

# HUMAN RESOURCE NEEDS AND DEMAND FOR POST-SECONDARY EDUCATION IN THE CANADIAN SECONDARY WOOD PRODUCTS INDUSTRY

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## ABSTRACT

Skilled labor shortages in manufacturing industries are being reported in a number of countries. The extent to which such shortages are affecting Canadian wood manufacturing industries is not known. The aim of this study was to survey the skills and educational needs of Canadian wood manufacturing industries, the status, capacity, and challenges that post-secondary education institutes face in meeting industries' human resource needs, and finally the attractiveness of the industry to high school job-seekers. The majority (83%) of wood manufacturing companies in Canada are experiencing problems in hiring skilled tradespeople, and 54.5% of the companies face difficulties in hiring and retaining professionals and supervisory personnel. Skilled staff shortages and competitive pressures were nominated by companies as the two most important factors restricting their growth. The skills needs of companies have changed over the last 10 years, and companies now place a much higher premium on leadership and communication skills from management, and attitude and advanced technical skills from tradespeople. Most companies offered some kind of in-house training to redress skills gaps, but less than half were likely to use the Internet to deliver in-house training. The majority of high school students were not interested in pursuing a career in the wood manufacturing industry because of its association with unsustainable forestry practices and manual labor, and the availability of more attractive career options. Lack of student interest in wood manufacturing is affecting the institutions offering relevant vocational and professional training, and nine of the thirteen institutes suffer from under-enrollment in their wood manufacturing programs. Comprehensive strategies are required to address the labor market imbalances currently affecting Canada's wood manufacturing industries.

*Keywords:* Human resources, education, skills, shortages, secondary wood industry.

## INTRODUCTION

Labor market shortages are being reported in North America, Europe, Australia, and New Zealand. Shortages are particularly concentrated

in manufacturing industries, and have been attributed to decreasing supply of young people entering the labor market, increased career choices for young people, aging workforce, increased labor mobility, inaccurate perceptions among young people of manufacturing as a career, provision of career advice along gender

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lines, and finally, reductions in numbers of relevant training facilities and low pay rates for teaching instructors (Evans 2003; Equal Opportunities Commission 2004; Ridout 2004). Anecdotal evidence suggests that Canada's wood manufacturing industries are also experiencing labor market problems, both in terms of skills shortages (lack of trained people to meet needs) and skills gaps (lack of qualifications and experience of entrants or current employees). Quantitative evidence to support such claims for the Canadian wood manufacturing industry is lacking, but would be helpful in guiding government policies and educational programs aimed at correcting any labor market imbalances.

It is reasonable to assume that the decreasing entrants into manufacturing industries would be reflected by low enrollments in post-secondary institutes offering relevant training. In the case of the wood manufacturing industries, this appears to be the case as the problem of low enrollment in wood science programs in North America is well known (Bowyer 1991; Winistorfer 2003). Enrollments in some institutions offering such training are, however, increasing. The Wood Products Processing Program offered by the Wood Science Department at the University of British Columbia in Vancouver is a case in point. Ten years ago, it conceived and executed a plan to re-engineer its undergraduate program in wood science to solve an acute enrollment crisis. A traditional wood science curriculum was abandoned, and in its place, a wood products manufacturing program focusing on value-added wood processing was substituted.

Extensive consultation with industry and market surveys preceded the development of the new program to ensure that it met the needs of industry (Cohen and Maness 1995; Barrett and Cohen 1996). The key findings from such groundwork, which were used to guide the creation of the new program, were: 1. The need for industry placements (co-op) in any new program; 2. A greater emphasis in the curriculum on managerial and engineering skills and less emphasis on the biology and chemistry of wood; and 3. The need for graduates of the new program to have good communication skills, writ-

ten and oral, as well as hands-on knowledge of advanced wood processing equipment. Academia and industry formed a strong partnership, which survives to this day, to leverage from federal and provincial governments the significant funds needed to establish the new program and ensure that it was adequately resourced. This partnership was critical to the success of the program as it enabled the curriculum to be tailored to meet the needs of industry, thereby ensuring that its graduates were in great demand. Furthermore, it provided the resources to allow the hiring of recruiters to make young people aware of the program and its attractive features such as paid industry co-op placements and the high potential for success of its graduates in the job market. The extremely high overall demand for undergraduate education at the University of British Columbia has also contributed significantly to the healthy enrollment figures for the program.

