

Multi-skilling: A Timely Manpower Utilization Strategy For the New Millennium?

Suppose you are a purchaser of construction services and a qualified contractor submits a proposal substantially reducing your construction bill. Would you want your advisors to take a closer look at having this contractor build your project? If, as a contractor, you become aware of a project management approach that increases your competitiveness by 5% and improves on-site safety, would you want to learn more? Perhaps you are a skilled tradesman considering comparable compensation offers from two reputable contracting firms. One firm indicates you are needed on site for eight months while the other requires your services for four months. Which opportunity would you be inclined to take? Well, according to a study released by the Construction Industry Institute in 1998, these are among the potential benefits that result from organizing and deploying staff on a multiskilled basis, the concept of tradespeople contributing more than one trade skill to a project.

WHAT IS THE CONSTRUCTION INDUSTRY INSTITUTE?

The Construction Industry Institute (CII) is a collaborative research forum based at the University of Texas in Austin, Texas. Funding is provided by major purchasers and suppliers of construction services including General Motors, DuPont, NASA, Ontario Hydro, BE&K, Kiewit Construction and HB Zachry. According to its mission statement, the Institute's primary objective is to: "improve the safety, quality, schedule and cost effectiveness of the capital investment process through research and implementation support for the purpose of providing competitive advantage to its members in the global market place."

Through some of North America's leading manufacturers and processors who are among its members, the institute knew that multiskilling labour strategies were successfully being implemented in various industries and locales throughout the world. As noted in the report: "a multiskilled workforce was identified as contributing to economic development, improved international competitiveness and increased profitability." With approximately 40% of total construction costs attributable to on site labour installation and erection activities, any increase in labour efficiency yields substantial capital cost savings for owners. Accordingly, the CII launched the study in 1997 to investigate the benefits, costs and impediments of deploying construction workers using a variety of multiskilling strategies.

MULTISKILLING: A RADICAL DEPARTURE FROM THE STATUS QUO

The construction industry is unique in the way it manages and organizes human resources. Unlike manufacturing or process industries, each construction project is different in terms of staffing, organization, strategy and management. Projects vary greatly - from small office renovations in large urban centres to multi-billion dollar state of the art processing facilities in remote locations. Consequently, every project presents its own challenges and requires a unique complement of tradespeople during various construction phases.

From initial pre-project engineering and planning by consultants, through estimating, to deploying personnel, all aspects of a construction project use a long standing, firmly entrenched structure that may require upwards of 25 categories of workers. These categories form what is commonly referred to as the craft structure. This structure is so fundamental to construction that to contemplate altering any of its components is to challenge the core fabric of the industry - a fabric woven over many centuries.

The basis for the current craft structure dates back to medieval times when workers were identified and organized according to craft or guild lines. From masons to carpenters, craft guilds organized apprenticeship training, set work standards and regulated who participated in an occupation within a geographic area. In time, governments, engineers and contractors adopted regulations, licensing, design and work processes to meld with this craft structure. Recognition of how deeply embedded this structure is, prompted the CII to state that implementing multiskilling strategies would require nothing less than a “paradigm shift throughout the industry.”

THE CONSTRUCTION PARADIGM IN TRANSITION

Many might suggest that relatively recent dramatic changes in market share from unionized to open shop construction are indicative of a “paradigm shift”. However, if one thinks of a paradigm as a structure, framework or underlying set of rules, it is apparent that many core rules and attitudes established when the industry was primarily unionized continue to be prevalent today. While these rules and attitudes evolved over time, they became particularly entrenched immediately following WWII when international building trades unions (BTU’s) emerged as a major political and economic force. With virtual monopolies in supplying manpower, the work each tradesman was expected to complete became synonymous with the “craft jurisdiction” defined by the various building trades unions. The result was that the list of apprenticeable trades, the training each tradesperson received and the rules (eg. journeyman to apprentice ratios) the tradesperson abided by while obtaining trade certification, effectively mirrored parameters established by the international craft unions.

In the late 1970’s, the Business Roundtable, a New York based forum of construction owners, initiated a major study to determine why construction costs were spiraling out of control. The results were published as the Construction Industry Cost Effectiveness Project.

