# QUALITY ASSURANCE FOR VALUE-ADDED WOOD PRODUCERS IN BRITISH COLUMBIA

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## ABSTRACT

Third-party quality assurance has long been embraced by many industrial sectors as an effective means of improving a company's quality, production, and ultimately, profitability. From a marketing point of view, quality assurance labels are an effective means of promoting high-quality products and, thus, building global demand. However, the value-added wood products industry in British Columbia has not been quick to adopt such systems, despite an urgent need to develop worldwide markets. This paper describes the process of quality assurance and provides examples of systems that currently operate in other sectors of the economy. Results from a 1998 survey of British Columbia's value-added wood products industry indicate that this sector has not yet embraced the notion of third-party quality certification. Nor is it engaged in formal quality control activities of any sort, for the most part. In fact, value-added wood producers' definition of quality seems to be very different from that of their customers. While the results decisively show that the widespread adoption of a third-party quality assurance program may prove challenging in the value-added wood products industry, it is, nonetheless, warranted at this time. One possible solution would be the introduction of an industry-specific quality certification system devoted exclusively to improving the global competitive position of the Canadian wood industry through the adoption of sound manufacturing practices and the promotion of high quality goods.

In many industrial sectors, third-party quality assurance programs, like the International Standards Organization (ISO) 9000 series, have proven to be an effective means of improving a company's quality, production, and ultimately, profitability. Furthermore, credible and independent third-party quality assurance systems can serve as very powerful marketing tools by promoting high-quality products, building global demand, and increasing the likelihood of customer acceptance. However, despite these obvious benefits, such programs are relatively uncommon, or even unknown, in the burgeoning British Columbia value-added wood products sector.

This paper sets out to examine the process of quality assurance, providing specific examples of systems that are currently in place in other sectors of the economy. Results from a 1998 survey of British Columbia's value-added wood products industry on issues pertaining to quality and quality assurance are also presented with recommendations for the adoption of such a system.

## BACKGROUND

Value-added wood products manufacturing can be defined as production activities that transform primary wood products (lumber and panels) into other wood products (11). Currently, there is a worldwide shift among primary wood-producing regions towards value-added production. Not surprisingly, this is occurring in conjunction with policies and programs encouraging job creation and the diversification of economies. Nowhere is this more prevalent than in British Columbia, where a significant value-added wood products economy is

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Forest Prod. J. 51(6):47-55.

rapidly emerging despite the dominance of an entrenched primary sector.

According to a 1998 survey of BC value-added wood producers, annual sales in this sector are estimated to be over $3 billion ($CDN), representing approximately 17 percent of all wood products sales from this region. The sector is comprised of 755 companies, producing a wide range of goods including remanufactured wood products (resawn, surfaced, or dried custom wood products), engineered wood products, mouldings and millwork, cabinets, furniture, pallets and containers, shakes and shingles, and other miscellaneous wood products (11).

A characteristic unique to this and any sector of the wood industry is the fact that wood, unlike other industrial products like steel or plastics, is a heterogeneous and variable material. This presents some very real challenges with respect to quality issues and speaks to the need for formalized quality control and quality assurance programs. However, a discussion of these topics within the context of the value-added sector must begin with a definition of quality itself.

This is more difficult than it seems. Quality is a very multifaceted and subjective term that is not well defined in most literature. In 1978, the American National Standards Institute attempted to increase the understanding of quality by offering a standardized definition as "the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs" (1). While this is not a particularly operational definition, it does point out two very important aspects of quality. First, customers, and perhaps more to the point, the value that customers place on products, is critical in defining quality; quality can be thought about in terms of the consistent satisfaction of customer needs. Second, quality is not just any one characteristic, nor the sum of many, but rather a holistic concept akin to the value that customers place on a number of product attributes.

Recognizing the fact that quality cannot be distilled into a single characteristic, David Garvin attempted to encapsulate the multiple attributes of product quality into eight dimensions (5): 1) performance; 2) features; 3) reliability; 4) conformance; 5) durability; 6) serviceability; 7) aesthetics; and 8) perceived quality (or image). While this paper does not interpret the meaning of these attributes, this listing is effective in showing the diversity of definitions surrounding the concept of quality. It is notable that this theoretical model has been empirically tested and validated within a forest products context (9). Furthermore, this model has been successfully incorporated in quality assessment studies related to the manufacture of value-added wood products (8).

Garvin's eight dimensions of product quality provide a useful starting point for any company attempting to incorporate a formal quality program or develop a quality strategy. They also point out the complexity involved in understanding quality, let alone applying it in the manufacture of products. Garvin himself addresses this complexity by discussing five varying interpretations of quality. The *transcendent* definition implies an innate distinction or superiority. The *value-based* definition constrains this interpretation with the expectation of a certain level of performance at an acceptable price. The *user-based* definition refers to how well a product performs in its intended use. The *product-based* definition says that product quality consists of attributes that can be measured. Lastly, the *process-* or *manufacturing-based* definition says that quality is the result of manufacturing and how well the product conforms to known industry standards, specifications, and designs (4).