Today, the Wood Products Processing Program at the University of British Columbia is the largest wood-related university degree program in North America, (albeit small compared to many engineering programs), and is increasing in size. Its students are in high demand, and several countries (Chile, New Zealand, and South Africa, amongst others) are seeking to emulate the program. The history of the program at UBC clearly indicates that educational programs in wood manufacturing can be viable even though the sector, as a whole, may not be particularly attractive to young people. One of the key elements that is needed to ensure that wood-related educational programs, and in particular the one at UBC, prosper is maintaining their relevance to the human resource needs of industry.

Over the last year, we have resurveyed the Canadian wood industry to ascertain their skills and educational needs, polled high school students to assess their awareness of careers and jobs in the Canadian wood products manufacturing industry, and finally examined the status, capacity, and challenges that post-secondary education institutes face in meeting industries' human resource needs. The results of these surveys will be used to assist Human Resources and

Skills Development Canada, through the Wood Manufacturing Council (of Canada), to develop programs and policies that will improve the availability and quality of the trained and educated people that the Canadian wood products industries require to remain competitive. It will also be used to inform the continuing process of program improvement at the University of British Columbia, and, in particular, to help maintain the relevance of its program to industry. The information from the surveys supplements the results of previous North American surveys of the educational needs of the wood-using industries (Barnes 1979 1980; Bratkovich and Miller 1993; Hansen and Smith 1997; Smith et al. 1998), and should prove useful to other post-secondary institutes seeking to develop or redesign wood-related educational programs. This study differs from the previous survey of the educational needs of the Canadian wood products industry (Cohen and Maness 1995) because it encompasses the entire education chain from high schools, institutes of higher learning, including community colleges and institutes of technology, through to industry, and has a greater focus on value-added wood manufacturers.

#### METHODS

Three separate surveys were conducted: 1. a mail survey of the Canadian secondary wood products industry to collect information on their human resource needs; 2. a mail survey of 500 high school students in Canada to gauge student awareness and impressions about careers and job opportunities in the Canadian wood manufacturing industry; and 3. telephone interviews with the academic coordinators of thirteen wood products educational programs in Canada to assess the status, capacity, and challenges that post-secondary education institutes face in meeting industries' human resource needs. Each is described in turn.

##### *Survey of the human resource needs of industry*

A mail survey was sent to 800 companies, some of which were members of the Wood

Manufacturing Council (WMC). The WMC is an independent, nonprofit corporation that serves as a national forum for employers, workers, educators, and government to address the human resources challenges of the furniture and wood products industries. Surveys were mailed out from the WMC offices in June 2003. Twenty surveys were returned undelivered for a total sample frame size of 780. In total, 93 surveys were completed and returned, yielding a response rate of 11.9%, which is within acceptable limits given that there was no follow-up once the surveys were mailed out.

The design of the survey was based on methods prescribed by the Tailored Design Method (Dillman 2000). The survey itself was comprised of five sections, with information being collected on: 1. the company; 2. jobs; 3. skills; 4. education; and 5. employee training. When companies were asked to rank the skills needed of employees, scores (evaluation points) were assigned to rankings as follows, first ranking (3 points), second ranking (2 points), third ranking (1 point), and then summed. These rankings are used in the results section to indicate the relative importance of attributes and skills. Given the exploratory nature of this survey, tests for nonresponse bias were not conducted. In addition, the sample frame, while comprehensive, was not a complete listing of Canadian value-added producers and was biased towards member organizations of the WMC. Thus, results should be approached with some caution, and statistical inferences onto the population of Canadian value-added wood producers should not be made. That said, the results do provide some very useful and valid insights into education and skills needs of the wood manufacturing sector.

