Millwright)	$1.50
Construction Electrician	$1.42
Heavy Duty Equipment Technician/Mechanic	$1.41
Machinist	$1.36
Automotive Service Technician	$1.32
Industrial Electrician	$1.31
Refrigeration and Air Conditioning Mechanic	$1.22
Carpenter	$1.20
Plumber	$1.02
Hairstylist	$0.65
Average across all trades, excluding Hairstylist	**$1.42**
Average across all trades	**$1.36**

Source: Survey A, n= 488

Figure 4.1 below shows the breakdown of training costs. The costs of training an apprentice are largely attributed to the apprentice wage and benefits (66%), and journeyperson time spent training or supervising (30%). Costs related to management of the apprentice and wastage of materials were relatively low, representing about 1% each of total costs. Costs related to cash disbursements were slightly higher for service trades, at 8%, compared to 4% for industrial trades and 1% for construction and service trades.

Figure 4.1 Distribution of Apprentice Training Costs



Source: Survey A, n= 488

4.2 Construction Trades

The results show a positive return for training investments across all six construction trades (see **Table 4.2**) for all four years of apprenticeship. The average return for every $1.00 invested was $1.35. Reported benefits range from $1.02 for plumbers to $1.72 for sheet metal workers.

Table 4.2 Summary of Estimated Costs and Benefits

Trade	Total Costs	Total Benefits	Net Benefits	ROTI
Sheet Metal Worker	$295,380	$508,197	$212,817	$1.72
Industrial Mechanic (Millwright)	$501,823	$750,429	$248,606	$1.50
Construction Electrician	$278,579	$395,300	$116,721	$1.42
Refrigeration and Air Conditioning Mechanic	$446,821	$543,735	$96,914	$1.22
Carpenter	$308,609	$369,343	$61,082	$1.20
Plumber	$460,644	$468,380	$8,128	$1.02

Source: Survey A, n= 245

A majority of the training costs (65%) can be attributed to apprentice wages and benefits (see **Figure 4.1 above**). Journeyperson time lost to training also accounts for a significant portion of the costs (33%), while other costs, including management (1%), wastage (<1%), and cash disbursements (1%), are relatively minimal.

As can be seen in the trade specific cost-benefit information presented below, plumbers tended to report higher costs attributed to journeyperson time compared to the other construction trades. Furthermore, the average revenue appears to be lower, per apprentice per year, for plumbers compared to other trades. These two factors contributed to the smaller ROTI found for plumbers compared to other construction trades.

4.2.1 Sheet Metal Worker

The results of the cost-benefit analysis for the sheet metal worker trade are presented in **Table 4.3**. According to the cost-benefit model, employers receive a return, on average, of $1.72 for every $1.00 invested in training an apprentice, or a net return of $0.72. Results indicate a positive return for all four years of apprenticeship, totaling to an average return of $212,817 over four years.

Table 4.3 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$45,559	$50,196	$56,885	$62,195	$214,835
Journeyperson time	$32,791	$18,768	$12,481	$9,933	$73,974
Management	$0.00	$0.00	$0.00	$0.00	$0.00
Wastage	$1,280	$855	$600	$8	$2,744
Cash disbursements	$1,363	$923	$915	$624	$3,826
Total Costs	$80,993	$70,742	$70,883	$72,761	$295,380
Avg hourly wage rate	$24/hr	$26/hr	$29/hr	$32/hr	Journeyperson $39/hr
Benefits:					
Revenue from charge out	$123,930	$120,636	$128,548	$135,082	$508,197
Net Benefits	$42,937	$49,894	$57,665	$62,321	$212,817

Source: BC ROTI Survey A; n=61

4.2.2 Industrial Mechanic (Millwright)

The results of the cost-benefit analysis for industrial mechanic (millwright) apprenticeship are presented in **Table 4.4**. According to the model, employers receive a return, on average, of $1.50 for every $1.00 invested in training an industrial mechanic (millwright) apprentice. Results show a positive return for all four years of apprenticeship, totaling an average return of $248,606 over four years.