The report’s introductory sentence passed a bleak judgment: “By common consensus and every available measure, the United States no longer gets its money’s worth in construction, the nation’s largest industry.” In noting a 20% productivity decline between 1972-79, the report continued: “Productivity in construction has been declining at a rate many industry leaders find appalling.”

A sub-report that focussed on problems associated “with organizing construction workforces along rigid craft lines according to the ‘jurisdiction’ each craft union”

concluded: “Exclusive jurisdiction, which is based on the notion that every task can be performed only by members of a particular [craft] union, is a major source of inefficiency in construction. An even greater cost to the industry results from inefficient work assignments routinely made to comply with precedents and jurisdictional agreements to avoid disputes.” This rigid compartmentalizing of tradespeople along craft union structures frequently paralyzed many sites.

The extent of owner frustration with this paralysis was evident in a speech by George Hill, former President of Saskatchewan Power. In recalling labour problems while building the Poplar River Power Station, he stated: “It was built strictly by union companies and there were to be no strikes. That understanding meant nothing and there was wobble after wobble. They didn’t strike; they just didn’t work. There was jurisdictional dispute after jurisdictional dispute. Between 1975 and 1981, 45% of the time, the project was at a standstill. The cost overruns were so phenomenal we quit publishing them because it was too embarrassing. Additional interest costs alone amounted to somewhere between \$18 and \$25 million. These were costs to the owner and with no recourse.”

Despite dramatic shifts in market share from union to non-union construction, many regulatory structures and attitudes developed when unionized construction dominated the industry, are resilient to change. In Alberta, for example, where unionized construction constitutes less than 10% of the market share, there are 28 craft units designated for collective bargaining. In a recent circular, the Labour Relations Board defended its practice of certifying construction employees on a trade by trade basis because in its view: “Employees within a ‘craft’ share a community of interest. They share skills, working conditions, training and union benefit provisions.” Though some would readily characterize this language as “perpetuating the big lie” in today’s market place, it is clear that new or alternative occupational groupings have yet to be identified, developed and formally recognized to replace the craft structure paradigm that has existed in the industry over the years.

TESTING THE BOUNDARIES

This does not mean that the current deployment boundaries are not being tested. As noted by David Bush, President of Adena Corporation, a Mansfield, Ohio, general contractor and multiskilling advocate: “The idea that a tradesman could accomplish more than one task may have a relatively new label called ‘multiskilling’, but it is a concept that has existed for open shop contractors for quite some time.”

Open shop organizations, such as the Merit Contractors Association of Alberta, are also demonstrating that benefit and training programs need not be structured along craft lines. Merit offers portable, industry-wide benefits which provide similar coverage to all construction tradespeople. The plan recently recorded its 100 millionth hour and includes participants from virtually every sector and specialty trade in the industry. With rates typically costing half those charged by building trades unions for comparable coverage, it is apparent that traditional craft lines are being effectively and efficiently crossed

without compromising services. Training programs grouping workers have also been successful.

THE CII STUDY RESULTS: THEORETICAL MULTISKILLING STRATEGIES

Concerns over declining numbers of trade entrants, labour productivity and training have prompted many in the industry to ask: are there ways to use current resources more efficiently and effectively? The CII multiskilling research project broadly addressed this question by postulating that: “alternate labour strategies and modified industry labour practices are needed if the industry is to address these growing concerns effectively.”

Accordingly, they outlined major issues involved in implementing various multiskilling strategies on construction sites. Defining multiskilling as: “a labour utilization strategy where workers possess a range of skills appropriate for more than one work process and are used flexibly on a project or within an organization”, the research team hypothesized “workers [could] be assigned to construction tasks based on their ability to perform the needed skill/task and not limited to their traditional job boundaries. Based on the flexible application of skills that the worker already possesses or is willing to acquire, workers can contribute to the output of several work processes although they may not achieve mastery-level skill in all areas.”