##### *Survey of high school students*

A mail survey was sent to 500 students to gauge students' awareness and impressions about careers and job opportunities in the Canadian wood manufacturing industry. The survey asked students to answer 13 questions and comment generally on the wood products manufacturing industry. The questions gauged student

awareness of the industry in their local community, province, and Canada; the importance of the industry in terms of jobs and economic impact both provincially and nationally; student knowledge of jobs in the wood products industry, impressions of the industry and the jobs that are available, and interest in pursuing a career in the industry; whether the students' school offered a wood-working course and the students' participation in the course; and students' knowledge of, and interest in, post-secondary wood-related educational programs. In total, 358 surveys were completed and returned, yielding a response rate of 71.6%.

### *Survey of educational institutes*

This section of the study focused in detail on thirteen Canadian post-secondary educational programs that lead to a degree, a diploma, or a certificate in the area of wood manufacturing (Table 1). Programs that focus on small-scale "designer-manufacturer" and apprenticeship programs (dealing with joinery or carpentry) were not included in the study. All of the thirteen programs surveyed were included in the industry survey (above), but the industry survey listed a greater number of programs (25 in total) because it also included the smaller scale ones.

Telephone interviews were conducted with the coordinators of each of the programs across Canada. Interviews typically lasted between 40–

90 minutes, with some data (such as historical student enrollment) being collected later by email contact. The interviews consisted, in part, of a series of questions designed to gather information on the following major topic areas: 1. the institutions and their program(s) offered in wood products manufacturing; 2. past and current marketing and recruitment efforts; 3. historical enrollment and capacity data; 4. faculty and staffing levels; 5. interest in developing national articulation agreements; 6. interest in a Canada-wide recruitment strategy; 7. industry involvement in the program; 8. the biggest challenges, institutional pressures, and factors affecting the attractiveness of the wood products industry to young people and; 9. job placement of graduates.

## RESULTS

### *Human resource needs of industry*

The distribution of responding companies by product type is given in Fig. 1. Most of the respondents of this survey could best be categorized as *higher* value-added producers of cabinets, architectural millwork, furniture, doors, and windows. Comparatively fewer respondents belonged to sectors more closely aligned with primary manufacturing like re-manufacturing, sawmilling, and engineered wood products and panel board production. The totals exceed 100%

TABLE 1. *Educational institutes in Canada offering post-secondary education programs leading to a degree, a diploma, or a certificate in the area of wood manufacturing.*

Institution	Location	Program Title	Qualification
Algonquin College	Nepean, Ont.	Furniture Technician	Diploma
British Columbia Inst. of Tech.	Burnaby, BC	Wood Products Man. Tech.	Diploma
College of New Caledonia	Prince George, BC	Wood Processing Eng. Tech.	Diploma
Conestoga College	Kitchener, Ont.	Woodworking Tech.	Diploma
Humber College	Toronto, Ont.	Ind. Woodworking Technician	Diploma
Northern Alberta Inst. of Tech.	Edmonton, Alb.	Wood Processing Eng. Tech.	Diploma
New Brunswick Comm. College	Campbellton, NB	Woodworking Technology	Diploma
Nova Scotia Comm. College	Sydney, NS	Wood Manufacturing	Diploma
Red River College	Winnipeg, Man.	Wood Products Man. Tech.	Diploma
Southern Alberta Inst. of Tech.	Calgary, Alb.	Wood Eng. Tech.	Diploma
University of British Columbia	Vancouver, BC	Wood Products Processing	Degree
University College of the Cariboo	Kamloops, BC	Computerized Man. Tech.	Diploma
University of New Brunswick	Fredricton, NB	Wood Products	Degree (minor)

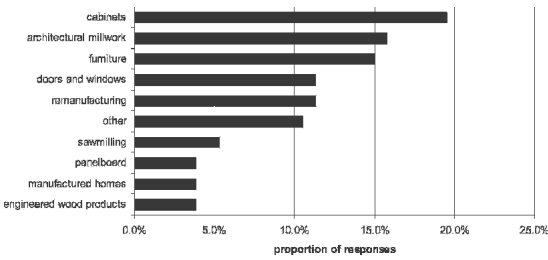


FIG. 1. Distribution of responding companies by production (n = 93).