Table 4.4 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$68,978	$75,452	$85,046	$90,973	$320,449
Journeyperson time	$50,712	$40,158	$44,326	$33,592	$168,788
Management	$429	$429	$429	$429	$1,714
Wastage	$143	$1,334	$143	$143	$1,763
Cash disbursements	$3,245	$2,198	$2,179	$1,487	$9,110
Total Costs	$123,507	$119,570	$132,122	$126,624	$501,823
Avg hourly wage rate	$31/hr	$33/hr	$38/hr	$40/hr	Journeyperson $43/hr
Benefits:					
Revenue from charge out	$160,865	$177,155	$199,573	$212,836	$750,429
Net Benefits	$37,358	$57,585	$67,451	$86,212	$248,606

Source: BC ROTI Survey A; n=21

The distribution of costs for the industrial mechanic (millwright) trade shows that costs are largely attributable to wages and benefits (64%). Journeyperson time spent training (34%) also accounts for a significant proportion of costs, while management (<1%), wastage (<1%), and cash disbursements (2%) are relatively minimal.

4.2.3 Construction Electrician

As indicated by the results of the cost-benefit analysis for the construction electrician trade presented in **Table 4.5**, employers receive a return, on average, of $1.42 for every $1.00 invested in training an apprentice. Results show a positive return for all four years of apprenticeship, totaling to an average return of $116,721 over four years.

Table 4.5 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$40,977	$47,914	$54,492	$59,322	$202,705
Journeyperson time	$26,265	$21,236	$12,947	$11,342	$71,791
Management	$98	$98	$98	$98	$390
Wastage	$623	$276	$558	$127	$1,585
Cash disbursements	$751	$509	$504	$344	$2,108
Total Costs	$68,715	$70,032	$68,600	$71,232	$278,579
Avg hourly wage rate	$21/hr	$24/hr	$27/hr	$30/hr	Journeyperson $37/hr
Benefits:					
Revenue from charge out	$101,097	$90,734	$100,091	$103,378	$395,300
Net Benefits	$32,382	$20,702	$31,491	$32,146	$116,721

Source: BC ROTI Survey A; n=43

The breakdown of construction electrician training costs highlights the same pattern seen across other construction trades. Costs are largely attributed to wages and benefits (73%). Journeyperson time spent training (26%) represents the second largest proportion of costs, followed by costs attributed to management (<1%), wastage (1%), and cash disbursements (1%).

4.2.4 Refrigeration and Air Conditioning Mechanic

According to the cost-benefit model (see **Table 4.6**) the return on training investment is $1.22 for every $1.00 invested in training a refrigeration and air conditioning mechanic apprentice. Results show a positive return for all four years of apprenticeship, totaling to an average return of $96,914 over four years.

Table 4.6 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$54,864	$60,184	$74,499	$82,486	$272,033
Journeyperson time	$53,110	$50,055	$29,013	$30,634	$162,812
Management	$0	$0	$0	$0	$0
Wastage	$1,024	$716	$358	$224	$2,321
Cash disbursements	$3,439	$2,329	$2,309	$1,576	$9,654
Total Costs	$112,437	$113,284	$106,179	$114,920	$446,821
Avg hourly wage rate	$25/hr	$28/hr	$34/hr	$38/hr	Journeyperson $49/hr
Benefits:					
Revenue from charge out	$125,863	$115,320	$141,455	$161,096	$543,735
Net Benefits	$13,426	$2,036	$35,275	$46,175	$96,914

Source: BC ROTI Survey A; n=63

The breakdown of refrigeration and air conditioning mechanic training costs highlights that apprentice wage and benefits (61%) and journeyperson time spent training (36%) account for most of the costs. Costs attributed to management (<1%), wastage (1%), and cash disbursements (2%) are minimal.

4.2.5 Carpenter

The results of the cost-benefit analysis for the carpenter trade are presented in **Table 4.7**. According to the cost-benefit model, employers receive a return, on average, of $1.20 for every $1.00 invested in training an apprentice. Results show a small loss during the first year of apprenticeship but a positive return for all remaining years, totaling to an average return of $61,082 over four years.

Table 4.7 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$49,161	$54,527	$62,181	$67,741	$233,610
Journeyperson time	$21,293	$18,622	$11,375	$14,649	$65,939
Management	$1,327	$1,327	$1,327	$1,327	$5,308
Wastage	$252	$152	$134	$34	$574
Cash disbursements	$1,132	$767	$760	$519	$3,178
Total Costs	$73,166	$75,395	$75,777	$84,270	$308,609
Avg hourly wage rate	$23/hr	$26/hr	$29/hr	$32/hr	Journeyperson $37/hr
Benefits:					
Revenue from charge out	$71,253	$76,448	$104,953	$116,689	$369,343
Grants					$348
Net Benefits	-$1,913	$1,053	$29,175	$32,419	$61,082

Source: BC ROTI Survey A; n=61

The breakdown of the carpenter training costs are similar to other construction trades. Wage and benefits (76%) account for the highest proportion of costs. Secondly, journeyperson time lost to training accounts for 21% of costs. Management (2%), wastage (<1%), and cash disbursements (1%) account for relatively minimal proportions of training costs.