This knowledge is critical in the application of quality principles to industrial situations. In setting up and implementing a formal quality program, the need for an operational framework precludes the use of the first three definitions. Only the product-based and process-based definitions are conducive to measurement and analyses. As a result, most formal quality programs operate by adopting quality principles related to either a product- or process-based definition. In fact, it can be argued that the two definitions are intrinsically tied, i.e., product quality problems are merely symptomatic of bigger and largely controllable process quality problems. In other words, while quality may be seen in product specifications, it is the result of proper manufacturing and design.

One means of applying these sorts of quality principles industrially is with some formal system of quality assurance. This is especially acute as we enter into what some have termed a "quality revolution," wherein companies must compete not only on cost, but on quality attributes, in order to prosper. Quality assurance gives these companies, and ultimately their customers, a means of assessing product quality in an unbiased and credible manner. In so doing, it allows manufacturers to more effectively compete in global markets. It is estimated that companies that have been certified by some quality assurance body are two to three times more likely to outperform companies that have not (7).

Based largely on Total Quality Management (TQM) principles of ensuring long-term success through customer satisfaction, quality assurance systems are usually administered by an independent third-party organization. These organizations will generally certify a company that has met their quality standards and allow them to use their logo or label on its packaging and advertising. Thus, in addition to improving manufacturing processes and production consistencies, quality assurance can also be used as a very powerful promotional tool (6).

There are three common models for quality assurance. The first is quality assurance through some award mechanism, meaning that companies are certified based on a set of criteria and a system of points that show whether or not the company has met those criteria. Examples include the Malcom Baldridge National Award for Quality in the United States, the National Quality Institute Awards for Excellence (through regional affiliates) in Canada, and the Deming Prize in Japan. The second model for quality assurance is the quality system approach, the most common of which is the ISO 9000 series. This set of international standards on quality management is designed to facilitate the documentation and implementation of effective quality plans by means of quality certification and/or the provision of information and general management guidelines. The third model for quality assurance, and arguably the best known from a consumer point of view, is the industry-specific quality assurance system. Used widely in the computer and textiles industries, these systems have been very successful in building global

demand and generating consumer awareness on an industry-specific level. Marks or logos are given to companies that have met strict production and performance control standards and are used to signify quality and reliability to consumers. Perhaps the most successful of these programs is the ubiquitous 'Woolmark' quality assurance system, which works on behalf of the wool producers of Australia.[1]

The need for a quality assurance program is becoming acute for value-added wood producers in British Columbia, where high quality fiber that has traditionally been used in the production of commodity products (like dimension lumber) is now being more prudently used in the production of higher value wood products (like furniture and cabinetry). Once price sensitive, customers for British Columbia's wood products are fast becoming more and more quality sensitive as the industry moves up the value chain.

The question of which model of quality assurance the value-added wood industry should adopt is not a simple one. Awards systems are often effective public relations tools, but do little in the way of continually improving product quality and consistency. Certainly, there are no awards that deal explicitly with the unique quality and consistency issues inherent in wood (drying, machining, assembly, etc.). The ISO 9000 series is an option and, while some companies have been forced to comply with these guidelines due to market pressures, this may not be the appropriate model for the value-added sector because of its scale. It is a large, rigid, and costly system that is difficult to implement in an evolving and tremendously varied industry. How does one impose any one set of standards in a sector that encompasses one-person shops, multinational corporations, hand-crafted goods, and high-tech equipment, to name but a few examples? One solution would be to scale down the scope of the quality assurance system, which has been attempted by some organizations. However, despite these initiatives, these systems are not particularly well known and still do not address the diversity seen in the value-added wood products industry and the robustness required in a quality assurance system. As such, it may well be worth exploring an industry-specific quality assurance program designed to build global demand through the production of quality goods. Such a system has never been fully explored in North America on a wide scale.

[1] http://www.woolmark.com/index.html

## METHODS

In June of 1998, a mail survey was sent out to all of the value-added wood producers that could be located in British Columbia in an attempt to better understand quality issues and the need for an industry-wide quality assurance system. In total, 487 surveys were sent out using a 3-point contact system (a questionnaire, followed by a reminder letter, followed by a replacement questionnaire). This system, a modification of Dillman's Total Design Method, is acknowledged to maximize response rate and minimize non-response error (3).

The survey itself queried respondents on topics surrounding quality, quality control, and quality assurance. As well, information related to each company's production, markets, and service needs was collected. In all, the survey consisted of six sections, the first four of which are analyzed in this paper: 1) production levels and markets; 2) quality certification; 3) quality issues; 4) customers; 5) services to the industry; and 6) industry profile information.

A survey cut-off date of 10 weeks was set. After this period, surveys were no longer accepted and coded data from each returned survey were entered into a spreadsheet and a statistical software package for further analyses. Fully, 16.6 percent of the surveys were returned "address unknown," which is indicative of an industry that is not only small and unstable, but also growing and transitory. Accounting for these returns yielded a corrected response rate of 33.7 percent.

