Canadian Apprenticeship Forum
Forum canadien sur l'apprentissage

Apprenticeship – Building a skilled workforce for a strong bottom line

RETURN ON APPRENTICESHIP TRAINING INVESTMENT FOR EMPLOYERS – A STUDY OF 15 TRADES

June 2006

Canada

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Special thanks are expressed to Human Resources and Social Development Canada for its financial support and contribution to the study. Recognition should be also given to the Board of Directors of the Canadian Apprenticeship Forum – Forum canadien sur l'apprentissage (CAF-FCA) for their efforts in spearheading this initiative.

Finally, thanks to the comprehensive research and analysis conducted by R.A. Malatest & Associates Ltd., and their associated consultants.

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EXECUTIVE SUMMARY

BACKGROUND

Given the anticipated shortages of skilled trades workers, an understanding of the barriers to hiring and training apprentices is critical. The findings of a recent study commissioned by the Canadian Apprenticeship Forum – Forum canadien sur l'apprentissage (CAF-FCA) indicates that employers perceive the cost of apprenticeship as a major barrier to apprenticeship training.[1] Costs to employers not only include wages but also the time of the journeyperson who trains the apprentice. However, there may be significant benefits of apprenticeship training. For example, apprenticeship training may provide an opportunity for journeypersons to enhance their skills and knowledge. In addition, an apprentice who is trained within an organization and becomes a qualified journeyperson (i.e., a "homegrown" journeyperson) will likely be more productive relative to an externally trained journeyperson.

The perceived cost of apprenticeship and the lack of research on the benefits of apprentices were catalysts for the current study, which examines both the costs and benefits of apprenticeship training across a range of service, construction and industrial trades.

OBJECTIVES AND SCOPE OF STUDY

To gain a more comprehensive understanding of the return on apprenticeship training investment to employers, CAF-FCA commissioned R.A. Malatest & Associates Ltd. and The Conference Board of Canada to assess the costs and benefits of apprenticeship training.[2] The overall objectives of this research are:

- ⇒ To determine the overall costs incurred by employers within the apprenticeship community in hiring and training apprentices;
- ⇒ To determine which factors (e.g., employer size, region), if any, influence cost and the return on training investment; and
- ⇒ To identify monetary and non-monetary benefits of apprenticeship training.

Data was collected through a national survey of employers across 15 trade areas, which was administered by R.A. Malatest & Associates Ltd. from September 2005 to February 2006. The survey instrument was initially developed by Prism Economics and Analysis and subsequently modified by R.A. Malatest & Associates Ltd. in consultation with CAF-FCA to ensure that it would capture the information required to conduct a detailed cost-benefit analysis. Using the data provided by employers, The Conference Board of Canada produced trade-specific cost-benefit estimates to determine the net benefit (or cost) of apprenticeship training.

To ensure that a range of skilled trades were represented in the study, the costs and benefits of apprenticeship training were assessed for the following 15 trade areas:

- ⇒ Automotive Service Technician;
- ⇒ Bricklayer;
- ⇒ Carpenter;
- ⇒ Construction Electrician;
- ⇒ Cook;
- ⇒ Heavy Duty Equipment Technician;
- ⇒ Industrial Mechanic (Millwright);
- ⇒ Insulator;
- ⇒ Machinist;
- ⇒ Mobile Crane Operator;
- ⇒ Motor Vehicle Body Repairer;

[1] *CAF-FCA (2004),* Accessing and Completing Apprenticeship Training in Canada: Perceptions of Barriers.

[2] *Funding for this study was provided by the Government of Canada's Sector Council Program.*

- ⇒ Refrigeration and Air Conditioning Mechanic;
- ⇒ Sheet Metal Worker;
- ⇒ Sprinkler System Installer; and
- ⇒ Tool and Die Maker.

The *Return on Apprenticeship Training Investment to Employers: A Pilot of 15 Trade Areas* project was intended to collect information from a minimum of 300 employers across the 15 trade areas, or 20 employers per trade. This report summarizes the findings associated with the information provided by 433 employers who participated in the project.

RESEARCH CONSIDERATIONS

This study estimated the costs and benefits of apprenticeship training to employers across 15 trade areas; however, it should be noted that it was not possible to capture all variations in each trade due to the small sample sizes. The results are based on averages across all employers and may not necessarily reflect the costs and benefits of apprenticeship training on an employer-by-employer basis.

Although the costs associated with apprenticeship training are generally quantifiable, the benefits are more difficult to measure. The questionnaire was designed to capture qualitative measures of the benefits derived from apprenticeship training; however, it should be noted that these are based on employers' subjective assessments. In addition, while the data at the national level can be viewed with confidence given the participation of over 400 employers, the limited number of employer completions for some trades suggests that, in these cases, trade-specific data should be interpreted with caution.

During the sample selection process, it was difficult to identify employers who hire apprentices in trades with a relatively small workforce. For example, the number of workers employed in the Mobile Crane Operator (11,245), Sprinkler System Installer (17,730), and Tool and Die Maker (17,025) trades is significantly lower than the combined average employment of 58,414 of the 12 remaining trades.[3] As a result, the sample sizes for these trades are below the minimum target of 20 employers. Therefore, the reader should use caution in generalizing the cost-benefit results for these trades to all Canadian employers.

To provide context as to the challenge of identifying employers who hire apprentices, only 1,941 (or 16.8%) of the 11,550 employers contacted by R.A. Malatest & Associates Ltd. qualified for the study (i.e., they currently employed apprentices or had hired apprentices during the past two years). Approximately one in five qualifying employers completed the survey questionnaire.

VALIDATION ROUNDTABLES

R.A. Malatest & Associates Ltd. and CAF-FCA facilitated a series of roundtables across Canada with economists and employers to determine if any significant costs and benefits of apprenticeship training had been excluded from the methodology and to validate the cost-benefit results.[4] A roundtable was held with economists and four roundtables were held with employers representing

[3] *Source: Statistics Canada, 2001 Census. It should be noted that the employment estimate for the Sprinkler System Installer trade includes Steamfitter/Pipefitter.*

[4] *Roundtables were held in Halifax, Nova Scotia (automotive service technicians); Ottawa, Ontario (economists); Regina, Saskatchewan (construction electricians); Edmonton, Alberta (industrial mechanics (millwrights)); and Vancouver, British Columbia (refrigeration and air conditioning mechanics).*

the following trades: Automotive Service Technician; Construction Electrician; Industrial Mechanic (Millwright); and Refrigeration and Air Conditioning Mechanic. For the economist roundtable session, R.A. Malatest & Associates Ltd. and The Conference Board of Canada presented the methodological approach used in the study. For each of the employer roundtable sessions, R.A. Malatest & Associates Ltd. presented the trade-specific cost-benefit results.

COST-BENEFIT MODEL

The cost-benefit model is based on a standard cost-benefit analysis for a single firm that hires apprentices. Net benefits and costs are calculated on a per apprentice, per year of apprenticeship basis. The cost and benefit components are detailed in the following sections.

COST COMPONENTS

Wages and Benefits

This includes base pay and non-compulsory and compulsory (e.g., Workers Compensation, Employment Insurance, Canada Pension Plan) benefits.

Opportunity Costs

These include costs related to the resources that apprentices draw from the organization as part of their training process. Opportunity costs associated with journeyperson time and wastage were included in the model and were estimated on a per apprentice, per year basis. In each situation, an attempt was made to price these factors and to determine the scale of their usage by apprentices.

Disbursements

Disbursements refer to costs incurred by the employer related to the ongoing training and development of apprentices, such as registration fees and wages during in-school training.

Administration

An estimate of the costs associated with the administering of apprenticeships was made. These costs were allocated on a per apprentice basis.

BENEFIT COMPONENTS

Revenue Generated by Apprentice

Using employer-supplied data on charge-out or mark-up rates and the total annual chargeable hours of work, an estimate was made of the average revenue associated with each apprentice.

Tax Credits

Where applicable, per apprentice tax credits were included in the model. For example, Ontario employers in a qualifying trade are eligible for a maximum tax credit of $15,000 per apprentice over the period of the apprenticeship.

COST-BENEFIT RESULTS

SUMMARY OF COST-BENEFIT RESULTS BY TRADE

The following observations can be made regarding the findings of the cost-benefit analysis for each of the 15 trades:

⇒ The net benefit of apprenticeship training increases in each year over the course of the apprenticeship period. In fact, employers in only three of the 15 trades (Construction Electrician, Mobile Crane Operator and Sheet Metal Worker) incur a net cost when training first year apprentices;

Total Per Apprentice Costs and Benefits by Trade

Trade	Duration of Apprenticeship (Years)[1]	Costs[2] ($)	Benefits[3] ($)		Net Benefit[4] ($)		Benefit-Cost Ratio[5]	
			Excl. Tax Credits	Incl. Tax Credits	Excl. Tax Credits	Incl. Tax Credits	Excl. Tax Credits	Incl. Tax Credits
Automotive Service Technician	4	219,354	327,835	342,835	108,481	123,481	1.49	1.56
Bricklayer	4	202,530	270,729	285,729	68,200	83,200	1.34	1.41
Carpenter	4	192,080	214,207	229,207	22,127	37,127	1.12	1.19
Construction Electrician	5	275,424	338,040	353,040	62,616	77,616	1.23	1.28
Cook	3	77,601	119,703	na	42,102	na	1.54	na
Heavy Duty Equipment Mechanic	4	208,231	304,247	319,247	96,016	111,016	1.46	1.53
Industrial Mechanic (Millwright)	4	246,061	298,493	313,493	52,432	67,432	1.21	1.27
Insulator	4	202,149	267,441	282,441	65,292	80,292	1.32	1.40
Machinist	4	184,956	283,669	298,669	98,713	113,713	1.53	1.61
Mobile Crane Operator	4	248,068	256,318	271,318	8,250	23,250	1.03	1.09
Motor Vehicle Body Repairer	4	180,647	295,281	310,281	114,634	129,634	1.63	1.72
Refrigeration and Air Conditioning Mechanic	4	242,960	319,084	334,084	76,124	91,124	1.31	1.38
Sheet Metal Worker	4	251,698	300,017	315,017	48,320	63,320	1.19	1.25
Sprinkler System Installer	4	206,153	338,933	353,933	132,780	147,780	1.64	1.72
Tool and Die Maker	4	173,469	290,473	305,473	117,004	132,004	1.67	1.76
Average	**4**	**207,425**	**281,631**	**308,198**	**74,206**	**91,499**	**1.38**	**1.44**

[1] Source: Apprenticeship Survey (Q28)
[2] Represents the total per apprentice costs incurred over the apprenticeship period.
[3] Measured as the revenue generated by an apprentice.
[4] Benefits – Costs
[5] Benefits/Costs

⇒ The revenue generated by an apprentice increases throughout the apprenticeship;

⇒ Wages and benefits paid to apprentices increase commensurately with training and experience; and

⇒ The costs related to journeyperson time spent training apprentices declines through each year of the apprenticeship.

The overall results of the cost-benefit analysis indicate that the benefits of apprenticeship training exceed the costs for each of the 15 trade areas, with the net benefit ranging from $8,250 (Mobile Crane Operator) to $132,780 (Sprinkler System Installer). In addition, the results indicate that for every $1 spent on apprenticeship training, an employer receives a benefit of $1.38 or a net return of $0.38 on average. If eligible tax credits are included, the net return to employers increases

to $0.44. Notwithstanding other qualitative benefits, these findings suggest that apprenticeship training is a worthwhile investment to employers.

To determine if the methodology and the cost-benefit results were appropriate, a series of roundtables were held with economists and employers. The purpose of the economist roundtable was to discuss the methodological approach and the employer roundtables were intended to obtain feedback on the cost-benefit results for the following four trades: Automotive Service Technician; Construction Electrician; Industrial Mechanic (Millwright); and Refrigeration and Air Conditioning Mechanic. The overall findings of the validation roundtables are discussed in the following section.

VALIDATION ROUNDTABLE FINDINGS

In general, roundtable participants agreed with the methodological approach and the results produced by the cost-benefit model. The following is a summary of the key findings and common themes that emerged from the roundtable discussions:

- ⇒ Although economists raised concerns regarding an employer's ability to accurately estimate hourly charge-out rates in construction trades (where labour is priced as part of a total project), it was noted that the methodological approach was appropriate and the scope of the study far exceeds any previous research in Canada.
- ⇒ Employers agreed that, on average, apprentices generate a net return to their organization over the apprenticeship period.
- ⇒ Average apprentice wage and revenue estimates produced by the model were accurate, although it was noted that there are regional differences with respect to these measures. For example, employers of industrial mechanic (millwright) apprentices in Alberta indicated that the results likely overstate costs and understate revenues. Conversely, employers of construction electrician apprentices in Saskatchewan viewed the wage and charge-out estimates as high relative to the prevailing rates in their organizations.
- ⇒ The costs and benefits of apprenticeship training may also differ within the same trade. For example, employers of industrial mechanics (millwrights) indicated that the revenue associated with apprentices performing service activities will be higher relative to those used "in-house" for general repair and maintenance. In the Refrigeration and Air Conditioning Mechanic trade, employers will not incur the costs associated with a service vehicle if an apprentice works as part of a construction crew. In addition, the size of the organization will also influence an employer's point of view regarding the validity of the cost-benefit results. For example, employers of automotive service technicians who operated larger facilities with more sophisticated diagnostic equipment indicated that an apprentice does not generate a net benefit until the second year of the apprenticeship.