4.2.6 Plumber

According to the cost-benefit analysis for the plumber trade (see **Table 4.8**), employers receive a return, on average, of $1.02 for every $1.00 invested in training a plumber apprentice. Results show a positive return for the last two years of apprenticeship, totaling to an average return of $8,128 over four years.

Table 4.8 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$47,876	$54,557	$62,088	$71,861	$236,383
Journeyperson time	$74,792	$57,948	$45,396	$37,434	$215,570
Management	$1,035	$1,035	$1,035	$1,035	$4,140
Wastage	$898	$443	$362	$80	$1,783
Cash disbursements	$986	$668	$662	$452	$2,768
Total Costs	$125,587	$114,652	$109,544	$110,862	$460,644
Avg hourly wage rate	$26/hr	$30/hr	$34/hr	$40/hr	Journeyperson $47/hr
Benefits:					
Revenue from charge out	$108,374	$104,335	$126,106	$129,565	$468,380
Grants					$392
Net Benefits	-$17,212	-$10,317	$16,562	$18,703	$8,128

Source: BC ROTI Survey A; n=39

Looking at the distribution of costs, we see that wage and benefits (51%) and journeyperson time spent training (47%) account for most of the costs. Management (1%), wastage (<1%), and cash disbursements (1%) account for a fairly minimal proportion of training costs.

There are several factors that may explain the modest return for the plumber trade. The wage costs for entry level plumber apprentices tend to be higher than those of other trades. In addition, employers also noted that their first- and second-year apprentices needed more journeyperson guidance and oversight increasing the journeyperson time spent with apprentices. These factors appear to contribute to the rather modest return reported by employers who hired plumber apprentices.

4.3 Industrial Trades

Results indicate a positive return for training investments across all four industrial trades (see **Table 4.9**) for all four years of an apprenticeship. An average return of $1.43 for every $1.00 invested was observed for the industrial trades. Reported benefits ranged from $1.31 for industrial electricians to $1.62 for welders.

Table 4.9 Summary of Estimated Costs and Benefits

Trade	Total Costs	Total Benefits	Net Benefits	ROTI
Welder	$255,401	$410,080	$154,679	$1.61
Heavy Duty Equipment Technician/Mechanic	$449,225	$632,816	$183,592	$1.41
Machinist	$426,059	$580,855	$154,796	$1.36
Industrial Electrician	$299,501	$390,950	$91,446	$1.31

Source: BC ROTI Survey A; n=148

Most of the training costs (67%) can be attributed to apprentice wages and benefits (see **Table 4.10**). Journeyperson time spent training also accounts for a significant portion of the costs (27%). Other costs, including management (<1%), wastage (1%), and cash disbursements (4%) are minimal.

Table 4.10 Distribution of Apprentice Training Costs for Industrial Trades

Costs	Proportion of Cost
Wage & benefit costs	67%
Journeyperson time	27%
Management	0%
Wastage	1%
Cash disbursements	4%
Total Costs	99%

Note that total costs do not sum to 100% due to rounding.
Source: BC ROTI Survey A; n=148

Compared to construction trades, the industrial trades included in this study reported slightly higher costs attributed to cash disbursements. As highlighted in the trade specific cost-benefit data presented below, machinist employers reported significantly higher costs related to cash disbursements than other industrial trades (11% compared to the 4% average). The other industrial trades, including welder, heavy duty equipment technician, and industrial electrician, reported cash disbursements that accounted for only 1% to 3% of total costs.

4.3.1 Welder

As shown in **Table 4.11** and according to the cost-benefit model, employers receive a return, on average, of $1.61 for every $1.00 invested in training apprentice welders. Results show a positive return for all four years of apprenticeship, totaling to an average return of $154,679 over three years.