The breakdown of responding companies by production is as follows: remanufacturers - 26.5 percent; engineered wood producers - 17.7 percent; cabinet producers - 16.3 percent; mouldings and millwork producers - 10.2 percent; furniture producers - 8.8 percent; treated wood producers - 4.1 percent; pallet and container producers - 3.4 percent; other miscellaneous wood producers - 12.9 percent. These proportions were compared to Wilson's census data on the value-added wood sector in British Columbia by a series of two-tailed z-tests ($\alpha = 0.05$) for differences in proportions (11). No significant differences were observed, which is a strong indication of little or no non-response bias. Testing some key variables in early versus late respondents further reinforced this, as no significant differences could be observed in response patterns. This means that the results presented in this study can be inferred onto the population of British Columbian value-added wood producers, but no further.

## RESULTS

Survey findings pertaining to the value-added wood products sector in British Columbia are presented in four parts: 1) a brief overview of the sector itself; 2) general quality issues for value-added wood producers; 3) the level of quality control programs that are currently in place; and 4) quality certification for the value-added wood products sector. Each is discussed in turn.

### OVERVIEW OF THE BRITISH COLUMBIA VALUE-ADDED WOOD PRODUCTS SECTOR

The British Columbia wood industry is one that has long been dominated by large primary producers of commodity products like dimension lumber and pulp and paper. While one might assume that a fiber-rich environment like this would be conducive to a prosperous secondary industry, this is not how the industry has evolved. A closer look at the types of value-added wood products manufactured shows an industry that is not very far removed from the dominant primary wood-producing sector. The majority of the value-added activity in British Columbia occurs in remanufacturing lumber products or producing engineered wood products. In addition, much of the industry can be characterized as service oriented; many shops do not sell products so much as services like resawing, planing, kiln-drying, finishing, and treating. Only slightly more than half of the producers can truly claim to be part of a more fully evolved secondary sector, manufacturing products like cabinetry, mouldings, millwork, and furniture.

The revenue structure of this sector (**Fig. 1**) is indicative of an industry that is small and evolving. The majority of value-added producers are small with revenues not exceeding $5 million. In

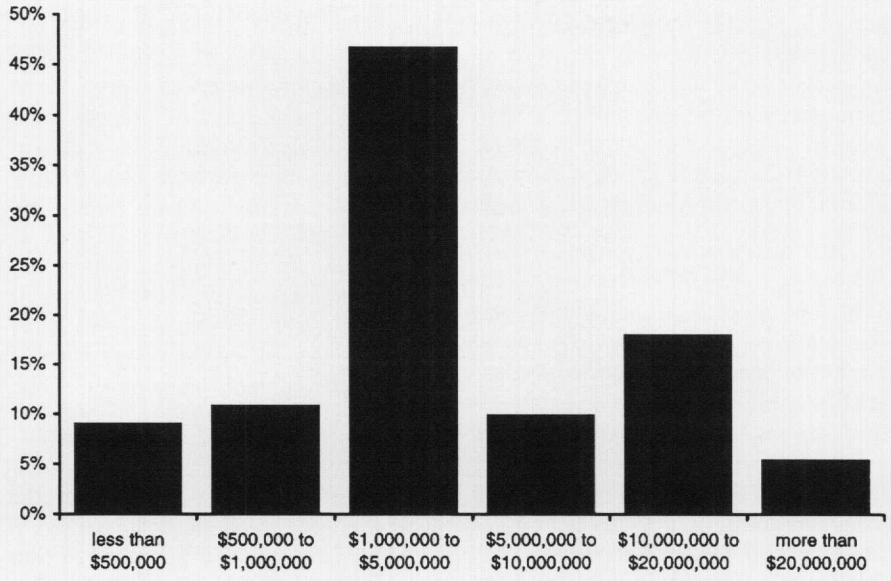


Figure 1. — Revenue structure of the British Columbia value-added wood products industry.

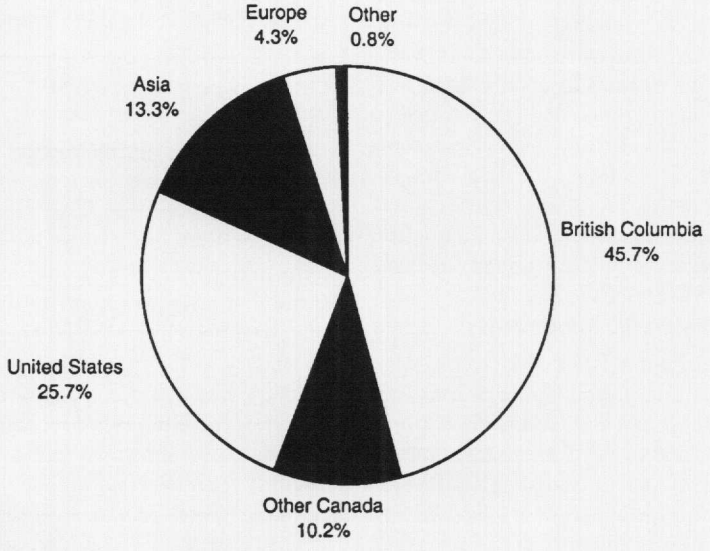


Figure 2. — Markets for British Columbia value-added wood products (by volume produced).

