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Nursery Automation in Faribault Minnesota

The nursery industry is shifting their operation towards automation. The industry is unique, in that, they mass produce products like a factory but are also dealing with a live product that needs care. Businesses are faced with multiple economic challenges and are looking for solutions in this labor intensive industry. Material costs have increased along with wages while the availability of the labor force has declined. For many businesses, the answer is automation. Machines have many benefits over employees, such as increased productivity and reduction of human error. However, automated machines have their own difficulties. The first challenge faced is the large initial investment, which is a dangerous risk for small businesses. Faribault growers have accepted this risk and the benefits have been rewarding. Or course, with automation comes the concern for loss of jobs and fewer small growers being able to enter the market. Faribault growers have created a balance of using automation to assist workers, rather than replace them. As a result, they have expanded their business operations. Automation has enabled

Faribault growers to improve productivity and achieve a competitive advantage in the nursery industry.

Nurseries have been using innovative greenhouses for years. The purpose of greenhouses is to control the environment. Like in nature, sometimes plants thrive on a sunny hill, while others may dwindle in the shade or get washed away by a storm. The idea of the greenhouse is to optimize the growing conditions to produce the healthiest plants for sale. By producing a quality product, growers can sell for a competitive price. In a greenhouse environment, growers regulate the temperature, the humidity, the amount and intensity of sunlight, the amount of water, and even nutrients from fertilizers. Of course, to regulate all of these aspects of the life of a plant requires labor. Nurseries need workers to operate water hoses, fertilize, and move product to maximize sunlight.

Labor is a major concern in the nursery industry. At the core it has always been an extremely labor intensive business. Labor costs and availability are raising challenges in the nursery industry. Labor is the largest expense, next to heating, at Faribault Garden Center in Faribault, Minnesota. "I always run one man short, that way the boss has a job," says owner Stanley Boe. The costs of an employee can really add up. Employers pay more than wages; they will often pay insurance, benefits, and training costs. "It is becoming harder to find people to do physical work these days," says Phil Zweber, of Donahue's Greenhouse in Faribault,

Minnesota. "As much as you don't want to criticize the American workforce, they don't want to do general labor work," Demaline says (qtd. in Petrovic). In addition to the hard physical work, the working environment is not the most comfortable. Greenhouses typically are quite hot and humid. "They [employees] don't want to work outside or in a greenhouse where it could be one hundred degrees or higher in the summer" Demaline says (qtd. in Petrovic). Phil Zweber recognizes that the work is not easy, "Everyone should have a job you don't like at least once, [because] it makes you want to improve yourself."

Increasing production costs and declining market prices are serious challenges for nursery growers. Over the past two decades automation has slowly increased its presence in the industry. While costs have increased with inflation and the economy, prices have remained steady, according to Boe. This economic trend has decreased the profit margin for businesses. Because many nurseries are small business, they don't have the power to raise prices and must remain competitive to ensure sales. Economic returns within nurseries are limited because of supply costs, such as fuel for heating greenhouses, but also from labor expenses. "We sell a three foot arborvitae tree for nine or ten dollars," reports Gold. "They'll [automated competitors] sell that same arborvitae for two dollars. They're highly automated in how they plant, trim, and harvest… " (qtd. in McClellan). Some

consumers are also demanding plants that are grown local, of high quality, and yet with a cheap price. This can be a key challenge for local growers.

> …with nurseries and greenhouses in a mature marketplace; the only way you are going to reduce costs and remain competitive, because you don't have the ability to raise prices, is to continue to take costs out. Automation is one of the only ways you can do that. If you look at any other industry, car manufacturing or anything else, automation is where it's at. These industries are taking costs out with mechanization. (qtd. in Petrovic, Demaline)

Some businesses have implemented automation to fill their employee gaps and lower payroll costs. A machine will arrive on time, won't call in sick, and works efficiently without getting tired. However, the initial cost is thousands of dollars; this can be a major investment for many businesses. A business must be large enough for the machine to pay for itself. Also with automation comes maintenance and repair costs. Sometimes a mechanic will need to be hired to fix machinery in an business operation. The large investment and unpredictable expenses can deter businesses from automating.