- ⇒ In general, major capital costs associated with apprenticeship training are not significant, although some consideration should be given to the cost of major assets for some trades, such as the provision of a service bay (Automotive Service Technician) and a service vehicle (Refrigeration and Air Conditioning Mechanic).
- ⇒ Poaching was viewed as a concern for employers. Employers of construction electrician apprentices in Saskatchewan indicated that poaching from other provinces (e.g., British Columbia and Alberta) was a serious issue. On the other hand, the discussion with industrial mechanics (millwrights) in Alberta revealed that employers were more concerned with the lack of qualified labour. Clearly, regional differences exist with respect to employers' perceived seriousness of poaching.

SURVEY RESULTS

QUALITATIVE BENEFITS OF APPRENTICESHIP TRAINING

The survey questionnaire included a series of questions designed to measure the importance of several qualitative benefits of apprenticeship training. These include:

- ⇒ Potential reasons for investing in apprenticeship;
- ⇒ The benefit of apprenticeship training to journeypersons; and
- ⇒ The advantages of employing a homegrown journeyperson.

Reasons for Investing in Apprenticeship

Surveyed employers rated a number of potential reasons for investing in apprenticeship using a ten-point scale, where 1 is 'not at all important' and 10 is 'very important'. The most important reason indicated by employers was to ensure that their company has skilled labour (8.9). In addition, employers indicated that hiring apprentices is important to replace the aging workforce and to reduce the turnover rate (each with a rating of 7.5).

Benefit of Apprenticeship Training to Journeypersons

The majority of employers (67.6%) indicated that their journeypersons receive a benefit from training apprentices. Benefits to journeypersons as cited by employers include enhancement of skills and knowledge and an increase in productivity when the apprentice assists with complex job tasks.

Advantages of Employing a Homegrown Journeyperson

Employers representing all business sizes and regions indicated that a homegrown journeyperson (i.e., a journeyperson who was trained as an apprentice within the organization) is more productive than an externally trained journeyperson. On average, employers indicated that homegrown journeypersons are 26.5% more productive, an additional benefit of apprenticeship training.

FINANCIAL SUPPORT FOR APPRENTICES

Overall, the majority of employers (53.6%) provide cash disbursements to their apprentices. The most significant costs are related to wages during in-school training; equipment that is lent or donated to training bodies; and top-up

of EI benefits during in-school training. Not surprisingly, larger organizations are able to provide a higher level of financial support.

PERCEIVED PRODUCTIVE VALUE VS. TRAINING COSTS

Approximately two-thirds of surveyed employers (66.1%) indicated that the apprentice's productive value to their company begins to exceed the training costs by the end of the second year of the apprenticeship or earlier. This indicates that the apprentice becomes proficient in the trade within a relatively short period of time.

POACHING RISK

"Poaching" refers to the situation where competitors hire away recently qualified journeypersons that an employer trained as apprentices. This is often perceived as a disincentive to apprenticeship training. Employers were asked to indicate the seriousness of poaching by competitors or other industries using a ten-point scale, where 1 is 'not at all serious' and 10 is 'very serious'. Of the 407 employers who responded, the average rating was 5.1 (competitors) and 4.8 (other industries). Although the results suggest that poaching is viewed as a somewhat serious issue, it is also possible that employers are unaware of the extent to which poaching occurs. Employers who represented large organizations viewed poaching risk by other industries as a more serious issue relative to smaller organizations. In addition, employers in Atlantic Canada were more concerned with poaching risk by competitors and other industries relative to other regions.

CONCLUSIONS

The results from this study indicate that employers across the 15 trade areas receive a net benefit from apprenticeship training. Although the cost of apprenticeship is often perceived as a barrier, it appears that the monetary benefits generated by apprentices outweigh the training costs. In addition, employers indicated that there are important qualitative or non-monetary benefits associated with apprenticeship training.

The main conclusions of this study can be summarized as follows:

- ⇒ According to the cost-benefit results presented in this report, apprenticeship training is a worthwhile investment. On average, for each $1 invested in an apprentice, a benefit of $1.38 accrues to employers or a net return of $0.38. All 15 trades included in the analysis show an overall net benefit of apprenticeship training.
- ⇒ The findings of the roundtable discussions indicate that the methodological approach and the cost-benefit results presented in this report are valid. Participants of the economist roundtable agreed that the methodology was appropriate and that the scope of the study far exceeds any previous research in Canada related to the costs and benefits of apprenticeship training. Roundtable discussions with employers indicated that the cost-benefit results are an accurate depiction of the costs and benefits of apprenticeship training. However, organizational and regional differences will affect the applicability of the results.

- ⇒ For each trade, the cost-benefit results indicate that apprentices begin to generate net benefits for employers within a short period of time. This is further supported by the survey results. Specifically, the majority of employers (66.1%) indicated that the apprentice's productive value to their organization exceeds the training costs by the end of the second year or earlier.
- ⇒ In addition to the quantitative benefits associated with apprentices, employers indicated that there are qualitative benefits of apprenticeship training. Specifically, hiring apprentices ensures that an organization has skilled labour and a lower turnover rate. In addition, journeypersons receive a benefit from training an apprentice.
- ⇒ Employers perceive a benefit of employing a journeyperson who was trained as an apprentice within the organization. Employers indicated that homegrown journeypersons are a better fit with the organization and are 26.5% more productive relative to an externally trained journeyperson.
- ⇒ The majority of employers provide cash disbursements to their apprentices during the apprenticeship program. The most significant costs are related to wages during in-school training and equipment that is lent or donated to training bodies. Larger organizations provide a higher level of financial support.
- ⇒ Larger employers (i.e., with 500 or more employees) view the risk of poaching by other industries as a more serious issue relative to smaller employers. Employers in Atlantic Canada were more concerned with poaching by competitors and other industries relative to other regions.

Overall, apprenticeship training is a worthwhile investment to employers. Although the costs and benefits associated with apprenticeship training will vary on an employer-by-employer basis, the results indicate that there is a significant return on apprenticeship training investment.

1.0 INTRODUCTION

1.1 BACKGROUND

Given the anticipated shortages of skilled trades workers, an understanding of the barriers to hiring and training apprentices is critical. The findings of a recent study commissioned by the Canadian Apprenticeship Forum – Forum canadien sur l'apprentissage (CAF-FCA) indicates that employers perceive the cost of apprenticeship as a major barrier to apprenticeship training.[5] Costs not only include wages but also the time of the journeyperson who trains the apprentice. On the other hand, there may be significant benefits of apprenticeship training. If the apprentice stays within the organization and becomes a qualified journeyperson there may be advantages to the employer, such as increased productivity. However, there is a risk that a competitor may hire away a recently qualified journeyperson who was trained as an apprentice within the organization (i.e., a homegrown journeyperson). From the employer's perspective, this poaching risk is a disincentive to investing in apprenticeship. These are some of the issues that are examined in this report.

Previous research in this area has focused mainly on the costs of apprenticeship training.[6] In addition, the perceived cost of apprenticeship and the lack of research on the benefits of apprentices were catalysts for the current study, which examines both the costs and benefits of apprenticeship training across a range of service, construction and industrial trades. A similar research project conducted in the UK quantified the costs and benefits of apprenticeship training in five industries, including engineering, construction, retailing, business administration and hospitality.[7] Employer costs included wage costs, supervisory costs and training costs while employer benefits were measured as the productive contribution of the apprentice and government funding provided for apprenticeship training.

A frequent finding of this and other studies is that, on average, for many employers who invest in apprenticeship, the costs exceed the benefits. This finding is counterintuitive. It would appear, therefore, that benefits which are not easily quantifiable have been omitted or discounted by a number of studies. Excluding these factors could underestimate the benefits derived from apprenticeship training. In addition, many studies use book costs rather than opportunity costs to estimate the cost of the journeyperson's time that is spent training apprentices. For example, if the training takes place when the journeyperson's time would not otherwise have been used productively (i.e., to generate revenue), then the opportunity cost is less than the book cost. In this case, using the book cost overestimates the cost to the employer of apprenticeship training. This study incorporates opportunity costs into the analysis and attempts to assess other qualitative benefits associated with apprenticeship training.

[5] *CAF-FCA (2004),* Accessing and Completing Apprenticeship Training in Canada: Perceptions of Barriers.

[6] *For example, see Roslyn Kunin & Associates, Inc. (2002),* Assessment of Training Costs for Machinists, Auto Mechanics and Plumbers Engaged in Apprenticeship Training *and R.J. Sparks Consulting Inc. and WGW Services Ltd. (2002),* The Cost of Apprenticeship Borne by Employers: Machining and Tooling Trades – Ontario.

[7] *Institute for Employment Research (2003),* Net Costs of Modern Apprenticeship Training to Employers.

1.2 OBJECTIVES AND SCOPE OF STUDY

To gain a more comprehensive understanding of the cost of apprenticeship and the return on apprenticeship training investment to employers, CAF-FCA commissioned R.A. Malatest & Associates Ltd. and The Conference Board of Canada to assess the costs and benefits of apprenticeship training.[8] The overall objectives of this research are:

- ⇒ To determine the overall costs incurred by employers within the apprenticeship community in hiring and training apprentices;
- ⇒ To determine which factors (e.g., employer size, region), if any, influence cost and the return on training investment; and
- ⇒ To identify monetary and non-monetary benefits of apprenticeship training.

Data was collected through a national survey of employers across 15 trade areas, which was administered by R.A. Malatest & Associates Ltd. from September 2005 to February 2006. The survey instrument was initially developed by Prism Economics and Analysis and subsequently modified by R.A. Malatest & Associates Ltd. in consultation with CAF-FCA to ensure that it would capture the information required to conduct a detailed cost-benefit analysis. Using the data provided by employers, The Conference Board of Canada produced trade-specific cost-benefit estimates to determine the net benefit (or cost) of apprenticeship training.

To ensure that a range of skilled trades were represented in the study, the costs and benefits of apprenticeship training were assessed for the following 15 trade areas:

- ⇒ Automotive Service Technician;
- ⇒ Bricklayer;
- ⇒ Carpenter;
- ⇒ Construction Electrician;
- ⇒ Cook;
- ⇒ Heavy Duty Equipment Technician;
- ⇒ Industrial Mechanic (Millwright);
- ⇒ Insulator;
- ⇒ Machinist;
- ⇒ Mobile Crane Operator;
- ⇒ Motor Vehicle Body Repairer;
- ⇒ Refrigeration and Air Conditioning Mechanic;
- ⇒ Sheet Metal Worker;
- ⇒ Sprinkler System Installer; and
- ⇒ Tool and Die Maker.

The *Return on Apprenticeship Training Investment for Employers: A Pilot of 15 Trade Areas* project was intended to collect information from a minimum of 300 employers across the 15 trade areas, or 20 employers per trade. This report summarizes the findings associated with the information provided by 433 employers who participated in the project. A description of the sample of employers is included in Appendix A. In addition, details regarding the survey administration process are discussed in Appendix B.

[8] *Funding for this study was provided by the Government of Canada's Sector Council Program.*

1.3 RESEARCH CONSIDERATIONS

This study estimated the costs and benefits of apprenticeship training to employers across 15 trade areas; however, it should be noted that it was not possible to capture all variations in each trade due to the small sample sizes. The results are based on averages across all employers and may not necessarily reflect the costs and benefits of apprenticeship training on an employer-by-employer basis.

Although the costs associated with apprenticeship training are generally quantifiable, the benefits are more difficult to measure. The questionnaire was designed to capture qualitative measures of the benefits derived from apprenticeship training; however, it should be noted that these are based on employers' subjective assessments. In addition, while the national-level data can be viewed with considerable confidence given the participation of more than 400 employers, in some cases the trade-specific data should be interpreted with caution given the small, non-representative sample of respondents.

During the sample selection process, it was difficult to identify employers who hire apprentices in trades with a relatively small workforce. For example, the number of workers employed in the Mobile Crane Operator (11,245), Sprinkler System Installer (17,730), and Tool and Die Maker (17,025) trades is significantly lower than the combined average employment of 58,414 of the 12 remaining trades.[9] As a result, the sample sizes for these trades are below the minimum target of 20 employers. Therefore, the reader should use caution in generalizing the cost-benefit results for these trades to all Canadian employers.

To provide context as to the challenge of identifying employers who hire apprentices, only 1,941 (or 16.8%) of the 11,550 employers contacted by R.A. Malatest & Associates Ltd. qualified for the study (i.e., they currently employed apprentices or had hired apprentices during the past two years). Approximately one in five qualifying employers completed the survey questionnaire.