addition, there seems to be tremendous variety in production levels, from small crafts shops manufacturing toys and games to large multinational corporations manufacturing a diverse range of value-added goods like engineered wood products. It should also be noted that, unlike the primary sector in British Columbia, most respondent companies (approximately three-quarters) are non-union shops, with an average of 32.1 full-time and 4.1 part-time employees.

British Columbia is fortuitously situated in near proximity to very large global markets. Its markets for value-added wood products (by volume) are shown in **Figure 2**. The domestic market is, by far, the largest one, with 45.7 percent of the volume staying in British Columbia and 10.2 percent going to other parts of Canada. Only slightly less than half of the volume produced is shipped internationally. The second and third largest markets are the United States and Asia at 25.7 percent and 13.3 percent of the volume, respectively. Europe and other parts of the world account for the remaining 5.1 percent of the volume produced.

According to the survey, manufacturers are currently producing at 62.5 percent of capacity, on average. This, no doubt, can be partially attributed to weak economic performance in Canada and Asia. However, three-quarters of the respondents expect that this situation will soon reverse and that markets will continue to grow, especially in Canada and the United States. In general, there seems to be less confidence and more of a "wait and see" attitude with respect to Asian markets.

### Quality Issues in the British Columbia Value-Added Wood Products Sector

The survey also queried British Columbia value-added wood producers on various issues pertaining to quality. They were first asked to define what quality meant to them by rating the importance of each of Garvin's eight product quality dimensions (on a scale from 1 to 10, with 1 being not at all important and 10 being extremely important). Mean importance ratings computed for each attribute are shown in **Figure 3**. Included in this figure are results of a concurrent study that asked the same question of customers, in this case, 225 Japanese potential homebuyers (2).

The two attributes that ranked as most important in defining quality among producers are product performance and product conformance. This result is expected given that producers, in general, are keenly interested in knowing that their products do what they are intended to do and that they are made well. These were followed by product reliability, perceived quality, and product aesthetics, i.e., will the product work; what is the image or reputation of the company, brand and product; and how does the product look and feel? Lastly, the three attributes that did not rate very highly among producers are product features, product durability, and product serviceability. The low importance rating on the product features dimension is not particularly surprising as wood products typically come with few "bells and whistles." More surprising are the low ratings for product durability and serviceability, two quality attributes that are not seen on the shop floor, but rather

relate to product design and service over longer periods of time.

**Figure 3** also provides a comparison of how producers perceive quality relative to customers. In general, results seem to be fairly consistent between British Columbia value-added producers and Japanese potential homebuyers. Two-tailed t-tests ($\alpha = 0.05$) of differences between group means yielded significant differences on only three of the quality dimensions: perceived quality, product durability, and product serviceability.

While the limited scope of this analysis, and in particular the reliance on only one consumer segment, makes it is difficult to draw any general conclusions pertaining to these "perceptional gaps," it is noteworthy that British Columbia value-added wood producers place a great deal more importance on perceived quality. These companies feel that reputation and image is fundamental in defining quality, while these consumers tend not to agree. This speaks to the fact that customers may not be particularly loyal to any one company and, in fact, may be readily willing to substitute wood products. Two of the reasons that they may do so are the fact that this customer group rates product durability and serviceability very highly in defining quality, while producers do not seem particularly interested in the attributes that define quality long after the product has left the manufacturing facility. This makes sense, given that the consumer is in possession of a product for the duration of its service life, once it has been manufactured. However, this also seems to be a very myopic strategy, especially if value-added wood producers in British Columbia wish to encourage repeat business in Japan.

In an attempt to provide a greater understanding of the quality attributes information just described, data were segmented by production type. Unfortunately, this yielded random and inconclusive results as no patterns related to production were observed. For this reason, the nonhierarchical K-means clustering technique was deployed in an attempt to segment the quality attributes data into meaningful results. Based on underlying similarities in response patterns, this technique attempts to minimize within-cluster distances and maximize between-cluster distances. Using Garvin's eight dimensions of quality as input variables, the clustering was performed by choosing observations that maximized initial between-cluster solutions. A three-cluster solution emerged after two iterations, and this was deemed appropriate, both in terms of latent cluster meaning and cluster membership. Cluster means were computed and are shown in **Figure 4**.