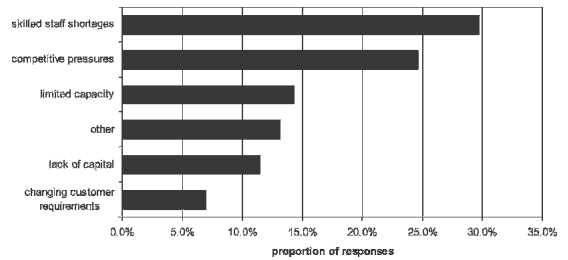


FIG. 3. Factors limiting the growth of responding companies (n = 93).

because some companies produce more than one type of product.

The companies represented tended to be sizeable, employing over 180 individuals, on average, with by far the largest number of employees working in production (Fig. 2).

When companies were asked which factors most limit their growth, the most common reply was skilled staff shortages at 29.7% of the total responses, with some companies (22.2%) even having to go outside of Canada to hire expertise in certain areas (Fig. 3). This point is supported by the fact that fully 83.5% of the companies feel that there is a shortage of production and tradespeople. This is somewhat less of a problem for management, professional and supervisory employees (at 54.5%), and entry-level workers (at 37.5%). That said, companies rate management, professional and supervisory employees as being the most difficult to attract and retain. Skilled staff shortages was followed closely by competitive pressures (at 24.6% of the responses) and more distantly by limited capacity, a lack of capital, and changing customer requirements.

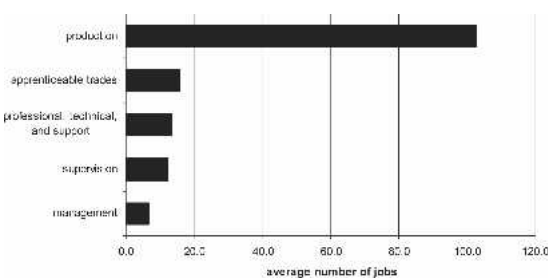


FIG. 2. Average numbers of jobs per responding company (n = 93).

Over three-quarters of the companies surveyed (76.4%) stated that the skills needs of their organizations have changed in the last ten years. Companies were asked to provide a ranking of the most important skills that are sought when hiring management, professional and supervisory employees (Fig. 4), and production and trades employees (Fig. 5). It should be noted that these rankings are conveyed in arbitrarily assigned “evaluation points,” which can only be used to describe the relative magnitude of attributes. For management, professional and supervisory employees, leadership clearly ranks as the most important skill, followed by communication, technical and management skills. The two skills deemed the least important were business and computer skills. For production and trades employees, ‘attitude’ was the most important ‘skill’ required. This was followed by technical skills and the related ability to be flexible. Communication, safety, and leadership skills did not rank as highly as attributes sought from these employees. When asked to comment on how jobs and skill requirements will change in the

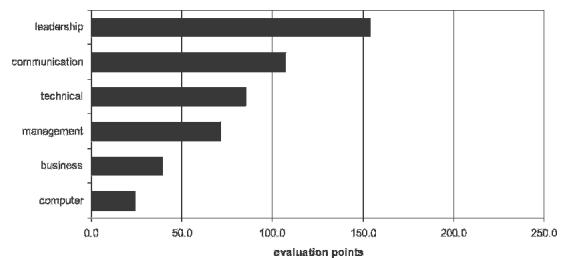


FIG. 4. Skills sought by responding companies for new management, professional and supervisory employees (n = 93).



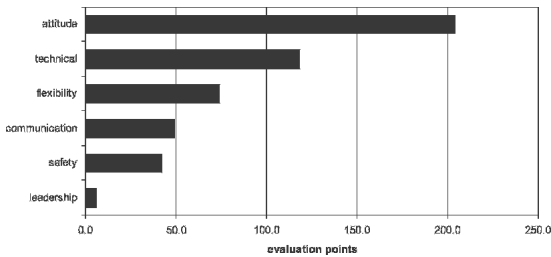


FIG. 5. Skills sought by responding companies for new production/trades employees (n = 93).

wood industry over the next ten years, most responses revolved around the need to understand and operate 'hi-tech' (automated and computerized) production machinery.