Table 4.11 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Total
Costs:				
Wage & benefit costs	$55,320	$59,086	$70,675	$185,081
Journeyperson time	$26,444	$15,093	$18,744	$60,282
Management	$714	$714	$714	$2,143
Wastage	$1,393	$2,671	$2,157	$4,800
Cash disbursements	$1,318	$893	$885	$3,096
Total Costs	$85,190	$78,458	$93,175	$255,401
Avg hourly wage rate	$25/hr	$26/hr	$32/hr	Journeyperson $38/hr
Benefits:				
Revenue from charge out	$116,050	$144,393	$149,638	$410,080
Net Benefits	$30,860	$65,935	$56,463	$154,679

Source: BC ROTI Survey A; n=25

The breakdown of training costs indicates that wages and benefits (73%) make up a majority of costs, and journeyperson time spent training (24%) also accounts for a significant proportion of costs. Management, wastage, and cash disbursements comprise relatively small proportions of the total cost of training, as each comprises 1% of the total costs.

4.3.2 Heavy Duty Equipment Technician/Mechanic

The results of the cost-benefit analysis for the heavy duty equipment technician/mechanic trade are presented in **Table 4.12**. According to the cost-benefit model, employers receive a return, on average, of $1.41 for every $1.00 invested in training an apprentice. Results show a positive return for all four years of apprenticeship, totaling to an average return of $183,592 over four years.

Table 4.12 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$59,679	$65,627	$81,533	$86,809	$293,648
Journeyperson time	$38,508	$38,139	$29,572	$34,501	$140,720
Management	$189	$189	$189	$189	$755
Wastage	$580	$603	$1,023	$170	$2,376
Cash disbursements	$4,177	$2,829	$2,805	$1,915	$11,726
Total Costs	$103,132	$107,386	$115,121	$123,585	$449,225
Avg hourly wage rate	$27/hr	$29/hr	$36/hr	$39/hr	Journeyperson $42/hr
Benefits:					
Revenue from charge out	$133,416	$152,371	$156,587	$190,442	$632,816
Net Benefits	$30,284	$44,985	$41,466	$66,857	$183,592

Source: BC ROTI Survey A; n=44

Costs are largely attributable to apprentice wage and benefits (65%) and journeyperson time spent training (31%). Management (<1%), wastage (1%), and cash disbursements (3%) account for relatively minimal proportions of costs.

4.3.3 Machinist

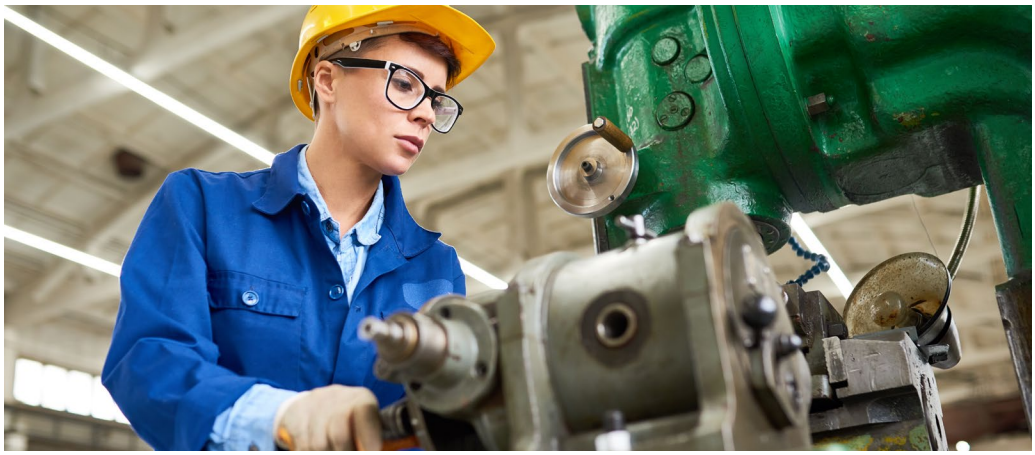
The results of the cost-benefit analysis for the machinist trade are presented in Table 4.13. According to the cost-benefit model, employers receive a return, on average, of $1.36 for every $1.00 invested in training an apprentice. Results indicate a positive return for all four years of apprenticeship, totaling to an average return of $154,796 over four years.

Table 4.13 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$47,800	$58,076	$62,129	$65,981	$233,986
Journeyperson time	$45,049	$28,886	$29,735	$35,094	$138,764
Management	$542	$542	$542	$542	$2,168
Wastage	$520	$1,240	$1,600	$840	$4,200
Cash disbursements	$16,720	$11,326	$11,230	$7,665	$46,941
Total Costs	$110,632	$100,070	$105,235	$110,122	$426,059
Avg hourly wage rate	$23/hr	$28/hr	$30/hr	$31/hr	Journeyperson $38/hr
Benefits:					
Revenue from charge out	$118,311	$145,979	$156,572	$159,993	$580,855
Net Benefits	$7,679	$45,909	$51,337	$49,871	$154,796

Source: BC ROTI Survey A; n=25

Wages and benefits (55%) account for the majority of the machinist costs. Journeyperson time spent training (33%) accounts for the second highest cost. Employers reported higher cash disbursement costs in the machinist trade than in the other industrial trades (11%). Like the other trades, both management and wastage costs are small components of the total cost of training with each comprising 1% of costs.