Cluster 1, with a membership of 90 companies, placed a great deal of importance on all of Garvin's quality dimensions. Cluster 2, with a membership

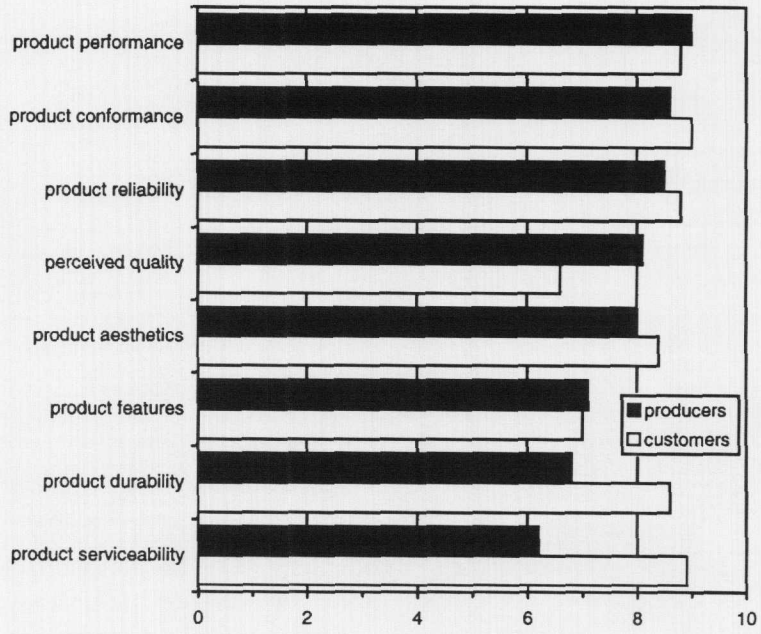


Figure 3. — Perceptions of Garvin's eight dimensions of quality – British Columbia value-added wood producers versus Japanese customers.

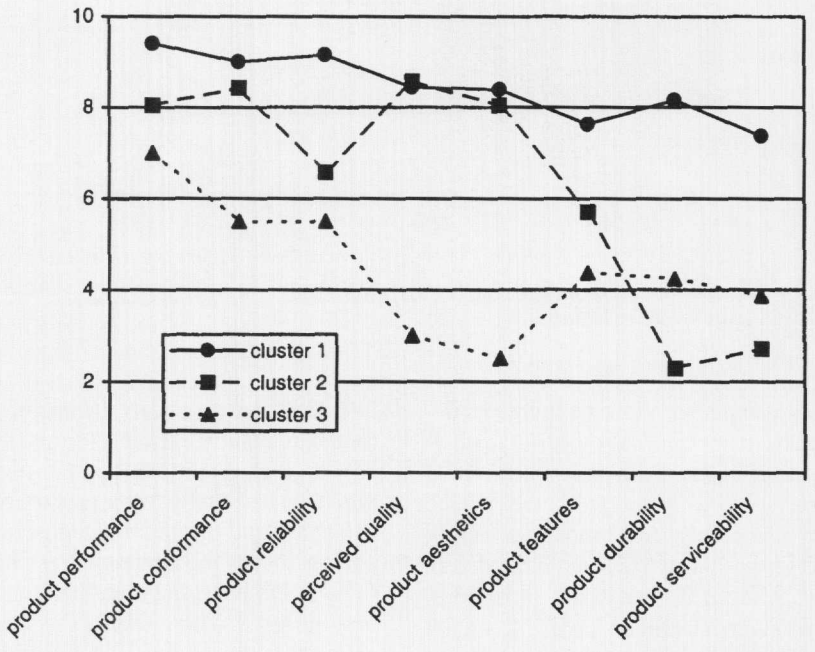


Figure 4. — Perceptions of Garvin's eight dimensions of quality – three clusters of British Columbia value-added wood producers (clusters 1, 2, and 3 place a high, moderate, and low degree of importance on quality, respectively).

*TABLE 1. — Composition of quality clusters (1, 2, and 3) by production type.*

| Production type | Cluster 1 ($n$ = 90) | Cluster 2 ($n$ = 24) | Cluster 3 ($n$ = 10) |
|---|---|---|---|
| | (%) | | |
| Engineered wood products | 14.4[a] | 33.3[a] | 20.0 |
| Remanufactured/treated wood products | 27.7 | 37.5 | 30.0 |
| Cabinetry/furniture | 35.6[b] | 8.3[b] | 20.0 |
| Mouldings and millwork | 11.1 | 12.5 | 0.0 |
| Pallets/containers/miscellaneous wood products | 11.1 | 8.3 | 30.0 |

[a] Significant difference in engineered wood products ($\alpha = 0.05$).
[b] Significant difference in cabinetry/furniture ($\alpha = 0.05$).