Companies were asked to estimate the proportion of employees that have attained various levels of education. By far, most workers employed by responding companies (55.3%) have a high-school diploma. Far fewer have an apprenticeship (14.4%) or a certificate/diploma (13.7%). Interestingly, the number of employees within the ranks of responding companies that do not have a high school diploma (15.7%) exceeds the number of post-secondary graduates (6.5%).

Responding companies replace or hire (approximately equally apportioned) an average of 28 production employees per year, compared to 3.5 employees in the management, professional or supervisory ranks. New hires are most typically sought out through advertisements and word-of-mouth.

When asked about the various post-secondary wood products programs that exist in Canada, respondents were most familiar with the three largest programs: those at Conestoga College (Ontario), British Columbia Institute of Technology, and the University of British Columbia. In general, companies were not as familiar with the remaining 22 post-secondary institutes listed. That said, most of the schools that were mentioned seem to be fairly equally well regarded with respect to the quality of students that graduate and enter the workforce.

When asked what types of positions graduates from post-secondary wood products programs take up in a company, the distribution of responses was as follows: professional/technical/

support staff—29.4%; production—23.5%; skilled trades—22.7%; supervision—13.4%; and management—10.9%. However, this result is tempered somewhat by the fact that 64.6% of the companies surveyed hire graduates from non-wood products programs like engineering and commerce, and 54.5% stated that this trend has increased over the last ten years.

The majority of companies surveyed (81.3%) indicated that they offer opportunities for employees to take additional training. This is mostly in the form of in-house training (41.3%), on-site continuing education (21.5%), or off-site distance education (21.5%). However, only 44.7% of the respondents were likely to use the Internet to deliver employee training.

Lastly, companies were asked whether they would recommend the wood industry as a career for a young person and 89.4% responded favorably, generally citing the large growth potential of the Canadian value-added wood manufacturing sector. However, the results also indicated that this is becoming more and more challenging, with 87.5% of the responding companies stating that wood products education programs in Canada are having a difficult time attracting students. Many of the reasons given revolve around the fact that the Canadian wood sector has a poor image and that careers in the value-added industry are perceived as being low-skill with low rates of pay.

#### *Students' awareness and impressions of careers in the Canadian wood manufacturing industry*

The majority of the 358 high school students who responded to the survey were generally aware of the existence of wood manufacturing companies in their community (57%), province (67%), and Canada (68%), but some of them were unable to distinguish between manufacturers and retailers of wood products. For example, when asked if there was a wood manufacturer in their town, many students listed one of the big box retail outlets. Students generally agreed that the wood products manufacturing sector was economically important, (both regionally and

nationally), but many of them (68%) could not name specific job titles in the industry, and 53% were unaware of post-secondary wood-related educational programs.

Many of the students rated jobs in the sector as average or above average in terms of use of technology, community involvement, environmental responsibility, and future potential. Nevertheless, 86% said they would not pursue a job in the sector. The reasons for the lack of student interest varied, but generally fell into the following categories: 1. poor image of the industry; 2. a lack of information about opportunities in the industry; 3. availability of better career opportunities and; 4. the blue collar image of the industry and its association with manual labor. The majority of students (72.7%) responded that their school offered a woodworking program. Forty-four (44) students (out of a total of 351) indicated that they were enrolled in woodwork and thirty-four (34) students indicated their reasons for taking the course. The majority of students (61.8%) chose woodwork for general interest. Some students (20.6%) saw the course as relevant to future employment opportunities, and the remaining responses (17.6%) indicated that students had enrolled in the courses because they provided graduation credits.