4.3.4 Industrial Electrician

The results of the cost-benefit analysis for the industrial electrician trade are presented in **Table 4.14**. According to the cost-benefit model, employers receive a return, on average, of $1.31 for every $1.00 invested in training an apprentice. Results show a positive return in year two of training and beyond, totaling an average return of $91,446 over four years.

Table 4.14 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$49,629	$53,304	$56,670	$67,128	$226,732
Journeyperson time	$22,221	$18,213	$14,019	$12,173	$66,626
Management	$247	$247	$247	$247	$989
Wastage	$1,476	$839	$840	$0.00	$3,155
Cash disbursements	$712	$483	$479	$327	$2,000
Total Costs	$73,574	$72,605	$71,776	$79,549	$299,501
Avg hourly wage rate	$25/hr	$27/hr	$28/hr	$33/hr	Journeyperson $38/hr
Benefits:					
Revenue from charge out	$71,846	$101,226	$106,528	$111,350	$390,950
Net Benefits	-$2,440	$28,966	$33,446	$31,474	$91,446

Source: BC ROTI Survey A; n=63

The breakdown of training costs indicates that wage and benefits (76%) compose the highest proportion of costs, followed by journeyperson time spent training (22%). Management (<1%), wastage (1%), and cash disbursements (1%) account for relatively minimal proportions of the training costs.

4.4 Service Trades

The results of the cost-benefit analysis for the service trades are presented in the following subsections. Results show a positive return across two of the three service trades, with reported benefits for automotive service technicians at $1.32 and motor vehicle body repairers at $1.91. Results show a negative return for the hairstylist trade, as the reported benefit is $0.66. Unlike construction and industrial trades, there was no discernable pattern in terms of the distribution of costs for training apprentices in service trades. The service sector is diverse spanning a variety of different occupations and it would be a challenge to draw conclusions about service trades in general based on the results available from this study.

4.4.1 Motor Vehicle Body Repairer

The results of the cost-benefit analysis for the motor vehicle body repairer trade are presented in **Table 4.15**. According to the cost-benefit model, employers receive a return, on average, of $1.91 for every $1.00 invested in training an apprentice. Results show a positive return for all four years of the apprenticeship, totaling an average return of $309,814 over four years.

Table 4.15 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$44,573	$49,425	$66,990	$64,261	$225,249
Journeyperson time	$46,317	$20,340	$24,159	$21,161	$111,977
Management	$240	$240	$240	$240	$960
Wastage	$325	$200	$125	$125	$775
Cash disbursements	$1,183	$801	$795	$542	$3,321
Total Costs	$92,639	$71,006	$92,308	$86,329	$342,282
Avg hourly wage rate	$21/hr	$23/hr	$30/hr	$31/hr	Journeyperson $35/hr
Benefits:					
Revenue from charge out	$161,262	$162,067	$162,067	$166,698	$652,095
Net Benefits	$68,624	$91,062	$69,760	$80,369	$309,814

Source: BC ROTI Survey A; n=17

The breakdown of training costs indicate that apprentice wage and benefits (66%) account for the largest proportion of costs, followed by journeyperson time spent training (33%). Management (<1%), wastage (<1%), and cash disbursements (1%) account for minimal proportions of total costs.

4.4.2 Automotive Service Technician

The results of the cost-benefit analysis for the automotive service technician trade are presented in **Table 4.16**. According to the cost-benefit model, employers receive a return, on average, of $1.32 for every $1.00 invested in training an apprentice. Results show a positive return for all four years of apprenticeship, totaling to an average return of $132,118 over four years.