The CII study encompassed building a hypothetical “virtual” petrochemical plant worth approximately \$85 million (US). Based on a plant design initially developed by CII members in 1985, three construction companies with extensive petrochemical construction expertise, submitted staffing lists for each scheduled activity. These lists were broken down into 17 trade classifications and reflected foremen, craftsmen and craft helper levels of experience.

A construction plan was developed to provide baseline data. Four different staffing strategies were then developed using sophisticated mathematical modeling techniques. Numbers of personnel required and the estimated amount of time they would be required on site were then analyzed for each strategy.

Cost schedules including direct wages, hiring costs and various indirect labour costs attributable to safety and orientation activities were also developed. To isolate costs directly associated with having a stabilized workforce on site, productivity levels were assumed to be constant for each strategy. Thus, the financial analysis focussed on the impact each strategy had on reduced turnover, orientation and screening costs. The results are summarized as follows with more detailed tabular results displayed in Tables 1 and 2.

The four strategies were referred to as 1) Dual Skills; 2) Four Crafts-A; 3) Four Crafts-B; and, 4) the Theoretical Maximum.

The “Dual skills” strategy simply assigned personnel based on complementary task and scheduling requirements. This was primarily a theoretical exercise as personnel were

matched regardless of related skills. For example, carpenters and pipe workers were grouped together because they met scheduling and staffing requirements sequentially. This approach yielded payroll savings of 2.8% , reduced manpower requirements by 18% and increased the average employee on-site employment duration by 18% .

The Four Crafts “A” Staffing plan considered four classification groupings: 1) Civil/Structural, including carpenters, and concrete finishers; 2) General Support, including labourers and equipment operators; 3) Mechanical, including insulators, and pipefitters; and, 4) Electrical, a matching of electricians with instrumentation workers. This strategy deployed helpers according to craft lines and provided more credible results as the phased nature of building a process facility was more closely related to matching the task similarities performed by the various tradespeople. The results showed a 3.4% reduction to payroll costs. Compared with the baseline scenario, 25% fewer employees were required and these employees were on site an average 29 % longer.

The Four Crafts “B” staffing plan used the same four groupings. However, since “helpers” tend to be new industry recruits and engage in similar activities regardless of trade, the study team deployed them through the General Support group to be utilized across the site on an as required basis. The added benefit of this approach is that entry level helpers gain exposure to a wide variety of crafts before choosing a specialty. This configuration yielded payroll expenses approximately 4.7% lower than the baseline amount. Manpower requirements were reduced by 37%, and on-site staff were employed on average 47% longer.

In the theoretical maximum strategy, all crafts were brought together under one occupational grouping with three levels of experience. The CII authors recognized the limitations of this approach but felt it was useful to have the information for further comparison. Under this scenario, payroll costs were reduced by 6.2% , manpower requirements were halved and tradespeople were employed on site 77% longer.

TABLE I LABOUR COST SAVINGS ASSUMING NO PRODUCTIVITY IMPROVEMENT

Cost Term	Labour Strategy				
	Baseline	Dualskill	Four Crafts-A	Four Crafts-B	Theoretical Max.
Total Project Wages	\$6,281,112	\$6,281,112	\$6,281,112	\$6,281,112	\$6,281,112
Project Safety	\$136,116	\$112,976	\$109,301	\$106,171	\$88,203
Orientation Costs	\$85,893	\$70,623	\$64,643	\$55,481	\$46,573
Recruiting/Screening	\$236,925	\$194,805	\$178,308	\$153,036	\$128,466
Qualification Costs	\$16,817	\$15,062	\$14,374	\$13,321	\$12,298

Small Tools and PPE	\$462,794	\$380,519	\$348,295	\$298,930	\$250,937
Workers' Compensation	\$1,086,004	\$1,086,004	\$1,086,004	\$1,086,004	\$1,086,004
FICA/FUTA	\$717,169	\$648,163	\$653,304	\$630,502	\$603,527
SUI/SUTA	\$108,527	\$81,905	\$84,294	\$74,763	\$63,653
Total Project Labour Cost	\$9,131,357	\$8,871,169	\$8,819,635	\$8,699,320	\$8,560,773
Total Cost Savings (%)	0.0%	2.8%	3.4%	4.7%	6.2%