Overall, the majority of employers indicated that completing the survey questionnaire was a challenge, not only because of the length of time required to complete the survey (one to two hours) but also the level of detail of the information requested. As a result, extensive follow-up with employers was necessary in order to verify the accuracy of the information provided. Given the limited availability of employers to complete the survey, several attempts were required to contact a single employer to clarify his/her responses.

1.4 VALIDATION ROUNDTABLES

R.A. Malatest & Associates Ltd. and CAF-FCA facilitated a series of roundtables across Canada with economists and employers to determine if any significant costs and benefits of apprenticeship training had been excluded from the methodology and to validate the cost-benefit results.[10] A roundtable was held with economists and four roundtables were held with employers representing

[9] *Source: Statistics Canada, 2001 Census. It should be noted that the employment estimate for the Sprinkler System Installer trade includes Steamfitter/Pipefitter.*

[10] *Roundtables were held in Halifax, Nova Scotia (automotive service technicians); Ottawa, Ontario (economists); Regina, Saskatchewan (construction electricians); Edmonton, Alberta (industrial mechanics (millwrights)); and Vancouver, British Columbia (refrigeration and air conditioning mechanics).*

the following trades: Automotive Service Technician; Construction Electrician; Industrial Mechanic (Millwright); and Refrigeration and Air Conditioning Mechanic. For the economist roundtable session, R.A. Malatest & Associates Ltd. and The Conference Board of Canada presented the methodological approach used in the study. For each of the employer roundtable sessions, R.A. Malatest & Associates Ltd. presented the trade-specific cost-benefit results. A discussion of the feedback received during the roundtable discussions is included in Section 3.3.

1.5 REPORT STRUCTURE

Information obtained through the survey research is presented in several sections. Detailed in Section 2 is a description of the cost-benefit model. Summarized in Section 3 are the detailed cost-benefit results for the 15 trade areas and the findings of the validation roundtables. Outlined in Section 4 is a discussion of the survey results and the conclusions are contained in Section 5 of the report.

2.0 COST-BENEFIT MODEL

THE COST-BENEFIT methodology for this study was originally developed by Prism Economics and Analysis, and subsequently modified by R.A. Malatest & Associates Ltd. to more fully capture a range of benefits that accrue to employers who participate in apprenticeship training. Highlighted in this section are the major elements that comprise the cost-benefit model adopted for this study.

2.1 OVERVIEW OF THE MODEL

The model is based on a standard cost-benefit analysis for a single firm that hires apprentices. Net benefits (or costs) are calculated per apprentice, per year of apprenticeship.

The benefit of apprentices is quite simply their value added; that is, the market price paid for their services versus the cost of these services. Included is the complete value added of apprentices as well as the full costs associated with an apprenticeship program.

2.2 COST COMPONENTS

2.2.1 Wages and Benefits

These are the fully loaded wage rates which include base pay and non-compulsory and compulsory (e.g., Workers Compensation, Employment Insurance, Canada Pension Plan) benefits.

2.2.2 Opportunity Costs

Opportunity costs are related to the resources that apprentices draw from the organization as part of their training process. These include journeyperson time and wastage. In each situation, an attempt was made to price these factors and to determine the scale of their usage by apprentices. In the case of journeyperson time and wastage, a per apprentice, per year cost was estimated. It should be noted that lost productivity of major assets (i.e., tools and equipment valued at more than $50,000 that are pulled out of production to train apprentices) is another opportunity cost associated with apprenticeship training. However, as only a small percentage of surveyed employers (12.5%) indicated this as a cost, it was excluded from the analysis.[11]

2.2.3 Disbursements

Disbursements are primarily related to employer shares of costs to support the ongoing training and development of apprentices. These include costs associated with registration fees and continuing education training.

2.2.4 Administration

An estimate of administrative costs associated with hiring and training apprentices was made. These costs were allocated on a per apprentice basis.

2.3 BENEFIT COMPONENTS

2.3.1 Revenue Generated by Apprentice

In most cases, apprentice labour is priced to market either in terms of direct charge-out rates or mark-ups on labour. Given data on the total annual chargeable hours of work, an estimate was made of the average revenue associated with each apprentice.

2.3.2 Tax Credits

Where applicable, per apprentice tax credits were included in the model. For example, Ontario employers in a qualifying trade are eligible for the Apprenticeship Training Tax Credit. The details of the tax credit are discussed in Section 3.1.

[11] *Source: Apprenticeship Survey (Q17a, n=433)*

2.4 REPORTING FRAMEWORK

Results are reported by trade and broken out by year of apprenticeship. This analysis demonstrates the time profile for costs and benefits. The results of the model are presented in a simplified table format that clearly shows the net benefit (or cost) by year of apprenticeship. There is no attempt to discount these through a present value type of analysis.

The reported net benefits (or costs) are best interpreted as partial gross benefits (or costs) per apprentice per year. Even though the model may produce a positive benefit in a particular year, each firm will have its own standards on the necessary level of benefit required to participate in an apprenticeship program (the so-called hurdle rate). These hurdle rates will depend on the broader cost structure of the organization, particularly the cost of capital.

3.0 COST-BENEFIT RESULTS

BASED ON DETAILED COST-BENEFIT data provided by employers, it was possible to identify the overall net benefit (or cost) of apprenticeship training for the 15 trades. A summary of the costs, benefits and net benefit (or cost) for each year of the apprenticeship period is included in the analysis.

3.1 DETAILED COST-BENEFIT RESULTS BY TRADE

In this section, detailed cost-benefit results are presented for the 15 trade areas:

- ⇒ Automotive Service Technician (n=45);
- ⇒ Bricklayer (n=21);
- ⇒ Carpenter (n=43);
- ⇒ Construction Electrician (n=52);
- ⇒ Cook (n=21);
- ⇒ Heavy Duty Equipment Technician (n=37);
- ⇒ Industrial Mechanic (Millwright) (n=23);
- ⇒ Insulator (n=21);
- ⇒ Machinist (n=33);
- ⇒ Mobile Crane Operator (n=16);
- ⇒ Motor Vehicle Body Repairer (n=21);
- ⇒ Refrigeration and Air Conditioning Mechanic (n=40);
- ⇒ Sheet Metal Worker (n=28);
- ⇒ Sprinkler System Installer (n=16); and
- ⇒ Tool and Die Maker (n=16).

As detailed above, the total number of employer responses included in the analysis for 12 of the 15 trades exceeds the minimum sample target of 20. The Mobile Crane Operator, Sprinkler System Installer, and Tool and Die Maker trades, which have relatively small workforces, are represented by fewer than 20 employers.

The cost-benefit results are presented under two scenarios: 1) per apprentice net benefit (or cost) *excluding* eligible tax credits, and 2) per apprentice net benefit (or cost) *including* eligible tax credits. The second scenario reflects the case in Ontario, where employers are eligible for the Apprenticeship Training Tax Credit. The tax credit refunds 25% of salaries and wages paid to an eligible apprentice in a qualifying trade, up to a maximum of $5,000 per year over the first three years of the apprenticeship.[12] All trades included in the study, with the exception of Cook, are eligible for the tax credit. Consequently, given the salary information provided by employers, the total per apprentice benefit for the Ontario case increases by $15,000.[13] However, the tax credit figures were included in the analysis regardless of whether an employer received the tax credit or not.[14] In addition, the same revenue and cost estimates have been used for both scenarios.

[12] *Source: Ontario Ministry of Training, Colleges and Universities.*

[13] *It should be noted that a tax credit is available to employers in Quebec who provide on-the-job training. The tax credit applies to apprenticeship, vocational and post-secondary training programs. Source: Revenu Québec.*

[14] *Question 26 of the Apprenticeship Survey asked employers to identify the amount of tax credit or other subsidy received from government for apprenticeship training.*

3.1.1 Automotive Service Technician

The results of the cost-benefit analysis for the Automotive Service Technician trade are presented in Exhibit 3.1. According to the model, there is a net benefit of $363 during the first year of the apprenticeship or $5,363 for the Ontario case. The net benefit increases each year to $43,438 by the fourth year. The cost in terms of journeyperson time declines considerably from year 1 to year 4, indicating that the apprentice becomes more proficient and requires less training as he/she progresses through the apprenticeship. Cash disbursements and administration costs are relatively small components of the total cost of apprenticeship training, comprising 0.5% and 1.6% of total costs, respectively.

Exhibit 3.1 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Automotive Service Technician (n=45)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 63,700.39	$ 76,559.03	$ 90,261.02	$ 97,314.86	$ 327,835.30
Costs					
Wages and Benefits	$ 24,240.84	$ 27,913.70	$ 31,886.42	$ 40,269.11	$ 124,310.07
Journeyperson Time	$ 32,365.12	$ 22,157.18	$ 13,518.94	$ 11,081.59	$ 79,122.83
Wastage	$ 5,446.65	$ 2,699.24	$ 1,552.81	$ 1,419.50	$ 11,118.20
Disbursements	$ 385.33	$ 348.12	$ 264.09	$ 207.67	$ 1,205.20
Administration	$ 899.46	$ 899.46	$ 899.46	$ 899.46	$ 3,597.84
Total	$ 63,337.39	$ 54,017.70	$ 48,121.72	$ 53,877.33	$ 219,354.14
Net Benefit	**$ 363.00**	**$ 22,541.33**	**$ 42,139.30**	**$ 43,437.53**	**$ 108,481.17**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 363.00	$ 22,541.33	$ 42,139.30	$ 43,437.53	$ 108,481.17
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 5,363.00**	**$ 27,541.33**	**$ 47,139.30**	**$ 43,437.53**	**$ 123,481.17**

3.1.2 Bricklayer

As shown in Exhibit 3.2, there is an overall net benefit of apprenticeship training for employers in the Bricklayer trade. In addition, the net benefit increases considerably from year 1 to year 4, due in part to the higher revenue generated by more experienced apprentices. Costs related to wastage are not significant, as are costs associated with cash disbursements and administration. In addition, the cost in terms of journeyperson time that is spent training an apprentice declines from 31.7% of total costs during the first year to 11.9% during the fourth year.

Exhibit 3.2 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Bricklayer (n=21)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 57,886.08	$ 65,873.41	$ 69,152.29	$ 77,817.60	$ 270,729.38
Costs					
Wages and Benefits	$ 31,783.04	$ 39,256.63	$ 42,808.75	$ 48,591.22	$ 162,439.63
Journeyperson Time	$ 15,317.05	$ 7,484.19	$ 8,065.21	$ 6,574.64	$ 37,441.09
Wastage	$ 620.00	$ 320.00	$ 212.50	$ –	$ 1,152.50
Disbursements	$ 420.79	$ 290.54	$ 180.34	$ 110.21	$ 1,001.88
Administration	$ 123.66	$ 123.66	$ 123.66	$ 123.66	$ 494.64
Total	$ 48,264.54	$ 47,475.03	$ 51,390.45	$ 55,399.72	$ 202,529.74
Net Benefit	**$ 9,621.54**	**$ 18,398.38**	**$ 17,761.83**	**$ 22,417.88**	**$ 68,199.64**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 9,621.54	$ 18,398.38	$ 17,761.83	$ 22,417.88	$ 68,199.64
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 14,621.54**	**$ 23,398.38**	**$ 22,761.83**	**$ 22,417.88**	**$ 83,199.64**

3.1.3 Carpenter

Exhibit 3.3 presents the cost-benefit analysis for the Carpenter trade. The revenue generated by first, second, third and fourth year apprentices exceeds the costs incurred by employers. Under the Ontario tax credit scenario, the net benefit increases by $5,000 for each of the first three years of the apprenticeship. The productive contribution of the apprentice in terms of revenue generated increases throughout the apprenticeship, as expected. In addition, the cost associated with journeyperson time declines indicating that the apprentice becomes more proficient throughout the apprenticeship period. Administration costs are a relatively insignificant cost component, comprising 1.7% of total costs.

Exhibit 3.3 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Carpenter (n=43)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 50,119.95	$ 50,615.83	$ 53,060.66	$ 60,410.13	$ 214,206.56
Costs					
Wages and Benefits	$ 31,972.32	$ 37,573.37	$ 43,663.57	$ 50,248.04	$ 163,457.29
Journeyperson Time	$ 8,926.67	$ 3,191.20	$ 2,944.75	$ 1,278.71	$ 16,341.34
Wastage	$ 4,250.00	$ 2,437.50	$ 1,233.33	$ 866.67	$ 8,787.50
Disbursements	$ 62.83	$ 53.17	$ 48.33	$ 77.33	$ 241.67
Administration	$ 812.95	$ 812.95	$ 812.95	$ 812.95	$ 3,251.80
Total	$ 46,024.78	$ 44,068.19	$ 48,702.93	$ 53,283.70	$ 192,079.60
Net Benefit	**$ 4,095.17**	**$ 6,547.64**	**$ 4,357.73**	**$ 7,126.42**	**$ 22,126.96**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 4,095.17	$ 6,547.64	$ 4,357.73	$ 7,126.42	$ 22,126.96
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 9,095.17**	**$ 11,547.64**	**$ 9,357.73**	**$ 7,126.42**	**$ 37,126.96**

3.1.4 Construction Electrician

The cost-benefit results for the Construction Electrician trade are presented in Exhibit 3.4. During the first year of the apprenticeship, employers incur a net cost of $833 or a net benefit of $4,167 if eligible tax credits are included. However, a second year apprentice generates a net benefit of $9,419 that increases to $22,199 by the fifth year. Overall, the total net benefit to employers of apprenticeship training for this trade is $62,616 or $77,616 under the tax credit scenario.