Table 4.16 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Year 3	Year 4	Total
Costs:					
Wage & benefit costs	$43,885	$48,665	$54,363	$61,468	$208,382
Journeyperson time	$38,844	$35,407	$29,056	$35,324	$138,632
Management	$278	$278	$278	$278	$1,111
Wastage	$515	$608	$454	$269	$1,846
Cash disbursements	$22,728	$15,396	$15,265	$10,419	$63,809
Total Costs	$106,251	$100,353	$99,416	$107,759	$413,779
Avg hourly wage rate	$21/hr	$23/hr	$26/hr	$29/hr	Journeyperson $37/hr
Benefits:					
Revenue from charge out	$113,641	$133,504	$148,957	$149,794	$545,897
Net Benefits	$7,390	$33,151	$49,541	$42,036	$132,118

Source: BC ROTI Survey A; n=17

Apprentice wage and benefits (50%) and journeyperson time lost to training (34%) account for most of the costs. Cash disbursements account for 15% of costs, a considerably larger proportion of costs compared to other trades. Management (<1%) and wastage (1%) account for relatively minimal proportions of the training costs.

4.4.3 Hairstylist

The results of the cost-benefit analysis for the hairstylist trade are presented in **Table 4.17.** According to the cost-benefit model, employers who hire hairstylist apprentices do not experience a positive return. Results show a negative return (or loss) for all four years of $34,524 over two years. Fewer surveys were received for this trade making the sample size small. This trade is a two-year program giving employers less time to benefit from the higher returns experienced in the upper years of an apprenticeship. Employers noted in this trade that journeypersons have to spend a significant amount of time supervising apprentices in their first year.

Table 4.17 Summary of Estimated Costs and Benefits

	Year 1	Year 2	Total
Costs:			
Wage & benefit costs	$26,062	$29,227	$55,289
Journeyperson time	$27,586	$12,961	$40,547
Management	$0	$0	$0
Wastage	$113	$110	$223
Cash disbursements	$994	$673	$1,667
Total Costs	$54,755	$42,971	$96,059
Avg hourly wage rate	$17/hr	$19/hr	Journeyperson $23/hr
Benefits:			
Revenue from charge out	$27,756	$35,447	$63,203
Net Benefits	-$26,999	-$7,525	-$34,524

Source: BC ROTI Survey A; n=15

The breakdown of hairstylist training costs show that wage and benefits (58%) and journeyperson time lost to training (42%) account for almost all of the costs. Other costs, including management (<1%), wastage (<1%), and cash disbursements (2%) account for a minimal proportion of the training costs.

5.0 Hiring And Training Apprentices: Benefits And Challenges

5.1 Overview

This section summarizes key findings from Survey A (employers who hire apprentices) and Survey B (employers who do not hire apprentices). Results in this section have been separated into three categories: non-monetary benefits of hiring and training apprentices, retention of apprentices, and challenges and barriers to hiring and training apprentices.

5.2 Non-monetary benefits of hiring and training apprentices

Employers who completed Survey A were asked about the benefits of training apprentices. These benefits are not easily quantifiable but do add to the return on training investment in both financial and non-financial ways. As shown in **Table 5.1**. most employers reported that the apprentices they train are a better fit with the organization. Employers also reported better retention of the journeypersons trained internally compared to external hires. Employers across sectors consistently identify similar benefits to training apprentices.

Table 5.1 Non-Monetary Benefits of Training Apprentices

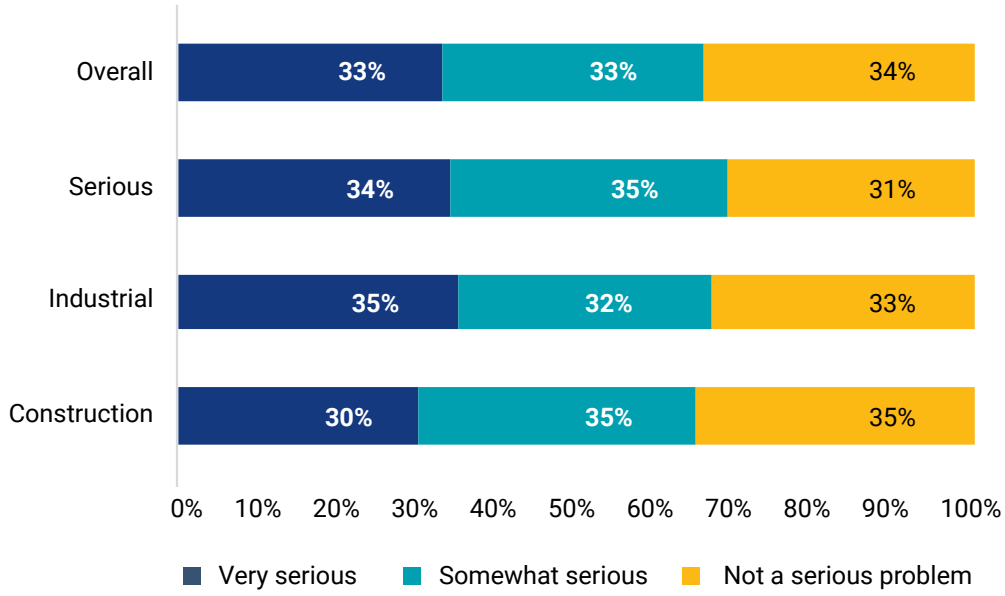
Benefit	Construction	Industrial	Service	Overall
Better fit with the organization	92%	88%	86%	89%
Better retention of employees	85%	83%	73%	81%
Potential for career advancement in the company	84%	70%	78%	79%
Avoids risk of skills shortages	73%	82%	70%	75%
Greater overall productivity	79%	65%	70%	74%
Fewer mistakes	71%	61%	58%	66%
Better health and safety performance	71%	60%	54%	66%
Better relationships with customers	63%	40%	56%	56%
Number of employers	**192**	**89**	**71**	**385**