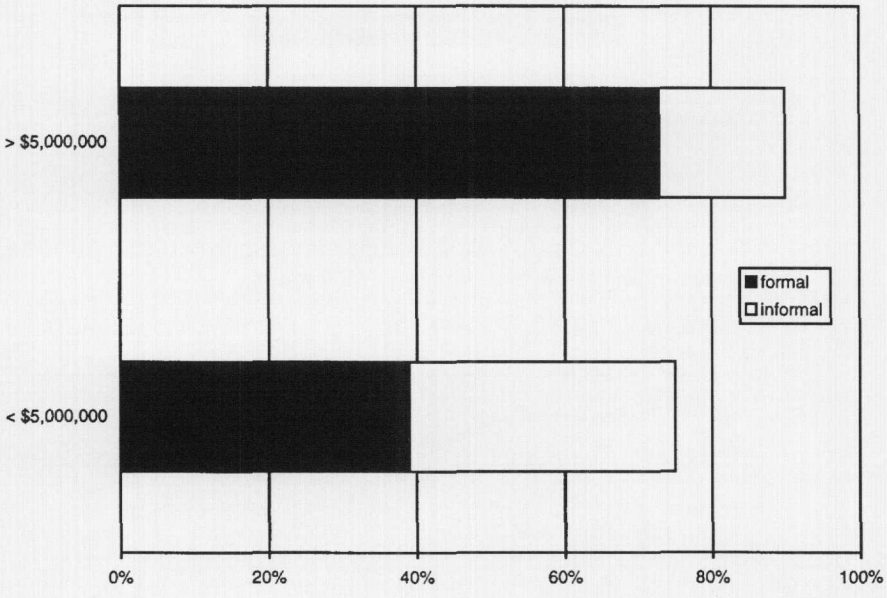


Figure 5. — Quality control programs within the British Columbia value-added wood products sector by revenue.

of 24 companies, placed a moderate degree of importance on most of the quality dimensions, with the exception of perceived quality and aesthetics (which they rate highly) and product durability and serviceability (which are rated very low). Cluster 3, somewhat underrepresented with a membership of 10, did not place a high degree of importance on any of the quality dimensions. Companies in cluster 1 generally operated with a higher degree of capitalization than companies in clusters 2 and 3.

The composition of each cluster by production type was determined and is shown in **Table 1**. Two-tailed z-tests ($\alpha = 0.05$) for differences in cluster proportions were performed on each production type. Only two statistically significant differences were uncovered. A significantly higher proportion of engineered wood producers belong to the moderate quality cluster (cluster 2) versus the high-quality cluster (cluster 1), while a significantly lower proportion of cabinetry and furniture manufacturers belong to the moderate-quality cluster (cluster 2) versus the high-quality cluster (cluster 1). These results seem to indicate that engineered wood producers place a moderate to high degree of importance on most quality attributes, especially perceived quality and product aesthetics. However, they do not perceive product durability and serviceability to be particularly important in defining quality, a result that is perplexing given the long-term structural requirements of the products that they manufacture. Furniture and cabinetry manufacturers, on the other hand, tend to place a relatively high value on each of Garvin's eight quality dimensions. This result makes a good deal more sense, given the high degree of value-addition and end-user requirements in this sector.

## QUALITY CONTROL IN THE BRITISH COLUMBIA VALUE-ADDED WOOD PRODUCTS SECTOR

Value-added manufacturers were also asked about the quality control programs that they currently have in place at their facilities. Despite their claims that quality control activities account for approximately 9.0 percent (on average) of the total production costs, there seems to be a definite lack of quality control within the British Columbia value-added wood products sector. Less than 40 percent of the companies have a formal quality control program in place or one that is currently under development. The majority of wood producers seem to have what they term "informal" programs, with some not having a quality control system at all. Despite this, quality issues seem to be discussed fairly regularly. Almost 40 percent of the companies surveyed discuss quality every day, while approximately 20 percent discuss quality either every week or every month. However, an alarming proportion of manufacturers, almost 40 percent, discusses quality only when a problem occurs, which is indicative of an industry that is not particularly proactive in the area of quality control.

When one analyzes quality control programs within the value-added wood products sector in more detail, some interesting trends begin to emerge. It is no surprise, for example, that companies with lower sales revenues (mostly remanufacturers) are less likely to have quality control programs in place and much less likely to have formal quality control programs in place (**Fig. 5**). The more surprising trend is seen when quality control programs are segmented by production type (**Fig. 6**). It seems that as one moves up the value chain from engineered and remanufactured wood products to millwork and furniture/cabinetry, quality control programs, and especially formal programs, become less and less common. In fact, in the case of furniture/cabinetry, the vast majority of quality discussions occur only when needed. It is noteworthy that this is the sector of the value-added wood products industry that places a great deal of value on each of the attributes that define quality. However, it is also comprised of smaller companies that are less likely to be able

to commit the resources required to build and maintain quality management infrastructures.

A further analysis of the quality programs that are currently in place again reveals an industry that is not particularly evolved in the field of quality control. Productivity information is the most commonly used tool for conveying quality (27.9% of the time), followed by sales information (22.1%), and recovery information (20.6%). Neither profit information nor higher level tools like statistical process control charts are very common (used 12.6% and 6.9% of the time, respectively).