Exhibit 3.4 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Construction Electrician (n=52)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Benefits						
Attributed Revenue	$ 51,508.30	$ 61,007.78	$ 66,851.28	$ 74,888.70	$ 83,783.89	$ 338,039.95
Costs						
Wages and Benefits	$ 31,362.40	$ 37,159.75	$ 43,021.92	$ 50,393.82	$ 57,700.90	$ 219,638.79
Journeyperson Time	$ 16,081.88	$ 9,896.54	$ 6,575.60	$ 4,977.91	$ 2,783.40	$ 40,315.34
Wastage	$ 2,905.45	$ 3,334.44	$ 1,467.78	$ 926.25	$ 203.33	$ 8,837.26
Disbursements	$ 1,331.45	$ 538.58	$ 538.58	$ 687.55	$ 236.96	$ 3,333.12
Administration	$ 659.84	$ 659.84	$ 659.84	$ 659.84	$ 659.84	$ 3,299.18
Total	$ 52,341.03	$ 51,589.15	$ 52,263.72	$ 57,645.36	$ 61,584.43	$ 275,423.69
Net Benefit (Cost)	**$ (832.73)**	**$ 9,418.63**	**$ 14,587.56**	**$ 17,243.33**	**$ 22,199.45**	**$ 62,616.26**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Net Benefit (Cost) Before Tax Credit	$ (832.73)	$ 9,418.63	$ 14,587.56	$ 17,243.33	$ 22,199.45	$ 62,616.26
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 4,167.27**	**$ 14,418.63**	**$ 19,587.56**	**$ 17,243.33**	**$ 22,199.45**	**$ 77,616.26**

3.1.5 Cook

The results for the Cook trade are presented in Exhibit 3.5. Overall, a net benefit accrues to employers who train cook apprentices. However, employers in this trade are not eligible for the Ontario Apprenticeship Training Tax Credit. The average annual wage paid to apprentices in this trade ($19,951) is well below that of the other service trades, such as Automotive Service Technician ($31,078). In addition, the revenue generated by apprentices (assuming a 100% mark-up rate) is low relative to the other trades, totaling $119,703 over the three-year apprenticeship period. However, employers in this trade incur the lowest training costs ($77,601).

Exhibit 3.5 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Cook (n=21)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Total
Benefits				
Attributed Revenue[1]	$ 36,325.03	$ 39,471.82	$ 43,906.21	$ 119,703.06
Costs				
Wages and Benefits	$ 18,162.52	$ 19,735.91	$ 21,953.10	$ 59,851.53
Journeyperson Time	$ 6,333.33	$ 3,920.02	$ 3,622.33	$ 13,875.68
Wastage	$ 1,050.00	$ 650.00	$ 766.67	$ 2,466.67
Disbursements	$ 452.11	$ 339.08	$ 452.11	$ 1,243.30
Administration	$ 54.62	$ 54.62	$ 54.62	$ 163.86
Total	$ 26,052.57	$ 24,699.64	$ 26,848.82	$ 77,601.03
Net Benefit	**$ 10,272.46**	**$ 14,772.19**	**$ 17,057.38**	**$ 42,102.03**

[1] *Based on a 100% mark-up rate.*

3.1.6 Heavy Duty Equipment Technician

The cost-benefit results for the Heavy Duty Equipment Technician trade are presented in Exhibit 3.6. During the four-year apprenticeship period, the model estimates that there is a total net benefit of $96,016 (excluding eligible tax credits) or $111,016 (including eligible tax credits). The costs associated with journeyperson time and wastage account for 12.6% and 6.6% of the total costs of apprenticeship training in this trade, respectively.

Exhibit 3.6 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Heavy Duty Equipment Technician (n=37)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 62,090.94	$ 64,228.98	$ 81,719.96	$ 96,206.75	$ 304,246.64
Costs					
Wages and Benefits	$ 32,855.42	$ 37,820.19	$ 43,961.11	$ 47,367.34	$ 162,004.06
Journeyperson Time	$ 13,721.60	$ 5,283.82	$ 3,532.59	$ 3,633.62	$ 26,171.64
Wastage	$ 4,275.00	$ 4,166.67	$ 3,820.00	$ 1,525.00	$ 13,786.67
Disbursements	$ 1,494.18	$ 944.15	$ 866.19	$ 1,026.44	$ 4,330.96
Administration	$ 484.38	$ 484.38	$ 484.38	$ 484.38	$ 1,937.52
Total	$ 52,830.59	$ 48,699.20	$ 52,664.27	$ 54,036.77	$ 208,230.84
Net Benefit	**$ 9,260.35**	**$ 15,529.78**	**$ 29,055.69**	**$ 42,169.98**	**$ 96,015.80**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 9,260.35	$ 15,529.78	$ 29,055.69	$ 42,169.98	$ 96,015.80
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 14,260.35**	**$ 20,529.78**	**$ 34,055.69**	**$ 42,169.98**	**$ 111,015.80**

3.1.7 Industrial Mechanic (Millwright)

As detailed in Exhibit 3.7, the net benefit of apprenticeship training increases over the course of the apprenticeship, from $2,948 during the first year to $21,409 by the fourth year. Wastage costs in this trade are relatively high, although these account for only 6.3% of the total costs. Overall, the total net benefit of apprenticeship training for this trade is $52,432 or $67,432 if eligible tax credits are included.

Exhibit 3.7 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Industrial Mechanic (Millwright) (n=23)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 65,315.71	$ 74,189.49	$ 77,896.15	$ 81,091.20	$ 298,492.55
Costs					
Wages and Benefits	$ 34,942.35	$ 42,478.50	$ 46,872.17	$ 50,789.18	$ 175,082.20
Journeyperson Time	$ 21,832.20	$ 13,628.11	$ 9,842.07	$ 4,237.56	$ 49,539.93
Wastage	$ 4,000.00	$ 3,966.67	$ 4,275.00	$ 3,300.00	$ 15,541.67
Disbursements	$ 541.77	$ 338.60	$ 507.91	$ 304.74	$ 1,693.02
Administration	$ 1,051.04	$ 1,051.04	$ 1,051.04	$ 1,051.04	$ 4,204.17
Total	$ 62,367.35	$ 61,462.92	$ 62,548.19	$ 59,682.52	$ 246,060.99
Net Benefit	**$ 2,948.35**	**$ 12,726.57**	**$ 15,347.97**	**$ 21,408.67**	**$ 52,431.56**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 2,948.35	$ 12,726.57	$ 15,347.97	$ 21,408.67	$ 52,431.56
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 7,948.35**	**$ 17,726.57**	**$ 20,347.97**	**$ 21,408.67**	**$ 67,431.56**

3.1.8 Insulator

The cost-benefit results for the Insulator trade are presented in Exhibit 3.8. A net benefit of apprenticeship training accrues to employers in each year of the apprenticeship period. The cost in terms of journeyperson time is relatively low for this trade, representing 8.4% of the total costs. In addition, costs associated with journeyperson time and wastage decline while revenue increases from year 1 to year 4, indicating that the apprentice becomes more proficient as he/she progresses through the apprenticeship.

Exhibit 3.8 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Insulator (n=21)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 60,185.24	$ 65,506.52	$ 70,742.69	$ 71,006.83	$ 267,441.29
Costs					
Wages and Benefits	$ 34,693.03	$ 40,661.78	$ 46,397.65	$ 53,418.88	$ 175,171.34
Journeyperson Time	$ 8,110.44	$ 3,634.74	$ 2,697.42	$ 2,617.48	$ 17,060.08
Wastage	$ 3,641.67	$ 1,810.00	$ 2,100.00	$ 300.00	$ 7,851.67
Disbursements	$ 650.07	$ 376.35	$ 325.03	$ 359.25	$ 1,710.70
Administration	$ 88.77	$ 88.77	$ 88.77	$ 88.77	$ 355.08
Total	$ 47,183.98	$ 46,571.64	$ 51,608.88	$ 56,784.38	$ 202,148.87
Net Benefit	**$ 13,001.26**	**$ 18,934.88**	**$ 19,133.82**	**$ 14,222.45**	**$ 65,292.41**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 13,001.26	$ 18,934.88	$ 19,133.82	$ 14,222.45	$ 65,292.41
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 18,001.26**	**$ 23,934.88**	**$ 24,133.82**	**$ 14,222.45**	**$ 80,292.41**

3.1.9 Machinist

As illustrated in Exhibit 3.9, the net benefit of apprenticeship training increases over each year of the four-year apprenticeship period for the Machinist trade. The revenue generated by a fourth year apprentice is 28.7% higher relative to a first year apprentice. In addition, costs associated with journeyperson time, wastage, and disbursements decline as the apprentice progresses through the apprenticeship. Overall, the model estimates that the total per apprentice net benefit for this trade is $98,713 or $113,713 if eligible tax credits are included.

Exhibit 3.9 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Machinist (n=33)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 61,780.12	$ 65,988.25	$ 76,410.23	$ 79,490.19	$ 283,668.79
Costs					
Wages and Benefits	$ 25,407.20	$ 29,094.54	$ 34,460.40	$ 37,164.27	$ 126,126.40
Journeyperson Time	$ 19,393.24	$ 8,726.47	$ 6,028.93	$ 5,220.02	$ 39,368.66
Wastage	$ 3,836.36	$ 3,800.00	$ 3,566.67	$ 2,410.00	$ 13,613.03
Disbursements	$ 602.55	$ 594.43	$ 374.07	$ 285.78	$ 1,856.83
Administration	$ 997.78	$ 997.78	$ 997.78	$ 997.78	$ 3,991.12
Total	$ 50,237.13	$ 43,213.22	$ 45,427.84	$ 46,077.86	$ 184,956.04
Net Benefit	**$ 11,542.99**	**$ 22,775.04**	**$ 30,982.39**	**$ 33,412.33**	**$ 98,712.75**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 11,542.99	$ 22,775.04	$ 30,982.39	$ 33,412.33	$ 98,712.75
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 16,542.99**	**$ 27,775.04**	**$ 35,982.39**	**$ 33,412.33**	**$ 113,712.75**

3.1.10 Mobile Crane Operator

According to the results of the cost-benefit analysis for the Mobile Crane Operator trade, which are presented in Exhibit 3.10, employers incur a net cost of apprenticeship training during the first two years of the apprenticeship (if eligible tax credits are excluded). This is due in part to the relatively high wages paid to first year apprentices ($39,091). However, a net benefit is realized in years 3 and 4 of the apprenticeship period. Overall, there is a net benefit of apprenticeship training to employers of $8,250 per apprentice or $23,250 under the tax credit scenario.

Exhibit 3.10 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Mobile Crane Operator (n=16)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 40,760.18	$ 61,352.17	$ 71,632.41	$ 82,573.34	$ 256,318.09
Costs					
Wages and Benefits	$ 39,091.35	$ 49,155.08	$ 53,952.15	$ 54,434.68	$ 196,633.26
Journeyperson Time	$ 18,533.22	$ 12,016.97	$ 7,448.30	$ 6,480.25	$ 44,478.74
Wastage	$ –	$ –	$ –	$ –	$ –
Disbursements	$ 433.90	$ 271.19	$ 406.78	$ 244.07	$ 1,355.93
Administration	$ 1,400.00	$ 1,400.00	$ 1,400.00	$ 1,400.00	$ 5,600.00
Total	$ 59,458.47	$ 62,843.24	$ 63,207.23	$ 62,559.00	$ 248,067.93
Net Benefit (Cost)	**$ (18,698.29)**	**$ (1,491.07)**	**$ 8,425.18**	**$ 20,014.34**	**$ 8,250.16**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit (Cost) Before Tax Credit	$ (18,698.29)	$ (1,491.07)	$ 8,425.18	$ 20,014.34	$ 8,250.16
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit (Cost) After Tax Credit	**$ (13,698.29)**	**$ 3,508.93**	**$ 13,425.18**	**$ 20,014.34**	**$ 23,250.16**

3.1.11 Motor Vehicle Body Repairer

The cost-benefit results for the Motor Vehicle Body Repairer trade are presented in Exhibit 3.11. The benefits of apprenticeship training exceed the costs during each year of the apprenticeship. According to the model, there is a total net benefit of $114,634 that accrues to employers over a four-year apprenticeship. If eligible tax credits are included in the model, the total net benefit increases to $129,634. The largest components of the training costs are wages and benefits (64.2%) and journeyperson time (33.0%). However, costs associated with wastage and cash disbursements are not significant.