Note: Percentages may sum to greater than 100% due to multiple responses.
Source: BC ROTI Survey A.

5.3 Retaining Apprentices

As highlighted in **Figure 5.1**, results suggest that some employers have concerns about the risk of an apprentice leaving to finish their training with another employer. This practice is commonly referred to as poaching. Overall, 67% of employers felt the risk of poaching was a "somewhat serious" or "not a serious" problem. Only one-third (33%) of employers reported it to be a "very serious" problem. Perceptions of the risk of poaching did not vary by trade.

Figure 5.1 Employer Reported Severity of Poaching Risk



Source: BC ROTI Survey A.

Despite the risk of poaching, only a small proportion (7%) of employers reported that apprentices leave the organization within one year of completing training. Approximately one-half (51%) of employers reported that apprentices tend to stay with their organization for one to five years and 42% reported that apprentices stay with the organization for five or more years after completing their training (see **Table 5.2**).

Table 5.2 Employer Reported Retention of Apprentices After Training

Retention of apprentices	Construction	Industrial	Service	Overall
Less than one year	6%	7%	5%	7%
1-5 years	55%	50%	46%	51%
5 years +	39%	43%	49%	42%
Number of employers	**192**	**89**	**71**	**385**

Source: BC ROTI Survey A.

5.4 Challenges and barriers to hiring and training apprentices

Employers who do not hire apprentices were asked about the reasons why they do not engage in apprenticeship training. Respondents were provided with a list of reasons for not hiring apprentices and asked to select the response most relevant to their situation. Across all trades, the most frequently reported reasons were:

- Cannot find apprentices to hire (32%)
- Apprentices take up too much of the journeyperson's time (24%)
- Not enough continuous work/contracts to support training apprentices (23%)
- Too few journeypersons to supervise apprentices (18%)

Table 5.3 below outlines employers' reasons for not hiring apprentices.

Table 5.3 Employer Reported Reasons for Not Hiring Apprentices

Reasons for not Hiring Apprentices	Percentage of Employers
Not enough apprentices / no-one applies to job postings	32%
Apprentices require too much of the journeyperson's time	24%
Not enough continuous contracts to sustain apprenticeships	23%
Insufficient journeypersons to supervise apprentices	18%
The possibility that an apprentice will be poached or recruited by another company	12%
In the past, my apprentices had too many essential skills issues	8%
In the past, my apprentices had too many life management issues	8%
Worker's Compensation costs for apprentices	7%
Health and safety concerns related to apprentice training	6%
Insurance costs	4%
Other	19%

Source: Survey B, Q2; n=344

Employers who do not hire apprentices were also asked about factors that would encourage them to hire apprentices in the future (see **Table 5.4**). Overall, 27% of employers reported that nothing would encourage them to hire an apprentice. The three most commonly reported factors that would encourage employers to hire an apprentice were the availability of more apprentices or a larger pool of apprentices to hire from (41%), more financial supports (32%), and more tax credits (38%).

Hairstylist employers were more likely than others to say that nothing would encourage them to hire an apprentice. In most cases, hairstylists operate at a loss when training. Most hairstylists in British Columbia pursue a non-apprenticeship pathway. There were no other discernable patterns by trade or sector.