### Quality Certification in the British Columbia Value-Added Wood Products Sector

The survey results show decisively that the British Columbia value-added wood products sector has not yet embraced the concept of quality assurance. Only 14.3 percent of the companies surveyed are currently certified by an accredited and independent third-party quality assurance body, and only one company was identified as being ISO 9000 certified. Further analysis reveals that approximately 40 percent of the engineered wood producers are currently certified, while none of the cabinetry, furniture, mouldings, or millwork producers are (the remaining wood producers fall between 10% and 20%). Furthermore, only 23.7 percent of the companies surveyed that are currently not certified intend on becoming certified any time in the future (mostly with ISO 9000). Overwhelmingly, the most commonly cited reasons for not doing so are: 1) there is no demand for quality certification from customers; 2) their in-house quality systems are sufficient; and 3) quality certification offers no competitive advantage in the wood industry.

The results of this and other surveys indicate that those assertions may be somewhat misguided; there is indeed a place for an independent third-party quality assurance program in the British Columbia value-added wood products sector. An overwhelming majority of the survey respondents who have been certified (93.3%) would go through the process again, and there is unanimity that the process was important to their respective establishments. While 37.5 percent of the certified companies felt that quality assurance was difficult to implement, 87.5 percent stated that it was definitely worth the effort, and 85.7 percent would recommend it to others. Lastly, 62.5 percent of the certified companies felt that the quality assurance program that is in place has been effective in increasing their profitability.

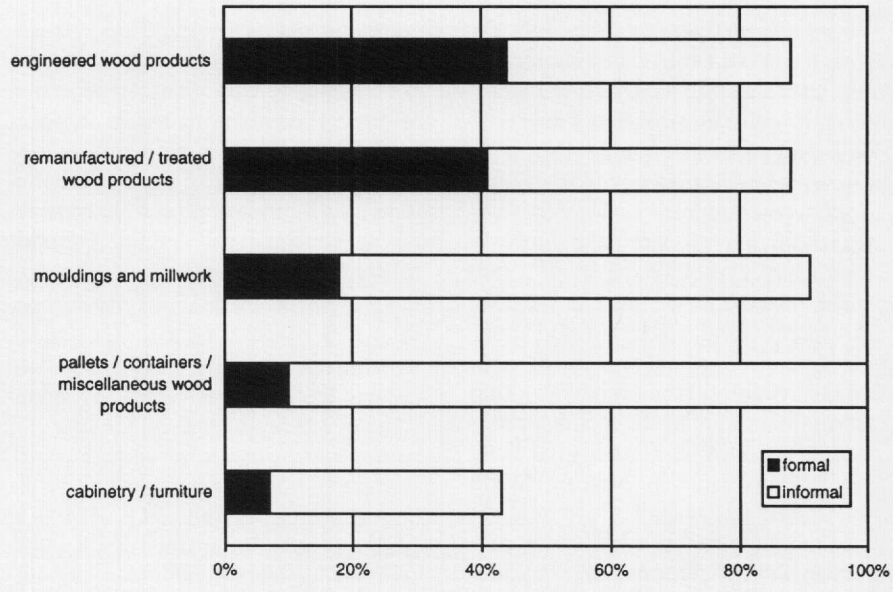


Figure 6. — Quality control programs within the British Columbia value-added wood products sector by production type.

The argument for third-party quality certification in the British Columbia value-added wood products sector is further borne out in a recent market study, which posed similar questions related to quality certification to 13 medium and large Japanese homebuilders (10). Responses support the notion of quality certification, with 70 percent of the homebuilders stating that they would like to see a quality assurance program for interior wood products, especially doors and windows, because of the very strict fire laws in Japan. Half of those surveyed believed that a quality-certified product should meet some internationally recognized standard, while the vast majority of respondents felt that a quality system should be based on the durability, performance, and reliability of the product in question. Furthermore, this customer group recommended that these quality attributes be reinforced by a high degree of after-sales service.

All that being the case, 68.9 percent of the British Columbia value-added wood products companies surveyed stated that any assurance system must take both the product and the process into account in assessing quality. Only 17.9 percent of the respondents stated that it should be solely based on how well wood products meet certain predefined standards, while the remaining 13.2 percent said that it should only be based on the production processes and quality control activities that are in place.

### Discussion

While support for a quality assurance system is, by no means, unanimous among value-added wood producers in British Columbia, the results clearly point to the need for an independent wood-specific quality certification body. Any lack of support for such a program is mitigated by the fact that several value-added wood producers feel strongly that the development of a quality assurance system is an important step for the industry to take at this time. Industry associations, government, and the academic community alike share this opinion. However, it is clear from the industry survey that a paradigm shift in how the term quality is perceived is required for such a program to be successful within the value-added wood products sector of British Columbia.