Exhibit 3.11 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Motor Vehicle Body Repairer (n=21)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 53,047.81	$ 64,166.27	$ 83,730.10	$ 94,336.57	$ 295,280.74
Costs					
Wages and Benefits	$ 21,820.85	$ 26,860.13	$ 30,563.36	$ 36,721.72	$ 115,966.05
Journeyperson Time	$ 22,935.55	$ 16,149.42	$ 10,830.37	$ 9,747.33	$ 59,662.67
Wastage	$ 466.67	$ 308.33	$ 1,037.50	$ 37.50	$ 1,850.00
Disbursements	$ 151.08	$ 69.42	$ 114.33	$ 73.50	$ 408.33
Administration	$ 690.00	$ 690.00	$ 690.00	$ 690.00	$ 2,760.00
Total	$ 46,064.14	$ 44,077.30	$ 43,235.56	$ 47,270.05	$ 180,647.05
Net Benefit	**$ 6,983.66**	**$ 20,088.97**	**$ 40,494.54**	**$ 47,066.52**	**$ 114,633.69**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 6,983.66	$ 20,088.97	$ 40,494.54	$ 47,066.52	$ 114,633.69
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 11,983.66**	**$ 25,088.97**	**$ 45,494.54**	**$ 47,066.52**	**$ 129,633.69**

3.1.12 Refrigeration and Air Conditioning Mechanic

As shown in Exhibit 3.12, the revenue generated by an apprentice is greater than the total costs for each year of the apprenticeship. As a result, the model estimates an overall net benefit of $76,124 over the four-year period. If the Apprenticeship Training Tax Credit is included, the total net benefit increases to $91,124. As a proportion of total costs, wastage (3.4%), disbursements (1.1%), and administration (1.0%) are not significant relative to wages and benefits (66.0%) and journeyperson time (28.4%).

Exhibit 3.12 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Refrigeration and Air Conditioning Mechanic (n=40)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 62,461.44	$ 72,926.12	$ 89,569.47	$ 94,126.95	$ 319,083.99
Costs					
Wages and Benefits	$ 29,142.16	$ 36,044.92	$ 43,972.18	$ 51,274.73	$ 160,433.99
Journeyperson Time	$ 26,733.13	$ 23,179.31	$ 10,079.84	$ 9,122.34	$ 69,114.62
Wastage	$ 2,800.00	$ 1,464.29	$ 2,237.50	$ 1,671.43	$ 8,173.21
Disbursements	$ 865.86	$ 561.36	$ 648.83	$ 716.82	$ 2,792.87
Administration	$ 611.32	$ 611.32	$ 611.32	$ 611.32	$ 2,445.28
Total	$ 60,152.47	$ 61,861.18	$ 57,549.67	$ 63,396.64	$ 242,959.97
Net Benefit	**$ 2,308.98**	**$ 11,064.93**	**$ 32,019.80**	**$ 30,730.31**	**$ 76,124.03**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 2,308.98	$ 11,064.93	$ 32,019.80	$ 30,730.31	$ 76,124.03
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 7,308.98**	**$ 16,064.93**	**$ 37,019.80**	**$ 30,730.31**	**$ 91,124.03**

3.1.13 Sheet Metal Worker

Similar to the Construction Electrician and Mobile Crane Operator trades, employers who train sheet metal worker apprentices incur a net cost during the first year of the apprenticeship. As shown in Exhibit 3.13, the total costs of apprenticeship training increase from year 1 to year 2; however, the increase in revenue during this period offsets the increase in costs. Consequently, a net benefit accrues to employers beginning in year 2 of the apprenticeship. Overall, the model estimates a total net benefit to employers of $48,320 that increases by $15,000 to $63,320 if eligible tax credits are included.

Exhibit 3.13 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Sheet Metal Worker (n=28)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 58,591.61	$ 72,196.33	$ 79,451.79	$ 89,777.64	$ 300,017.37
Costs					
Wages and Benefits	$ 27,158.47	$ 32,700.58	$ 39,707.24	$ 43,760.29	$ 143,326.59
Journeyperson Time	$ 33,705.74	$ 32,283.95	$ 18,139.29	$ 12,138.19	$ 96,267.17
Wastage	$ 2,936.36	$ 1,812.50	$ 2,985.71	$ 1,633.33	$ 9,367.91
Disbursements	$ 528.02	$ 542.29	$ 392.44	$ 349.63	$ 1,812.38
Administration	$ 230.94	$ 230.94	$ 230.94	$ 230.94	$ 923.76
Total	$ 64,559.53	$ 67,570.26	$ 61,455.63	$ 58,112.39	$ 251,697.81
Net Benefit (Cost)	**$ (5,967.92)**	**$ 4,626.08**	**$ 17,996.15**	**$ 31,665.25**	**$ 48,319.56**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit (Cost) Before Tax Credit	$ (5,967.92)	$ 4,626.08	$ 17,996.15	$ 31,665.25	$ 48,319.56
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit (Cost) After Tax Credit	**$ (967.92)**	**$ 9,626.08**	**$ 22,996.15**	**$ 31,665.25**	**$ 63,319.56**

3.1.14 Sprinkler System Installer

The cost-benefit results for the Sprinkler System Installer trade are presented in Exhibit 3.14. As an apprentice progresses through the apprenticeship, revenue increases; wages and benefits increase; costs associated with journeyperson time decrease; and wastage costs decrease. A net benefit accrues to employers in each year of the apprenticeship, totaling $132,780 or $147,780 if eligible tax credits are incorporated into the model.

Exhibit 3.14 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Sprinkler System Installer (n=16)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 75,430.40	$ 79,018.05	$ 85,858.08	$ 98,626.50	$ 338,933.03
Costs					
Wages and Benefits	$ 30,988.73	$ 37,361.52	$ 43,169.63	$ 50,459.36	$ 161,979.24
Journeyperson Time	$ 15,795.33	$ 9,617.68	$ 7,117.80	$ 6,599.72	$ 39,130.52
Wastage	$ 2,070.00	$ 1,245.00	$ 1,037.50	$ 162.50	$ 4,515.00
Disbursements	$ –	$ –	$ –	$ –	$ –
Administration	$ 132.11	$ 132.11	$ 132.11	$ 132.11	$ 528.44
Total	$ 48,986.17	$ 48,356.30	$ 51,457.04	$ 57,353.69	$ 206,153.21
Net Benefit	**$ 26,444.22**	**$ 30,661.75**	**$ 34,401.04**	**$ 41,272.81**	**$ 132,779.82**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 26,444.22	$ 30,661.75	$ 34,401.04	$ 41,272.81	$ 132,779.82
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 31,444.22**	**$ 35,661.75**	**$ 39,401.04**	**$ 41,272.81**	**$ 147,779.82**

3.1.15 Tool and Die Maker

As illustrated in Exhibit 3.15, the model estimates that a first year tool and die maker apprentice generates a net benefit to employers of $20,893. When an apprentice has progressed to the fourth year, the net benefit increases to $40,966.

Although wastage costs are not necessarily a significant component of the training costs at 7.7% of total costs, this proportion is higher than that of the other 14 trades included in the analysis.

Exhibit 3.15 *Per Apprentice Costs and Benefits by Year of Apprenticeship – Tool and Die Maker (n=16)*

A. EXCLUDING ELIGIBLE TAX CREDITS

	Year 1	Year 2	Year 3	Year 4	Total
Benefits					
Attributed Revenue	$ 61,152.10	$ 68,487.78	$ 74,056.61	$ 86,776.17	$ 290,472.65
Costs					
Wages and Benefits	$ 23,207.11	$ 27,834.87	$ 31,758.31	$ 37,819.31	$ 120,619.60
Journeyperson Time	$ 10,996.37	$ 9,822.37	$ 8,009.48	$ 5,075.13	$ 33,903.35
Wastage	$ 4,600.00	$ 4,300.00	$ 2,950.00	$ 1,460.00	$ 13,310.00
Disbursements	$ 253.31	$ 171.89	$ 149.27	$ 253.31	$ 827.79
Administration	$ 1,202.08	$ 1,202.08	$ 1,202.08	$ 1,202.08	$ 4,808.33
Total	$ 40,258.88	$ 43,331.22	$ 44,069.15	$ 45,809.84	$ 173,469.08
Net Benefit	**$ 20,893.22**	**$ 25,156.56**	**$ 29,987.46**	**$ 40,966.33**	**$ 117,003.57**

B. INCLUDING ELIGIBLE TAX CREDITS (ONTARIO CASE)

	Year 1	Year 2	Year 3	Year 4	Total
Net Benefit Before Tax Credit	$ 20,893.22	$ 25,156.56	$ 29,987.46	$ 40,966.33	$ 117,003.57
Tax Credit	$ 5,000.00	$ 5,000.00	$ 5,000.00	na	$ 15,000.00
Net Benefit After Tax Credit	**$ 25,893.22**	**$ 30,156.56**	**$ 34,987.46**	**$ 40,966.33**	**$ 132,003.57**

3.2 SUMMARY OF COST-BENEFIT RESULTS BY TRADE

To summarize, the following observations regarding the cost-benefit results can be made:

- ⇒ For all 15 trades, the total benefits of apprenticeship training exceed the total costs over the apprenticeship period;
- ⇒ The cost in terms of journeyperson time declines during the apprenticeship;
- ⇒ Wastage, disbursements and administration are relatively small components of the total costs of apprenticeship training; and
- ⇒ The revenue potential of an apprentice increases through each year of his/her apprenticeship.

Exhibit 3.16 presents a summary of the cost-benefit results by each of the 15 trade areas. The figures presented represent the total costs and benefits to the employer over the entire period of apprenticeship training, which ranges from three to five years. Overall, all trades show a net benefit per apprentice over the apprenticeship period.

Exhibit 3.16 *Total Per Apprentice Costs and Benefits by Trade*

Trade	Duration of Apprenticeship (Years)[1]	Costs[2] ($)	Benefits[3] ($)		Net Benefit[4] ($)		Benefit-Cost Ratio[5]	
			Excl. Tax Credits	Incl. Tax Credits	Excl. Tax Credits	Incl. Tax Credits	Excl. Tax Credits	Incl. Tax Credits
Automotive Service Technician	4	219,354	327,835	342,835	108,481	123,481	1.49	1.56
Bricklayer	4	202,530	270,729	285,729	68,200	83,200	1.34	1.41
Carpenter	4	192,080	214,207	229,207	22,127	37,127	1.12	1.19
Construction Electrician	5	275,424	338,040	353,040	62,616	77,616	1.23	1.28
Cook	3	77,601	119,703	na	42,102	na	1.54	na
Heavy Duty Equipment Technician	4	208,231	304,247	319,247	96,016	111,016	1.46	1.53
Industrial Mechanic (Millwright)	4	246,061	298,493	313,493	52,432	67,432	1.21	1.27
Insulator	4	202,149	267,441	282,441	65,292	80,292	1.32	1.40
Machinist	4	184,956	283,669	298,669	98,713	113,713	1.53	1.61
Mobile Crane Operator	4	248,068	256,318	271,318	8,250	23,250	1.03	1.09
Motor Vehicle Body Repairer	4	180,647	295,281	310,281	114,634	129,634	1.63	1.72
Refrigeration and Air Conditioning Mechanic	4	242,960	319,084	334,084	76,124	91,124	1.31	1.38
Sheet Metal Worker	4	251,698	300,017	315,017	48,320	63,320	1.19	1.25
Sprinkler System Installer	4	206,153	338,933	353,933	132,780	147,780	1.64	1.72
Tool and Die Maker	4	173,469	290,473	305,473	117,004	132,004	1.67	1.76
Average	**4**	**207,425**	**281,631**	**308,198**	**74,206**	**91,499**	**1.38**	**1.44**

[1] *Source: Apprenticeship Survey (Q28)*
[2] *Represents the total per apprentice costs incurred over the apprenticeship period.*
[3] *Measured as the revenue generated by an apprentice.*
[4] *Benefits – Costs*
[5] *Benefits/Costs*

As discussed in the preceding sections, the most significant cost components for employers who train apprentices are wages and benefits and journeyperson time. The lowest costs of apprenticeship training occur in the Cook trade at $77,601, which is well below the average total training costs of $207,425. Average annual wages paid to cook apprentices ($19,951) are significantly lower than the average across all 15 trades ($37,384) as are the costs associated with journeyperson time ($13,876 as compared to the average of $44,120). Trades where employers incur relatively high training costs include Construction Electrician ($275,424), Sheet Metal Worker ($251,698), and Mobile Crane Operator ($248,068). This is due in part to the relatively high wages paid to apprentices in these trades.

Excluding eligible tax credits, the largest monetary benefits accrue to employers who train apprentice sprinkler system installers ($338,933); construction electricians ($338,040); and automotive service technicians ($327,835). In these trades, the revenue generated by an apprentice far exceeds the total training costs. Overall, the model estimates an average net benefit of $74,206 over the apprenticeship period or $91,499 if the Ontario Apprenticeship Training Tax Credit is included.[15]

A standardized measure that can be used to compare the cost-benefit results by trade is the benefit-cost ratio. For example, the average benefit-cost ratio for the 15 trades (excluding tax credits) is 1.38, which indicates that for every $1 spent on training an apprentice, an employer receives a benefit of $1.38 or a net return of $0.38 per apprentice. Trades with the highest benefit-cost ratios include Tool and Die Maker (1.67); Sprinkler System Installer (1.64); Motor Vehicle Body Repairer (1.63); Cook (1.54); and Machinist (1.53). In other words, the return on apprenticeship training investment is relatively high in these trades. Conversely, trades with a low benefit-cost ratio include Mobile Crane Operator (1.03); Carpenter (1.12); Sheet Metal Worker (1.19); Industrial Mechanic (Millwright) (1.21); and Construction Electrician (1.23). Nevertheless, the model estimates that employers in these trades receive a net return on apprenticeship training investment. However, it should be noted that the results have not been discounted to take into account the time profile of the costs and benefits of apprenticeship training.