#### *Status, capacity, and challenges faced by wood-manufacturing educational programs*

The enrollment capacities of the various programs ranged widely, from approximately 200 down to 10. In total, there were approximately 750 places for students in the 13 programs surveyed (Fig. 6). Current enrollments as a percentage of available capacity also varied widely. Four programs were at or very close to 100% of capacity, while three others were currently suspended because of a lack of applicants. Overall enrollments were at 61% of capacity (all programs considered). The majority of educational institutes had not recruited new faculty recently and thus were unable to comment on the degree of difficulty of attracting suitable instructors. The majority of the institutes, however, commented that there was insufficient technical sup-

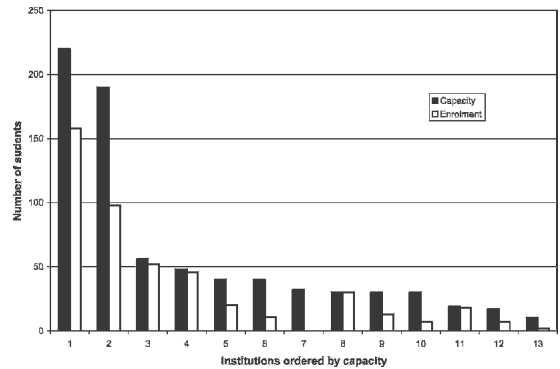


FIG. 6. Capacity and enrollment figures (2002–2003) for Canadian educational institutes offering advanced training in wood-products manufacturing.

port for faculty teaching courses in wood products manufacture.

Of the 13 programs surveyed, five offered some sort of formal integrated work experience program (co-operative education). In three cases, this work experience was required, while in two others it was optional, but encouraged. The other programs encouraged their students to gain relevant employment experience during scheduled breaks in the program, but generally lacked the resources to establish a formal work program.

All but four of the programs had established industry advisory boards that were actively involved in the programs to varying degrees. Some programs held regular advisory board meetings where formal procedures existed for the board to have input into program curriculum, while others were more general in their advisory role. All programs cited strong local industry in-kind support for their programs and very high employment rates for their graduates.

Interest in the development of articulation agreements, whereby students can transfer between institutions, was very mixed. Some coordinators thought that the ability of their graduates to receive advanced standing in a degree program would attract potential students. Other coordinators thought that students were unlikely to be interested in transferring between institutions for further education because they had noted reluctance amongst students to relocate for employment opportunities.

There was almost unanimous agreement on the major challenges facing wood-products manufacturing education programs in Canada. The first was the poor public perception of the wood manufacturing industry. Respondents felt that either there was no perception or a very negative one. Typical responses from the program coordinators used to characterize the current public perception of the industry were: 1. 'not that attractive'; 2. 'below the horizon'; 3. 'could not be less attractive'; 4. 'not at all attractive'; 5. 'terrible'. Respondents were often quick to add that these were generally misperceptions and they all had examples that they could present to skeptical students, parents, and teachers about the good career prospects for young people in the industry. The second major challenge facing the programs was the low numbers of students enrolled in the programs and the relatively poor academic standing of the students. Currently, almost no students are being declined admission to any of the programs providing that they have the required minimum academic qualifications. Respondents indicated that they would like to be in a position where the size of their qualified applicant pool was larger so they could be more selective of who was admitted into their programs.

Almost all programs had engaged in some limited advertising or promotional activities in the hope of recruiting more students. Often recruitment efforts relied on centralized institutional activities since funding was not available to undertake program-specific activities. Most programs had developed small promotional booklets and all had web-pages describing their programs. Instructors from some of the programs had occasionally visited local high schools in an effort to recruit students. In some cases, there were ongoing relationships with local high schools and almost all coordinators indicated that bringing potential students into their facilities to view the activities of the current students was one of the most powerful recruiting tools at their disposal. All program coordinators were very enthusiastic about a larger scale recruitment strategy. They indicated their willingness to provide whatever logistical support they

could to assist a recruiter visiting their local schools. The coordinators thought that the professionally designed promotional material recently developed by the Wood Manufacturing Council would help to improve the image of the industry in the eyes of students and their parents.