It goes without saying that, for a quality assurance program to succeed in building global recognition of quality and, ultimately building demand, it must appeal to the needs of diverse customer groups. In particular, the perceptional gaps pertaining to the longer-term quality attributes that affect customer satis-

faction, like product durability and serviceability, need to be addressed through rigid attention to design and manufacturing. It is also clear from the results of the survey that any quality assurance program that is introduced to the value-added wood products sector must address both the product- and process-based aspects of quality. Perhaps more salient, however, is the need for the British Columbia value-added wood products sector to adopt and implement a formal quality control program of any kind (especially in light of the fact that product conformance is a quality attribute that is highly rated by both producers and customers). Lastly, it should be noted that for a quality certification program to flourish, it must have a wider reach than the 755 value-added wood processors in British Columbia. For this reason, a national program, targeting the thousands of wood-processing companies that exist across Canada, may be a more appropriate business model. In a sense, this research can be thought of as a pilot study to validate the need for a broader, nationally focused quality assurance program.

With these constraints in mind, the Wood Products Quality Council of Canada and its distinctive WOODMARK logo were launched in early 1999 with a mission "to enhance the global competitive position of Canada's value-added wood products industry with quality principles and practices."[2] The Council, a third-party quality certification body, serves the Canadian wood industry by increasing customer awareness and acceptance of high-quality Canadian wood products around the world. The intention is that, in time, the WOODMARK logo will become a well-known sign of quality to customers. Through an intensive program of promotion on the part of the Council, companies that are certified with this logo will be instantly recognized as reliable and high-quality producers of wood products.

Any Canadian value-added wood producer who is willing to adopt the Council's quality philosophies and participate in the activities of the Council can apply for membership. In order to become certified, a company must demonstrate commitment to seven standards: 1) management buy-in; 2) development of a documented quality plan; 3) inspection of critical incoming materials; 4) measurement of critical in-progress work; 5) product traceability; 6) quality-control training of employees; and 7) continuous improvement and definition of critical areas.

Each of the seven standards was developed in consultation with value-added wood producers. That is, each standard reflects the quality needs of the value-added wood products sector at large. Of particular note is the seventh standard, continuous improvement, which is the underpinning of the WOODMARK quality system. Companies who become certified by the Council must demonstrate (with yearly audits) that quality problems that arise in production are being addressed and resolved on an ongoing basis by everyone in the plant. Lastly, it should be noted that this system was designed to be a "stepping stone" to other quality systems. For example, if companies wish to become certified by ISO 9000, rigid attention to each of the seven standards described will put them most of the way towards that goal.

June 2000 marked the first certification of a company by the Wood Products Quality Council of Canada. This pilot audit was performed on a large British Columbia manufacturer of ready-to-assemble furniture that manufactures some 9,000 parts per week (90,000 processes). Typically, less than five non-conformities occur every week, with each affecting approximately 1,000 parts. This company's main goals in adopting the quality system were: 1) reduce the number of parts that it takes to make acceptable components; and 2) use the WOODMARK logo as a tool for promoting its products worldwide. While it is too early to see any bottom-line results in terms of profitability, several improvements in the plant have been noted since the process began. First and foremost, the number of waste parts and rejects has been substantially reduced. There also now exists a "quality culture" in the company, both in the front office and in the plant. Check sheets are seen at every machine center and critical processes are now thoroughly documented. Employees focus on non-conformities and preventive action, as opposed to reacting to quality problems when they arise. The rigid procedures have been beneficial, not only in recognizing, documenting, and remedying quality problems, but in decreasing lead times for the development of new product lines. Lastly, an increased awareness of customer requirements permeates throughout the organization, with mechanisms in place to convey this information readily.

In the near future, the Council will be certifying a second pilot company (a remanufacturer) in an attempt to fine-tune its certification standards. Upon completion of this audit, the activities of the Council will revolve around the deployment and promotion of a Canada-wide third-party quality certification body. Finally, it should be noted that, despite some reticence on the part of British Columbia value-added wood producers to become engaged in the process of quality assurance, the demand for such programs from companies at this time far exceeds the Council's ability to certify them.

## Conclusion

Wood is a beautiful and functional material that is ideally suited to a countless array of consumer goods. However, what gives wood its transcendent aesthetic and utilitarian qualities also causes quality problems. This paradox of quality is rooted in wood's heterogeneity; it is an organic and anisotropic material that is prone to defects. As a result, wood processing requires very specific skills in order to achieve a high degree of quality that consistently meets the needs of various customer segments. Given the importance that both producers and customers place on product conformance, these objectives would be best achieved by the adoption of formal quality programs based on statistical process control techniques and methods of continuous improvement.

Examples from other sectors of the economy point to quality assurance as the appropriate mechanism for hastening this evolution towards quality management in the value-added wood products sector. However, very few systems take the natural variation of wood, and moreover the resulting difficulties inherent in wood processing, into account. For this reason, an industry-specific third-party quality certification system is recommended as a means of increasing the global competitiveness and prof-

[2] Wood Products Quality Council of Canada promotional literature

itability of Canada's value-added wood products sector.

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