The next section presents a summary of the feedback received during the roundtable discussions with economists and employers.

3.3 VALIDATION ROUNDTABLE FINDINGS

A series of roundtable discussions were held with economists and employers representing four trade areas (Automotive Service Technician, Construction Electrician, Industrial Mechanic (Millwright), and Refrigeration and Air Conditioning Mechanic) to validate the methodological approach and to determine if the cost-benefit results were consistent with employers' experience and knowledge of apprenticeship training. Detailed in the following sections is the feedback received during each of the roundtable sessions.

[15] *The calculated average net benefit excludes the Cook trade as it is not eligible for the tax credit.*

3.3.1 Economist Roundtable

The economist roundtable was intended to discuss the methodology of the study. The following issues were raised during the discussion:

- ⇒ There was some concern as to the concept of a "charge-out" rate for construction trades (e.g., Bricklayer, Carpenter) as employers in these trades typically price their labour as part of a total project. It may be more difficult for employers to estimate the average hourly revenue generated per apprentice than would be the case for the service/repair trades.
- ⇒ It was noted that the sample sizes for some of the trades were small and future research could benefit from larger sample sizes that would facilitate a cost-benefit analysis on the basis of employer size and region.
- ⇒ The study did not take into account the potential returns associated with other investment options for employers including hiring of more experienced labour (e.g., journeypersons) or capital investment.

Notwithstanding the concerns expressed by the economists who participated in the roundtable discussion, it was noted that the scope of the study (in terms of the number of trades examined) far exceeds any previous research in Canada and could be considered leading research on an international basis.

3.3.2 Automotive Service Technician Roundtable

Roundtable participants representing the Automotive Service Technician trade indicated that the study did not address the costs associated with the provision of a service bay. Offsetting this service bay cost, however, is the revenue associated with the value of parts that would be used by apprentices when completing repairs. Overall, employers indicated that the omitted costs would be equivalent to the parts revenue associated with apprentice labour. In this context, the calculated net benefit is an accurate portrayal of the costs and benefits of apprenticeship training in the Automotive Service Technician trade.

Employers who operated larger facilities (with more sophisticated diagnostic equipment) indicated that a net benefit would not be realized until the second year of the apprenticeship as opposed to the first year as estimated by the model. All employers who participated in the roundtable, however, indicated that apprentices generate net benefits for their organization. However, employers indicated that there was considerable risk associated with hiring apprentices given the seriousness of poaching by public sector organizations and employers from other regions in Canada (e.g., Alberta).

3.3.3 Construction Electrician Roundtable

Employers representing the Construction Electrician trade raised concerns regarding the charge-out rates used in the study. For example:

- ⇒ Participants indicated that the use of a charge-out rate applies only to service calls. In general, employers noted that they were moving away from different charge-out rates based on the level of the apprentice to a more generic charge-out rate.
- ⇒ In examination of the estimated charge-out rates for first year construction electrician apprentices, roundtable participants (who operated their businesses in Saskatchewan) indicated that these were high, although such rates could be prevalent in Alberta and British Columbia. In addition, employers noted that the estimated wages for first year construction electrician apprentices were high relative to those in Saskatchewan.

⇒ Overall, employers indicated that costs associated with journeyperson time, wastage, disbursements and administration were appropriate.

Overall, roundtable participants indicated that the methodology would generally result in a close approximation of the net benefit of apprenticeship training in this trade. Employers agreed that there would be a negative return to employers during the first year of the apprenticeship, and many indicated that employers would likely incur negative returns during the second year. Employers noted that they do not generally hire apprentices solely for the net returns they generate, but rather to help ensure an adequate supply of qualified labour for their organization. In addition, employers indicated that there was a greater risk of poaching in Saskatchewan due to the close proximity to Alberta and British Columbia.

3.3.4 Industrial Mechanic (Millwright) Roundtable

Employers noted that for the Industrial Mechanic (Millwright) trade, considerable differences in findings would likely exist between those organizations that employed apprentices "in-house" to repair and maintain equipment or in a unionized plant setting as compared to employers who used apprentices in a service capacity. Employers who participated in the roundtable noted that the results of the research likely understate the actual returns on apprenticeship training to employers in Alberta, given the strength of the region's economy. However, roundtable participants were in general agreement with the cost components such as wastage, disbursements and use of journeyperson time to supervise apprentices.

3.3.5 Refrigeration and Air Conditioning Mechanic Roundtable

Employers who participated in the Refrigeration and Air Conditioning Mechanic roundtable indicated that the study did not address a key cost for employers – namely the cost associated with the provision of a service vehicle. This cost was estimated at $6,000 per year and is a significant cost of apprenticeship training. However, the cost of the service vehicle would vary on an employer-by-employer basis. For example, if apprentices worked as part of a construction crew, they would not require their own vehicle. If, however, the apprentice completed service calls, then employers would incur the costs associated with a service vehicle. Overall, employers agreed that the cost-benefit results were consistent with their experience and knowledge of apprenticeship training.

Employers who participated in the roundtable were concerned with poaching. It was noted that the Refrigeration and Air Conditioning Mechanic trade is unique in that apprentices are trained in pipefitting, sheet metal and electrical work. Therefore, the Refrigeration and Air Conditioning Mechanic trade competes for apprentice labour from several other trades. It was noted that in British Columbia, the majority of the industry is unionized which helps to reduce mobility and the likelihood of poaching (due to apprentices earning "seniority" rights).

3.3.6 Summary

In general, roundtable participants agreed with the methodological approach and the results produced by the cost-benefit model. The following is a summary of the key findings and common themes that emerged from the roundtable discussions:

- ⇒ Although economists raised concerns regarding an employer's ability to accurately estimate hourly charge-out rates in construction trades (where labour is priced as part of a total project), it was noted that the methodological approach was appropriate and the scope of the study far exceeds any previous research in Canada.
- ⇒ Employers agreed that, on average, apprentices generate a net return to their organization over the apprenticeship period.
- ⇒ Average apprentice wage and revenue estimates produced by the model were accurate, although it was noted that there are regional differences with respect to these measures. For example, employers of industrial mechanic (millwright) apprentices in Alberta indicated that the results likely overstate costs and understate revenues. Conversely, employers of construction electrician apprentices in Saskatchewan viewed the wage and charge-out estimates as high relative to the prevailing rates in their organizations.
- ⇒ The costs and benefits of apprenticeship training may also differ within the same trade. For example, employers of industrial mechanics (millwrights) indicated that the revenue associated with apprentices performing service activities will be higher relative to those used "in-house" for general repair and maintenance. In the Refrigeration and Air Conditioning Mechanic trade, employers will not incur the costs associated with a service vehicle if an apprentice works as part of a construction crew. In addition, the size of the organization will also influence an employer's point of view regarding the validity of the cost-benefit results. For example, employers of automotive service technicians who operated larger facilities with more sophisticated diagnostic equipment indicated that an apprentice does not generate a net benefit until the second year of the apprenticeship.
- ⇒ In general, major capital costs associated with apprenticeship training are not significant, although some consideration should be given to the cost of major assets for some trades, such as the provision of a service bay (Automotive Service Technician) and a service vehicle (Refrigeration and Air Conditioning Mechanic).
- ⇒ Poaching was viewed as a concern for employers. Employers of construction electrician apprentices in Saskatchewan indicated that poaching from other provinces (e.g., British Columbia and Alberta) was a serious issue. On the other hand, the discussion with industrial mechanics (millwrights) in Alberta revealed that employers were more concerned with the lack of qualified labour. Clearly, regional differences exist with respect to employers' perceived seriousness of poaching.

The next section presents the results from the employer survey and includes additional measures of the costs and benefits of apprenticeship training.

4.0 SURVEY RESULTS

THIS SECTION SUMMARIZES employers' responses related to a variety of measures of the costs and benefits of apprentices. These include qualitative benefits of apprenticeship training; financial support provided for apprentices; the perceived productive value of an apprentice compared to the training costs by year of the apprenticeship; and poaching risk. The sample sizes reported in this section refer to the "valid n"; i.e., only those employers who provided a response have been included in the analysis.

4.1 QUALITATIVE BENEFITS OF APPRENTICESHIP TRAINING

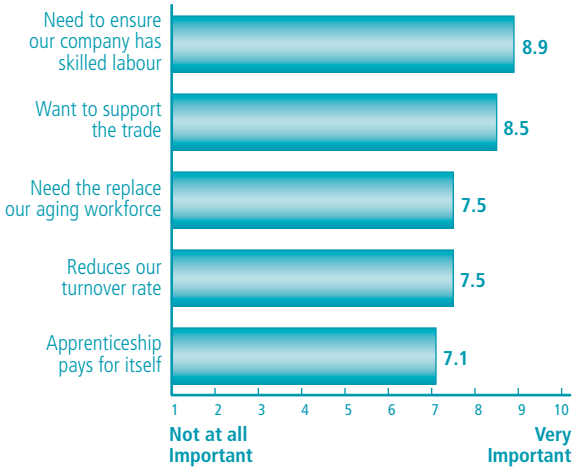
The survey questionnaire included a series of questions designed to measure the importance of several qualitative benefits of apprenticeship training. These include:

- ⇒ Potential reasons for investing in apprenticeship;
- ⇒ The benefit of apprenticeship training to journeypersons; and
- ⇒ The advantages of employing a homegrown journeyperson.

4.1.1 Reasons for Investing in Apprenticeship

Employers rated the importance of a number of potential reasons for investing in an apprentice using a ten-point scale, where 1 is 'not at all important' and 10 is 'very important.' As illustrated in Exhibit 4.1, employers indicated that investing in apprenticeship is very important as it ensures that the company has skilled labour and replacement workers for an aging workforce. These results indicate that employers are not necessarily investing in apprentices because of their ability to generate short-term revenue for the organization, but rather view apprenticeship as a means to meet long-term labour supply requirements. Lower turnover rates and the perception that apprenticeship pays for itself were also cited as important benefits of apprenticeship training.

Exhibit 4.1 *Employers' Top 5 Reasons for Investing in Apprenticeship*



Source: Apprenticeship Survey (Q30, n=403-418)

4.1.2 Benefit of Apprenticeship Training to Journeypersons

Employers identified whether there was a benefit to their journeypersons from providing training to an apprentice and also rated the importance of that benefit. The majority of employers (67.6%) indicated that their journeypersons derive a benefit from training an apprentice.[16] In addition, employers rated the importance of that benefit using a ten-point scale. The average rating was 7.6, indicating that employers view the benefit derived from apprenticeship training as important.[17] Frequently cited responses by employers with respect to the nature of the benefit included refinement of the journeyperson's skills and knowledge and an increase in productivity when the apprentice assists with complex job tasks.

[16] *Source: Apprenticeship Survey (Q10, n=413)*

[17] *Source: Apprenticeship Survey (Q11a, n=276)*

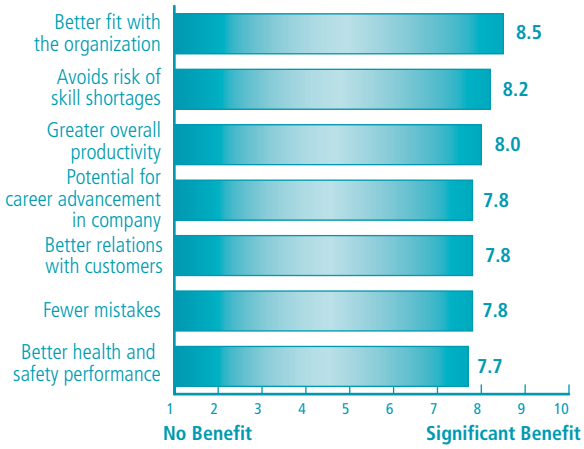
4.1.3 Advantages of Employing a Homegrown Journeyperson

In addition to the net economic benefit of hiring an apprentice, it appears that employers attach considerable importance to training their workers "in-house". In particular, employers rated the benefit for the following indicators:

- ⇒ Better fit with the organization;
- ⇒ Avoids risk of skill shortages;
- ⇒ Greater overall productivity;
- ⇒ Potential for career advancement in the company;
- ⇒ Better relations with customers;
- ⇒ Fewer mistakes; and
- ⇒ Better health and safety performance.

As indicated in Exhibit 4.2, employers rated 'better fit with the organization' as the most significant benefit of employing a journeyperson who was trained as an apprentice. Employers also indicated that hiring within the organization reduces the risk of skill shortages and leads to greater overall productivity.