#### DISCUSSION

The finding that labor shortages in the skilled trades area and, to a lesser extent, management appear to be limiting the growth of Canadian wood products companies is noteworthy and accords with trends in other manufacturing industries. Canadian wood manufacturing companies also nominated competitive pressures as being a very important factor affecting growth. A survey of Australian industry also found that these two factors were the most critical ones affecting competitiveness although their order of importance was reversed (Long 2004). The response to increased competitive pressure in manufacturing industries is for companies to seek to become more efficient through better integration of the supply chain, utilizing new technologies such as CAD/CAM, relocating offshore to manufacture certain components or products, and discarding non-core or less profitable businesses. These strategies change the skills balance that companies require of their workforce, and hence, increased competitive pressures tend to compound the problem of lack of skilled people and skills gaps. The need for companies to respond to competitive pressures by changing their structure and manufacturing processes may account for the very high emphasis they place on 'leadership' and 'communication' as qualities required of managers, and the future importance of computer-aided manufacturing. Industry was not asked to comment on the effect of skills shortages on productivity and costs, but a survey of 81 manufacturing companies and 33 engineering firms in the UK from 1980 to 1990 estimated that skills shortages reduced productivity growth by 0.4% per annum and raised wages growth by 1% per annum (Haskel and Martin 1993). These losses in productivity and costs were incurred because companies had to wait



longer to fill vacant positions (reducing productivity) and increase spending on in-house training. Labor shortages were also reported to increase the difficulty of extracting additional productivity from workers, and increased pressure on wages. Haskel and Martin (1993) also indicated that labor shortages increase the pressure on companies to hire less skilled workers. Bowyer (1991) pointed out the serious problems for wood industries that can arise from the hiring of people who lack an adequate understanding of the material properties of wood, for example, its shrinkage anisotropy and decay characteristics. This problem may be worse in wood manufacturing industries that utilize a greater range of materials including wood composites, adhesives, coatings, metals, leather, and glass and seek to combine them to produce more sophisticated engineered products. The increasing tendency noted here of companies to hire engineering and commerce graduates who presumably have an incomplete understanding of the complex nature of wood may therefore be a cause for concern unless their lack of knowledge of wood can be remedied by adult education programs.

The unmet demand for skilled and educated workers by the Canadian wood manufacturing industries, their increasing tendency to hire graduates from other fields, and under-enrollment in wood manufacturing education programs in Canada all point to a serious labor market imbalance between the demand and supply for labor by industry. Low current enrollment at colleges and technical institutes and the suspension of some wood manufacturing programs tend to suggest that there will be little improvement in the overall situation in the future unless more high school students, particularly women, can be persuaded to engage in post-secondary training relevant to the wood manufacturing industry. It may be difficult to achieve this aim because our survey clearly shows that the majority of students are not interested in pursuing a career in the wood manufacturing industry because of its association with unsustainable forestry practices and manual labor, and the availability of more attractive career options (wood is regarded as boring!). Changing

such negative perceptions requires a comprehensive communications strategy at a national level to develop awareness in schools and the community in general of careers in manufacturing and wood processing in particular.

Our results suggest that information conveyed to students should stress the technological sophistication of the industry, the use of wood from sustainable sources, and the competitive salaries offered by the industry (if this is the case) to counter current negative student perceptions of the industry. A more sophisticated understanding of the factors affecting student choice of career is required to identify and develop strategies to compete with other industries to hire talented job-seekers from a shrinking pool of young people. A survey of students in UK universities found that students rated job satisfaction (enjoyment), liking the people you work with, being challenged, and financial rewards as being the most important factors affecting employment choice (Prospects Careers Services' Desk 2003). Similar information is needed for Canada to allow the development of promotional material that will make careers in the wood manufacturing industries appear more attractive to young people. Additional strategies that could increase the numbers of skilled workers could include better integration of the educational chain. Examples include the industry-led 'adopt a school program' underway in some countries, the WoodLINKS program in the USA and Canada, more active involvement by industry in recruiting students into institutes of higher learning, and comprehensive government strategies designed to address labor market imbalances.