TABLE II SUMMARY COMPARATIVE DATA FOR ALL LABOUR STRATEGIES

Summary Data Values for the Economic Model Comparative Listing of Labour Utilization Strategies		
Utilization Strategy Name	Craft Hires	Avg. Employment Duration
Baseline	675 workers	18.6 weeks
Dualskill	555	22.0
Four Crafts – A	508	23.9
Four Crafts – B	436	27.4
Theoretical Maximum	366	33.0

The results lead to one unmistakable conclusion. Improved economies, are achievable by using multiskilling approaches. The above tables clearly show the cost savings for tradespeople, there is also the added benefit of longer term employment. Considering most accidents occur in the early stages of a project, it is also apparent that the longer a tradesperson is on site, the better the project's safety record will be.

These results speak for themselves. However, faced with long standing traditions, structures and prevailing institutional biases, how far and how fast should the industry go in embracing new occupational boundaries? Moreover, what role will the open shop sector play in setting these new limits?

TOWARDS A NEW MULTISKILLING BASED PARADIGM

For Mr. David Bush and his Ohio based general contracting business, Adena Corporation, working on an open shop basis has provided the "freedom" and flexibility to involve tradesmen in multiple tasks. For 17 years, his company has built heavy industrial, institutional, and warehousing facilities throughout America's industrial heartland.

Mr. Bush initially became interested in multiskilling as a means to retain good tradespeople: "It came from our desire to keep our workforce busy for a full year. Good workers will not stay home - they want to work 2,080 hours or more in a year."

In looking for ways to keep employees working longer, he observed that good tradespeople on forming crews were either proficient or capable of being proficient in a variety of related tasks. In particular, some skill sets were directly related to steel erection tasks. With additional training, Adena's forming crews were able to make this transition to steel erection activities. This resulted in a win-win situation as the company retained its good work crews and employees worked more continuously.

Mr. Bush also cites an example of how Adena's multiskilled staff helped a specialty sub-contractor. An electrical sub-contractor needed a two week delay to marshal his staff to complete electrical wiring on a project. Some of Adena's tradespeople were sufficiently skilled in less sophisticated electrical activities such as installing conduit and boxes. Left with completing connections and terminations – tasks requiring the specialty skills of journeymen electricians- the sub-contractor ultimately completed the electrical component of the project ahead of schedule. This helped Adena complete the project ahead of schedule saving time and money for both the contractor and the owner.

Mr. Bush also found that improved knowledge of the work of other tradespeople leads to better understanding of integrated construction activities. For example, a carpenter with experience installing conduit is more sensitive to the impact his work has on an electrician.

What about compensation? Should an employee receive less when doing work normally commanding less compensation? Mr. Bush quickly responds: "Our approach is to pay for your best skill." Then, does it make economic sense to pay a premium for work that could be done by someone else at less cost? As a contracting firm that embraces merit principles, Adena's compensation structure values each individual's contribution to the company and project not just the "job description." Attendance, attitude, quality and quantity of work, safety performance, leadership and creative contribution are all taken into account. In his experience, a good employee brings the same personality and work ethic to whatever job he or she is working at. So, for Mr. Bush, it does make sense.

If Adena's experience using multi-skilling is so overtly beneficial, why isn't the industry embracing it more quickly? Mr. Bush feels there is a need for greater industry-wide coordinated action especially in terms of developing and establishing skills assessment and tracking mechanisms. Accordingly, he firmly supports recent industry efforts to establish a national skills assessment and inventory system. At this point, research is underway to break down construction activities into core components. These components will be cross referenced across the various trades to determine skill "affinities" from which skills assessments and training mechanisms can be developed.

Developing and maintaining sophisticated skills assessment and tracking systems is a subject close to the heart of Marcy Anderson, Manager of Craft Training and Assessments with H.B. Zachry Company of San Antonio, Texas. H.B.Zachry is one of the largest contracting firms in the US, completing approximately \$1 billion worth of construction annually employing upwards of 10,000 tradespeople. Ms. Anderson is

responsible for managing the company's human resource database system which tracks individual employee skills and trade licenses according to 24 craft categories .