Exhibit 4.2 *Benefits of Employing a Homegrown Journeyperson*



Source: Apprenticeship Survey (Q12, n=396-408)

Exhibit 4.3 presents the results related to employers' assessments of the productivity of a homegrown journeyperson relative to an externally trained journeyperson. Approximately two-thirds (65.3%) of surveyed employers consider a journeyperson they trained as an apprentice to be more productive relative to an external journeyperson, with only 2.3% indicating that homegrown

Exhibit 4.3 *Perceived Productivity of a Homegrown Journeyperson Relative to an Externally Trained Journeyperson by Employer Size and Region*

	EMPLOYER SIZE			REGION					
% of Employers	<20 Employees (n=212)	20 to 499 Employees (n=159)	500+ Employees (n=29)	Atlantic (n=26)	Quebec (n=20)	Ontario (n=103)	Prairies & North (n=174)	BC (n=77)	Total (n=400)
More Productive	65.6	66.0	58.6	53.8	70.0	68.9	64.4	64.9	**65.3**
Less Productive	2.4	2.5	0.0	0.0	0.0	2.9	2.3	2.6	**2.3**
No Difference	32.1	31.4	41.4	46.2	30.0	28.2	33.3	32.5	**32.5**
% Difference in Productivity[1]	(n=124)	(n=99)	(n=17)	(n=11)	(n=13)	(n=66)	(n=104)	(n=46)	**(n=240)**
	26.4	27.6	20.3	31.4	38.1	26.6	23.8	27.7	**26.5**

[1] *These figures are based on employers' assessments.*

Source: Apprenticeship Survey (Q40 & Q41)

journeypersons are less productive. In addition, 32.5% of employers indicated that there is no difference in productivity between a homegrown and an external journeyperson. Overall, employers indicated that a homegrown journeyperson is 26.5% more productive on average.

The majority of employers across all business sizes and regions viewed a homegrown journeyperson as more productive than an externally trained journeyperson. For example, 65.6% of employers who operate a business with less than 20 employees indicated that a homegrown journeyperson is more productive. Only a small percentage (2.4%) of these employers indicated that homegrown journeypersons are less productive relative to external journeypersons.

4.2 FINANCIAL SUPPORT FOR APPRENTICES

To determine the extent to which employers provide financial support to apprentices, employers estimated annual per apprentice cash disbursements for tuition and related fees, tools, etc. The results presented in this section include only those employers who indicated a value greater than zero. Therefore, employers who did not respond (since they do not incur these costs) have been excluded.

As shown in Exhibit 4.4, wages paid during in-school training is the highest cost item for employers with an average annual cost of $4,338 per apprentice, followed by equipment that is lent or donated to training bodies ($1,368); top-up of EI benefits during in-school training ($1,283); scholarships ($957); and continuing education training ($875). Overall, the average per apprentice cash disbursement is $13,252 per year.

Exhibit 4.4 *Average Annual Per Apprentice Cash Disbursements and Percentage of Employers Providing*

Disbursement	Average Annual Cost[1] ($)	% of Employers Providing[2]
Registration fees for apprentices	337	22.6
Top-up of EI benefits during in-school training	1,283	4.4
Medical/health benefits during in-school training	439	21.5
Wages during in-school training	4,338	7.2
Tuition and related fees	545	16.6
Tools	558	15.0
Scholarships	957	1.6
Equipment lent or donated to training bodies	1,368	5.1
Use of company vehicle while in school	592	4.2
Continuing education training	875	14.3
Skills competitions	633	6.2
Cost of apprentice attending a "trade fair"	487	5.8
Other	839	3.7
Total	**13,252**	**53.6**

[1] *Includes only those employers who indicated a value greater than zero.*

[2] *Represents the percentage of the total sample (n=433). Percentages do not add to 100% due to multiple responses.*

Source: Apprenticeship Survey (Q20, n=7-98)

In addition, just over one-half (53.6%) of surveyed employers provide some form of cash disbursement to their apprentices.

Exhibit 4.5 provides a breakdown of the average annual per apprentice cash disbursements by employer size. Large organizations with 500 or more employees contribute a higher level of financial support to apprentices relative to smaller organizations, especially for wages during in-school training ($7,780) and continuing education training ($3,383). This does not imply that larger organizations are more generous but likely reflects the amount of financial resources available for apprenticeship training. Regardless of employer size, wages during in-school training represent the largest cash disbursement related to the training and development of apprentices.

Exhibit 4.5 *Average Annual Per Apprentice Cash Disbursements by Employer Size*

	Average Annual Cost by Employer Size[1]		
Disbursement	**<20 Employees (n=2-48)**	**20 to 499 Employees (n=4-43)**	**500+ Employees (n=0-8)**
Registration fees for apprentices	301	383	314
Top-up of EI benefits during in-school training	1,710	1,033	–
Medical/health benefits during in-school training	310	589	300
Wages during in-school training	2,548	4,504	7,780
Tuition and related fees	387	604	776
Tools	532	544	743
Scholarships	575	888	2,000
Equipment lent or donated to training bodies	985	1,800	2,167
Use of company vehicle while in school	439	650	1,500
Continuing education training	681	844	3,383
Skills competitions	383	640	2,000
Cost of apprentice attending a "trade fair"	521	363	1,050
Other	516	1,141	1,850
Total	**9,887**	**13,983**	**23,862**

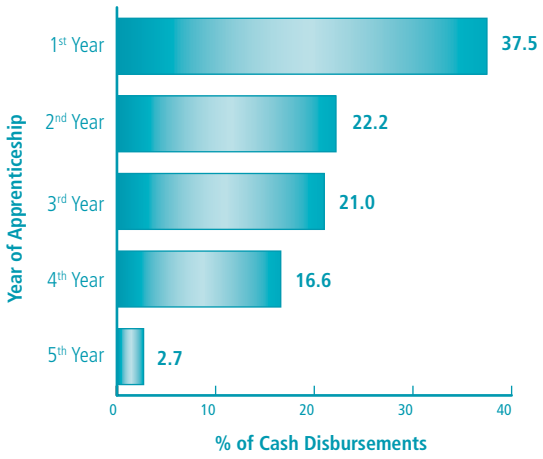
[1] *Includes only those employers who indicated a value greater than zero.*

Source: Apprenticeship Survey (Q20)

As illustrated in Exhibit 4.6, a higher proportion of mid-sized businesses (62.2%) contribute some form of cash disbursements to their apprentices relative to businesses with less than 20 employees (48.3%). Larger organizations are more likely to provide wages during in-school training; funding for tuition and related fees; and tools to an apprentice.

Employers estimated the distribution of these cash disbursements over the apprenticeship period. As illustrated in Exhibit 4.7, a significant proportion of cash disbursements (37.5%) is allocated to first year apprentices. This is not a surprising result, as there are one-time fees that are incurred by the employer when an apprentice is initially hired. Apprentices who have reached the fifth year of the apprenticeship receive only 2.7% of the total cash disbursements provided by employers.

Exhibit 4.7 *Distribution of Cash Disbursements by Year of Apprenticeship*



Source: Apprenticeship Survey (Q21, n=207)

Exhibit 4.6 *Percentage of Employers Providing Cash Disbursements to Apprentices by Employer Size*

	% of Employers Providing[1] by Employer Size		
Disbursement	**<20 Employees (n=236)**	**20 to 499 Employees (n=164)**	**500+ Employees (n=33)**
Registration fees for apprentices	20.3	25.6	24.2
Top-up of EI benefits during in-school training	3.0	7.3	–
Medical/health benefits during in-school training	19.5	26.2	12.1
Wages during in-school training	4.7	9.1	15.2
Tuition and related fees	10.6	24.4	21.2
Tools	15.7	12.8	21.2
Scholarships	0.8	2.4	3.0
Equipment lent or donated to training bodies	5.5	3.7	9.1
Use of company vehicle while in school	3.8	4.9	3.0
Continuing education training	14.8	14.6	9.1
Skills competitions	2.5	12.2	3.0
Cost of apprentice attending a "trade fair"	4.7	7.3	6.1
Other	4.2	2.4	6.1
Total	**48.3**	**62.2**	**48.5**

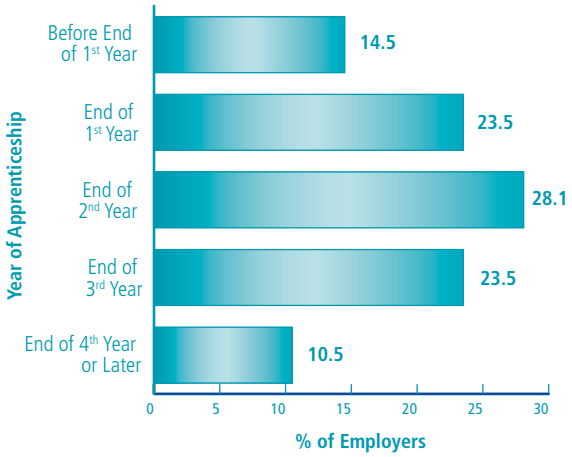
[1] *Represents the percentage of the total sample for each group. Percentages do not add to 100% due to multiple responses.*

Source: Apprenticeship Survey (Q20)

4.3 PERCEIVED PRODUCTIVE VALUE VS. TRAINING COSTS

Employers estimated when an apprentice's productive value to their organization begins to exceed the training costs. As illustrated in Exhibit 4.8, more than one-quarter (28.1%) of surveyed employers indicated that the benefit of training the apprentice exceeds the costs by the end of the second year of the apprenticeship. In other words, the employer perceives a net benefit of apprenticeship training at the mid-point of the apprenticeship period, which averages four years. In addition, more than one-third (38.0%) of employers perceive a net benefit to apprenticeship training by the end of the first year or earlier.

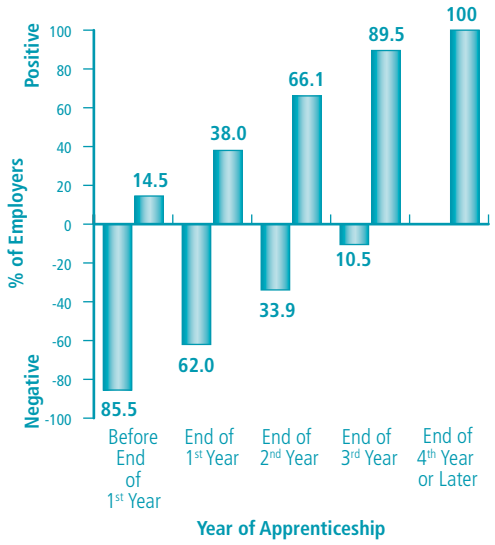
Exhibit 4.8 *Estimated Time for Benefit of Apprenticeship Training to Exceed Costs*



Source: Apprenticeship Survey (Q27, n=392)

Similarly, Exhibit 4.9 illustrates employers' assessments of the difference between the productive value of an apprentice and the training costs by each stage of the apprenticeship. For example, 14.5% of employers indicated that they receive a net benefit from training before the end of the first year of the apprenticeship. In other words, the apprentice's productive value exceeds the training costs. Conversely, the costs of training exceed the productive value of the apprentice for 85.5% of employers during this stage of the apprenticeship. By the end of the second year, the majority of employers (66.1%) indicate that the productive value of the apprentice exceeds the cost of training (i.e., a net benefit). However, over one-third (33.9%) of employers continue to incur a net cost during this period of the apprenticeship. By the end of the third year, only a small proportion of employers (10.5%) perceive that the cost of training exceeds the productive value of the apprentice.

Exhibit 4.9 *Percentage of Employers Indicating a Perceived Net Cost (Negative) or Net Benefit (Positive) of Apprenticeship Training by Year of Apprenticeship*



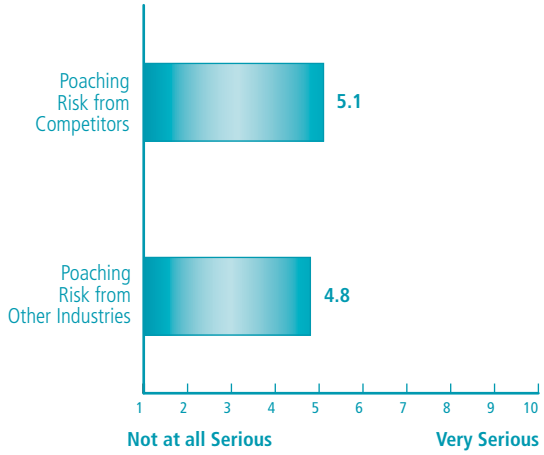
Source: Apprenticeship Survey (Q27, n=392)

4.4 POACHING RISK

The survey questionnaire included a section related to poaching risk. Poaching refers to the situation where competitors hire away recently qualified journeypersons that an employer trained as apprentices. This can occur if there are not enough skilled trades workers available to meet demand and is considered to be an important factor in undermining an employer's incentive to train apprentices. For the purposes of this study, employers were asked to rate the seriousness of poaching risk from competitors and other industries.