Loss of capacity to educate people for particular industries is mentioned in the literature as being a factor responsible for labor market imbalances in Europe (Evans 2003). In some countries a free-market approach to education that is responsive simply to the demands of students for degree courses has led to serious shortages of trained people for industries of critical national importance. For example, lack of student demand in the UK for post-secondary education in chemistry has led to the closure of many chem-

istry departments and this has the capacity in the medium-to-long-term to seriously erode the competitive ability of the UK's chemical industries (De Bruxelles and Owen 2004). There have been closures and suspensions of wood manufacturing programs in recent years in Canada. For example the program at the Southern Alberta Institute of Technology closed in 2002–03 and the Northern Alberta Institute of Technology and the British Columbia Institute of Technology suspended their programs in 2002–03 and 2003–04, respectively. Six out of the remaining ten programs are under-enrolled, and the academic coordinators of some of the programs doubted the viability of the programs in the long-term. They also added that, in the cases of courses currently under suspension, the longer the suspension the lower the probability of the programs reopening. Infrastructure and institutional support are rapidly lost over time when the course is suspended, as trained teaching personnel find other employment and equipment is absorbed into other programs. The coordinators also commented that programs can not be simply “switched on” again at short notice in response to increased market demand.

Our findings suggest that loss of educational capacity may emerge as a critical issue in the coming years unless steps are taken to increase student enrollment in the relevant institutes. Most of the institutes offering wood manufacturing programs had used their limited resources to try to recruit students, but with few exceptions their efforts were piecemeal and they lacked the capacity and expertise to sustain recruiting and promotional activities. A significant sector-wide approach involving government, industry, and educational institutes is needed to solve the problem. The recent development by the Wood Manufacturing Council of promotional material available to institutes of higher learning is a welcome development (Wood Manufacturing Council 2004), although a national network of recruiters found greater favor with the educational institutes because it would have a greater and more immediate impact on student numbers.

Our results did not find much direct evidence that the post-secondary institutes were respon-

sible for skills gaps, in other words failing to educate students to the required levels. Industry was generally satisfied with the graduates of the programs. Nevertheless, the high importance that the wood manufacturing industry places on qualities such as leadership and communication for graduates of universities, and attitude in the case of people with vocational qualifications, clearly signals the need for educational institutes to evaluate the extent to which their graduates possess these qualities. Previous surveys have also found that industry placed emphasis on non-technical qualities when hiring graduates. For example, a survey undertaken by the American Pulpwood Association, and reported by Duncan et al. (1989) concluded that ‘the profession must seek to attract students who are capable of effective interpersonal relationships, are highly motivated, are both creative and flexible, are committed to life-long learning, and possess high standards of personal integrity’. Kennedy (1990) also pointed to the need for graduates to ‘understand organizational behavior and the psychology of leadership’. There is an assumption that during school years and subsequently during post-secondary education students will become proficient at communicating (both orally and on paper). Hence, curricula generally focus on technical subjects and developing cognitive abilities. This assumption may be misplaced, although it is our observation at the University of British Columbia (and elsewhere) that students become highly proficient at communicating orally, but somewhat less so in writing, by the time they graduate. There is no doubt, however, that students would benefit from further instruction in technical writing. The extent to which educational institutes can teach qualities such as leadership and attitude to a pool of people who have been pre-selected on the basis of academic qualities is unknown, but clearly our findings suggest that they should focus attention on this important issue.

#### CONCLUSIONS

1. Canada's wood manufacturing industries face a severe shortage of skilled tradespeople

and find it difficult to attract and retain professional and supervisory personnel. Skilled staff shortages in the trades area and, to a lesser extent, management appear to be limiting the growth of Canadian wood products companies.

2. The majority of high school students are not interested in pursuing a career in the wood manufacturing industry because of its association with unsustainable forestry practices and manual labor and the availability of more attractive career options.
3. The majority of educational institutes in Canada offering higher qualifications in wood manufacturing face difficulties in attracting students, and hence, their programs are under-enrolled. Three of the 13 programs are currently suspended because of lack of student interest. Loss of relevant educational capacity may emerge as a critical issue for the wood manufacturing industries in the coming years unless steps are taken to increase student enrollment in the relevant institutes.
4. Comprehensive and creative solutions are needed to address the labor market imbalances faced by the Canadian wood manufacturing industries. A major part of such a strategy should be on improving young people's knowledge and image of the wood manufacturing industries. Educational institutes should focus attention on whether they are meeting industries' requirements for tradespeople with good 'attitude' and advanced technical skills, and professionals who are able to provide leadership and communicate to their workers the necessity for change in order for industry to remain competitive.

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(WoodLINKS) for coordinating the survey of high schools.

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