According to Ms. Anderson, the majority of the 24 trades identified follow traditional craft delineation. This is due in part to licensing requirements. Ms. Anderson's system identifies whether employees have "multi-craft" (i.e. attained journeyman standing in one or more crafts) or "multi-skill" capabilities (i.e. demonstrated proficiency in one or more crafts). While not consciously utilized in the planning phase, this information enables the company to identify on which skills or "crafts" on-site personnel are proficient. This permits rapid redeployment on an ad hoc basis when staffing requests are made from the field.

Some of H.B. Zachary's maintenance work for forest-processing clients is undertaken by employees outside the traditional craft structure. To suit their client's needs, the company has developed entirely new multi-skill positions which take into account that maintenance work now is substantially different from what was needed only ten years ago. These changes were brought about by rapidly changing technologies and markets which made the economics of keeping in-house maintenance staff extremely volatile.

J.P. Zapke, is Vice-President and Manager of the Process and Industrial Group for Fru-Con Construction Corporation. Located near St. Louis, Missouri, Fru-Con performs approximately \$540 million worth of engineering, construction and maintenance work annually. Mr. Zapke is well acquainted with the pervasive structural, "cultural" and regulatory roadblocks which must be overcome to accommodate multiskilling strategies. For example, how does a company develop a competitive time and materials proposal using a multi-skilled deployment strategy when bid documents dictate that rates be specified by traditional craft trade? How would a multiskilled employee be licensed to ensure that public safety concerns are satisfactorily addressed? Despite the impediments, he firmly believes that developing multiskilling potential presents a real opportunity to address the problem of fewer and fewer entrants to the industry.

Mr. Zapke believes that work requiring the highest degrees of specialization constitutes only a fraction of the work on a construction project. Accordingly, through research and analysis of skill affinities, traditional distinctions between specific trades could be reduced and procedures grouped together under a consolidated classification structure. The result could be the development of categories for "generalist" tradespeople and those requiring "specialist" skills sets. For example, iron workers, sheet metal workers, boiler makers and pipe fitters all do welding. A fillet weld in the "flat position" requires the same skill regardless of the tradesperson doing it. A specialist, however, might be required to handle other situations requiring more sophisticated welding.

In contrast to their unionized counterparts, to succeed, open shop contractors must develop strong employer/employee relationships and have a more intimate understanding of an individual employees strengths and weaknesses. For smaller companies, information is readily available through daily observation and interaction with employees. For larger companies, more sophisticated information systems are required.

Open shop contractors certainly are in a better position to develop these strong relationships and acquire and maintain the necessary skills information to implement multiskilling strategies. Given this, as well as the historic intransigence of building trades unions to effectively address skill duplication, it is apparent that tremendous opportunities exist for the open shop sector to be at the forefront in developing entirely new structures and rules. In so doing, they could rightfully claim credit for a complete paradigm shift in the industry.

Conclusion

The CII study indicates that the multiskilling concept holds the potential to shake up North America's construction industry. Given the potential efficiencies, how long will it be before purchasers of construction demand even greater economies from contractors? Given fewer and fewer industry entrants, will it be much longer before the industry is forced to implement these types of alternatives?

As we enter a new millennium, there is no consensus on the direction and distance the industry needs to travel to introduce modified rules and training programs. This is largely due to attitudes and rules developed when the industry was dominated by unionized construction.

Efforts are currently underway to establish skills assessment and inventory systems which could lead to the development of new types of "trades" and approaches. However, present consultation mechanisms which rely heavily on input from the building trades unions suggest progress in developing industry-wide standards will be slow in coming. In the absence of these standards, similar market forces which were the catalyst to shifting construction markets to open shop contractors will likely see this sector take the initiative in the field on an ad-hoc basis.

The impediments to multi-skilling as a new manpower utilization strategy are significant as are the concerns that are prompting industry players to search for alternative structures. As we enter the new millennium it seems clear the multiskilling approach offers a viable alternative. Stay tuned for developments.