As shown in Exhibit 4.10, it appears that employers do not perceive poaching risk from competitors or other industries to be a very serious issue given the average ratings of 5.1 and 4.8, respectively. However, these results indicate that there is some concern with respect to poaching. In addition, employers included in the study are more susceptible to poaching relative to those who do not hire apprentices. On the other hand, it is also possible that some employers are unaware of the extent to which poaching occurs.

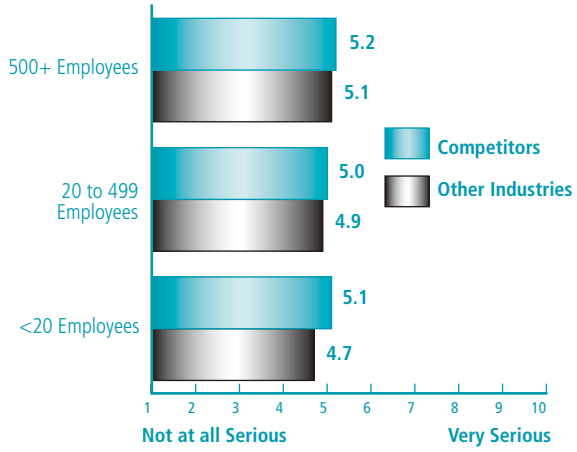
Exhibit 4.10 *Employers' Perceived Seriousness of Poaching Risk*



Source: Apprenticeship Survey (Q33 & Q34, n=407)

Exhibit 4.11 presents employers' perceived seriousness of poaching risk by employer size. Although the results indicate that large employers view poaching risk from other industries as a more serious issue relative to small and mid-sized employers, it should be noted that these results are based on a small sample of respondents (33). The perceived seriousness of poaching risk from competitors was similar across the different business sizes.

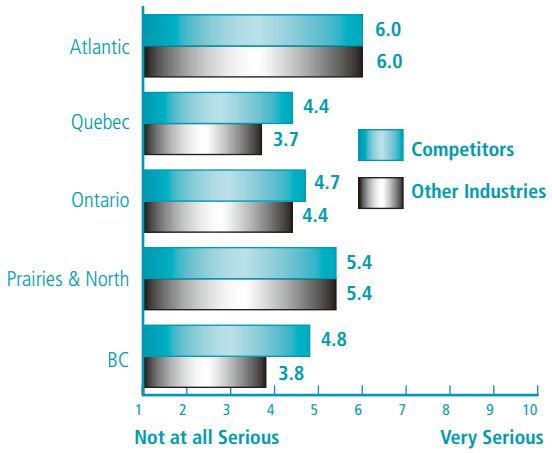
Exhibit 4.11 *Employers' Perceived Seriousness of Poaching Risk by Employer Size*



Source: Apprenticeship Survey (Q33 & Q34, n=33-221)

There are regional differences with respect to the perceived seriousness of poaching risk. As illustrated in Exhibit 4.12, employers in Quebec are the least concerned with poaching risk from both competitors and other industries. On the other hand, employers from the Atlantic region perceive poaching risk as a more serious concern relative to the other regions.

Exhibit 4.12 *Employers' Perceived Seriousness of Poaching Risk by Region*



Note: Caution should be exercised in the interpretation of these results given the small sample sizes on a regional basis.

Source: Apprenticeship Survey (Q33 & Q34, n=19-182)

5.0 CONCLUSIONS – APPRENTICESHIP – BUILDING A SKILLED WORKFORCE FOR A STRONG BOTTOM LINE

THE RESULTS FROM THIS STUDY indicate that employers across the 15 trade areas receive a net benefit from apprenticeship training.

The following conclusions are based on the overall findings of the study.

According to the cost-benefit results, employers across the 15 trade areas receive a positive return on apprenticeship training investment.

Overall, the quantitative benefits of apprenticeship training, which include the revenue generated by an apprentice, exceed the total costs for all 15 trades. Hence, there is an overall net benefit of apprenticeship training. In addition, the average estimated benefit-cost ratio of 1.38 indicates that for every $1 spent on apprenticeship training, employers receive a return of $1.38 or a $0.38 net return on each dollar invested. Although wages and benefits increase through the stages of apprenticeship commensurately with experience and training, costs associated with journeyperson time decline. In addition, as the apprentice becomes more proficient, the revenue potential of the apprentice increases. Other cost components, including wastage and cash disbursements, are relatively small as are the costs associated with administration. The results suggest that apprenticeship training builds a skilled workforce we need for a strong bottom line.

In addition, the cost-benefit results indicate that apprentices begin to generate net benefits for employers within a short period of time. This is further supported by the survey results. Specifically, the majority of employers (66.1%) indicated that the apprentice's productive value to their organization exceeds the training costs by the end of the second year or earlier.

The methodological approach and the cost-benefit results were validated by economists and employers during the roundtable discussions.

Economists who participated in the roundtable indicated that the methodological approach used to generate the cost-benefit results was appropriate. Although concerns were raised as to the small sample sizes and the ability of employers in non-service trades to correctly estimate hourly charge-out revenue, it was agreed that the scope of the study far exceeds any previous research in Canada regarding the costs and benefits of apprenticeship training. Overall, employers indicated that the cost-benefit results were consistent with their experience and knowledge of apprenticeship training. Although employers indicated that costs related to major assets (e.g., service bays, service vehicles) represent significant training costs, there was general agreement that the results were valid. However, it should be emphasized that organizational and regional differences will influence an employer's point of view regarding the validity of the cost-benefit results.

There are qualitative or non-monetary benefits that accrue to employers who engage in apprenticeship training.

Surveyed employers indicated that one of the most important reasons for investing in apprenticeship training is to ensure that their organization has an adequate supply of skilled labour. In addition, employers indicated that hiring apprentices is important to replace the aging workforce and to reduce the turnover rate.

In addition, there are benefits that accrue to journeypersons who train apprentices. The majority of employers (67.6%) indicated that their journeypersons receive a benefit from training apprentices. Benefits to journeypersons as cited by employers include enhancement of skills and knowledge and an increase in productivity when the apprentice assists with complex job tasks.

Employers indicated that a homegrown journeyperson is more productive than an externally trained journeyperson. On average, employers indicated that homegrown journeypersons are 26.5% more productive, an additional benefit of apprenticeship training.

More than one-half of surveyed employers provide annual cash disbursements to apprentices, although larger organizations are more likely to provide financial support.

Overall, the majority of employers (53.6%) provide cash disbursements to their apprentices. The most significant costs are related to wages during in-school training; equipment that is lent or donated to training bodies; and top-up of EI benefits during in-school training. Not surprisingly, larger organizations are able to provide a higher level of financial support.

Poaching is often cited as a disincentive to apprenticeship training. However, surveyed employers did not view this as a very serious concern.

Surveyed employers did not view poaching risk from competitors or other industries as a very serious concern. Employers who represented large organizations viewed poaching by other industries as a more serious issue relative to smaller organizations. In addition, employers in Atlantic Canada were more concerned with poaching risk by competitors and other industries relative to other regions. Although the overall ratings of poaching risk from competitors (5.1) and other industries (4.8) indicate that this issue is somewhat of a concern, it is also possible that employers are unaware of the extent to which poaching occurs.

APPENDIX A: SAMPLE DESCRIPTION

During the initial phase of the sample selection process, Statistics Canada data was analyzed to determine which industries employ the largest proportion of workers for each of the 15 trade areas. This was necessary to ensure that there was a high probability of selecting employers from the trades included in the study. Once the industries were selected based on the employment criterion, a random sample of employers was selected from a national employer database purchased from infoCANADA. In addition, CAF-FCA provided additional employer contacts through its consultation with industry and government representatives.

Exhibit A.1 provides a summary of the distribution of the sample by trade and region. The last row of the table indicates the distribution of registered apprentices within each region for the 15 trade areas. It should be noted that the sample of employers used in this study is not representative on a regional level, as Quebec is underrepresented and the Prairies & North region is overrepresented as compared to the proportion of registered apprentices for the selected trades in these regions.

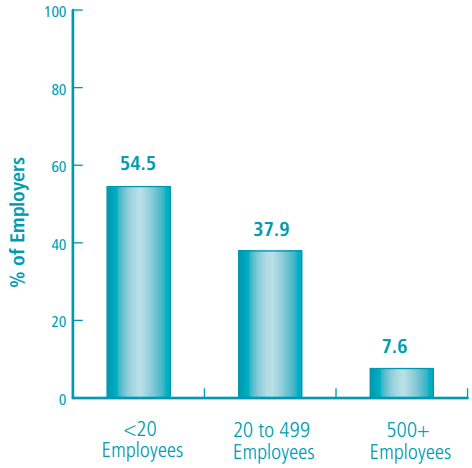
Exhibit A.1 *Distribution of Sample by Trade and Region*

Trade	Atlantic	Quebec	Ontario	Prairies & North	BC	Total
Automotive Service Technician	3	0	15	20	7	45
Bricklayer	0	3	9	4	5	21
Carpenter	0	6	8	23	6	43
Construction Electrician	6	1	19	20	6	52
Cook	0	2	2	11	6	21
Heavy Duty Equipment Technician	0	2	3	27	5	37
Industrial Mechanic (Millwright)	1	0	6	13	3	23
Insulator	1	0	4	14	2	21
Machinist	6	1	9	8	9	33
Mobile Crane Operator	0	0	2	13	1	16
Motor Vehicle Body Repairer	3	2	2	9	5	21
Refrigeration and Air Conditioning Mechanic	1	3	12	6	18	40
Sheet Metal Worker	3	0	7	12	6	28
Sprinkler System Installer	3	0	1	7	5	16
Tool and Die Maker	1	1	11	2	1	16
Total	**28**	**21**	**110**	**189**	**85**	**433**
% of Total Sample	**6.5**	**4.8**	**25.4**	**43.6**	**19.6**	**100.0**
Regional Distribution of Apprentices (%)[1]	**9.3**	**19.7**	**36.9**	**24.8**	**9.3**	**100.0**

[1] *Source: Statistics Canada, Registered Apprenticeship Information System 2003.*

As illustrated in Exhibit A.2, the majority of the sample (54.5%) consists of small organizations employing less than 20 employees worldwide. Only 7.6% of the sample consists of organizations with 500 or more employees. Unionized employers represent slightly more than one-quarter (26.1%) of the total sample.

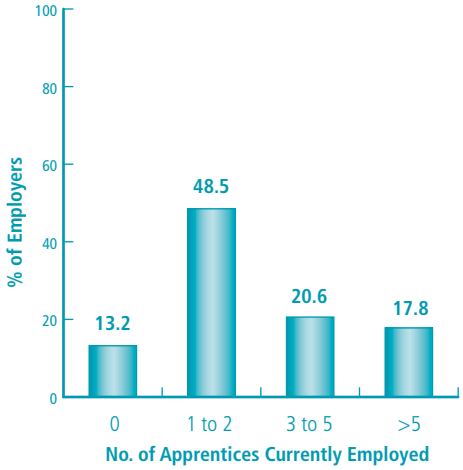
Exhibit A.2 *Distribution of Sample by Employer Size*



Source: Apprenticeship Survey (Q3, n=433)

The majority of employers (69.1%) indicated that they currently employed one to five apprentices at the time of the survey. Less than one-fifth of the sample (17.8%) employs more than five apprentices, as illustrated in Exhibit A.3.

Exhibit A.3 *Distribution of Sample by Number of Apprentices Currently Employed*



Source: Apprenticeship Survey (Q4, n=433)

APPENDIX B: SURVEY ADMINISTRATION

A screening process was required to identify employers who hire and train apprentices in the trades selected for the study. A mixed-mode survey approach was used whereby employers were mailed, faxed, or e-mailed a copy of the survey questionnaire. In addition, employers were given the option to complete part or all of the survey by phone. In-person interviews were also conducted with selected employers across Canada. Given the complex nature of the survey, extensive follow-up with employers was necessary to ensure that the information provided was complete and accurate.

R.A. Malatest & Associates Ltd. contacted a total of 11,550 employers and 1,941 employers (or 16.8%) qualified for the study and received the survey. A total of 433 surveys were completed. Detailed in Exhibit B.1 is the number of qualifiers and completions and response rates by trade.

Exhibit B.1 *Number of Qualifying Employers and Survey Completions by Trade*

Trade	No. of Qualifiers	No. of Completions	Response Rate (%)[1]
Automotive Service Technician	147	45	30.6
Bricklayer	80	21	26.3
Carpenter	313	43	13.7
Construction Electrician	187	52	27.8
Cook	179	21	11.7
Heavy Duty Equipment Technician	131	37	28.2
Industrial Mechanic (Millwright)	92	23	25.0
Insulator	88	21	23.9
Machinist	153	33	21.6
Mobile Crane Operator	59	16	27.1
Motor Vehicle Body Repairer	52	21	40.4
Refrigeration and Air Conditioning Mechanic	176	40	22.7
Sheet Metal Worker	176	28	15.9
Sprinkler System Installer	33	16	48.5
Tool and Die Maker	75	16	21.3
Total	**1,941**	**433**	**22.3**

[1] *Completions/Qualifiers*