Table 5.4 Employer Reported Factors to Encourage Hiring

Factors to Encourage Hiring	Percentage of Employers
More apprentices / I would hire apprentices if I could find them	42%
More financial support	35%
More tax credits	28%
More accessible avenues to get in contact with potential apprentices	25%
Better understanding of how to hire apprentices, including better understanding of where to find required paperwork and how to fill it out	25%
More liaison and coordination support provided by the government, a non-profit organization or an employer association	17%
More assistance with pre-screening candidates so they better meet my needs as an employer	17%
A change in the collective agreements at my organization to accommodate apprentices	12%
More information about the flexible training options available when training apprentices	11%
Nothing	27%
Other	14%

Source: Survey B, Q3, n = 421

6.0 Summary and Conclusion

6.1 Overview

Overall, the survey of employers who hire apprentices was completed by over 500 employers and the results suggest that there is a positive net return on investment. The average reported benefit depends on the trade. Benefits ranged from $1.02 for plumbers to $1.91 for motor vehicle body repairers. This amounts to a net return, on average, of $0.36, ranging from between $0.02 and $0.91 for every $1 invested in training apprentices.

Across the trades, most costs can be attributed to apprentice wages and benefits. These costs accounted for, on average, 66% of all costs associated with training apprentices. The second largest cost was journeyperson time, accounting, on average, for 30% of all costs. For most trades this cost decreases over the course of the apprenticeship as the apprentice becomes more proficient and can complete more tasks independently. Other costs associated with management of apprentices or the apprenticeship program, wastage of materials, and cash disbursements were relatively small compared to apprentice wages and benefits and journeyperson time.

For construction trades, the average return was $1.35 for every $1.00 invested. This ranged from $1.02 for plumbers to $1.72 for sheet metal workers. The distribution of costs showed that almost all the costs were attributable to apprentice wage and benefits (65%) followed by journeyperson time (33%). Management costs, costs related to wastage, and cash disbursements accounted for about 1% of the costs.

For industrial trades, the average return was $1.43 for every $1.00 invested, ranging from $1.31 for industrial electricians to $1.62 for welders. The breakdown of costs shows once more that apprentice wage and benefits account for the largest cost at 67% of total costs followed by journeyperson time at 27%. Costs attributed to the management of the apprentice and material wastage were minimal, representing only 1% of costs on average. Costs related to cash disbursements were slightly higher for industrial trades compared to construction trades, but this was largely driven by a single trade. The costs attributed to cash disbursements for machinist apprentices were reported at 11% compared to 1% to 3% for the other industrial trades.

When service trades are considered, the average return ranged from a loss of $0.66 for every $1.00 invested in training hairstylist apprentices to a positive return of $1.32 and $1.91 for automotive service technicians and motor vehicle body repairers, respectively. Given that only three trades were categorized as service trades and that there is great variability between the three, it is difficult to draw conclusions that reflect the service sector in general.

It is important to note that the applied methodology of this survey likely underestimates the actual return on training investment. Employers reported other benefits of hiring and training apprentices that, while not easily quantifiable, still save employers money. For example, most employers cited retention and lower turnover as benefits which results in lower recruitment costs.

The survey of employers who do not hire apprentices revealed common barriers to hiring apprentices. Results here suggest there may be a lack of awareness among employers about how to hire an apprentice and where to find an apprentice. Many reported that apprentices do not apply to their job postings or that they do not know how to go about hiring an apprentice. Additionally, many reported that they do not have enough continuous work to support training an apprentice. These findings may speak to the need for employer-apprentice matchmaking services or a process to help qualified employers find apprentices. For employers who report that they do not have enough continuous work, either due to the seasonal nature of their

work or slowdowns due to other factors (e.g., at the time of the survey some were still rebounding from COVID-19 pandemic work slowdowns), there may be an opportunity to share apprentices through an apprenticeship consortium or similar program, for example.

Some employers report that they do not hire apprentices because they take up too much of the journeyperson time or they are too time-consuming in general (i.e., due to management costs and resources needed to conduct training). Findings from the ROTI analysis suggests that while training an apprentice does take a substantial amount of journeyperson time, it is a profitable investment overall. These findings also highlight the relatively minimal costs associated with managing an apprentice program, which may help to allay some concerns from employers who anticipate high costs and resources devoted to apprentice management. Furthermore, most employers said the risk of poaching of apprentices was not a major concern. In fact, many employers noted they had a high level of retention as the apprentices tended to remain with the organization upon completion of the training.

Overall, the findings of this British Columbia study indicate there is a strong business case for training apprentices. The average ROTI was $1.36 for every $1.00 invested in training, or a net benefit of $0.36. When only trades with a positive return are considered (i.e., excluding hairstylists), the average return was $1.42 for every $1.00 invested.