The investment in automation is a risk that a business must weigh before deciding. Donahue's Greenhouse took this risk and made the investment of twelve thousand dollars in automated machines eighteen years ago. They purchased a potting machine to increase their production. The machine works in a conveyor

belt pattern, stopping at each station for a few seconds. It made an assembly line possible for their operations. The transplanting process has easily increased twenty percent, according to Zweber. "Some days we have twenty thousand plants to pot, [the potting machine] is a huge labor saver."

Another difficulty in automation is the process of integrating. Before automating, a business has a certain method of production. They have a process, where all their employees have jobs and responsibilities in producing a product. Adding an automated machine will change a number of things. It may replace someone's job completely and require others to adapt their methods. Business practices have evolved to perfection over the years and changing would require replacing equipment and retraining employees. Many times, the automated machines are large and require a substantial amount of space. This can cause the machines to be placed in a backroom or off to the side. As a result, the travel time in moving product around the operation will increase. The machine that was supposed to improve productivity is now creating additional problems and possibly even slowing production.

Nursery work is repetitive and can take a toll on the body. Since thousands of each variety are produced in mass quantity, the same step of the process must be repeated for each individual plant. This includes: transplanting, watering, trimming, and spacing. The repetitive nature of the production process can be

detrimental for many employees. Stanley Boe shares, smaller operations are able to move workers around, giving the needed variety. It could cost too much for larger businesses to retrain workers. Automation can take some of these tasks away, but add new ones; like feeding pots into a machine.

"There's a value that isn't expected, like a uniform-look that buyers are really attracted to," says Decker, "that's another key benefit" (qtd. in Nursery Management). In our automated world almost all products bought in stores are mass produced. Consumers have become accustom to products looking identical and now they even look for uniform live plants. Nurseries also enjoy uniform plants for shipping purposes. They are able to estimate production and maximize truck space used with an identical sized product, according to Boe.

Machines replace human workers, and therefore also replace the human error in production. For example, Zweber describes the importance of uniform transplanting. The first step in transplanting is filling a pot with soil. If a worker scoops the soil, some pots will result in over and others under filled. While this little slight difference may seem meaningless, through the plant's life it will become a recurring struggle. The plant with less soil will dry out sooner every time it is watered. Also, it may become weak without the necessary support from the roots. This will stunt the growth of that plant over its lifespan. The flat filler machine at Donahue's solves this problem. The pots are filled evenly and leveled

off with a brush. Each pot comes out even and uniform. Automated machines remain accurate and efficient all the time.

However, not everything can be automated in the greenhouse industry. While more is becoming automated as technology improves, some things are better done by hand. For instance, the delicate process of staking plants and twist tying them to a stake is done by nursery workers because each plant grows differently and their stems are fragile. Spacing plants and moving product around the greenhouse, is another task best done by a worker. These two processes are still done the way they have always been done; by hand, which allows the necessary care and attention to detail for each unique plant.

> Still, no matter how advanced the industry becomes the need for labor will never diminish entirely. Even large-scale operations outfitted with the most advanced technology require workers to run the machines and ensure the operation is producing high-quality plants. (qtd. in Petrovic, Steiner)

The level and type of automated process depends uniquely on the operation. Many operations integrate machines alongside workers. At Donahue's, in Faribault, growers work with machines in an assembly line for transplanting. A worker feeds pots into the flat filler that fills the pots with soil. The pot is then moved to a potting machine, which acts as a conveyor belt. One worker places a seedling in the pot, the next worker plants the plant, and a third worker inserts the

label. Instead of replacing employees, Donahue's has streamlined production and increased their business (Zweber).

Automated systems can adjust heating and watering schedules, based on the weather. The cuttings at Donahue's Greenhouse need to be watered often, because they have not developed a root system. Depending on the level of sunlight and evaporation of the soil, the watering can fluctuate from every twenty minutes to twice a day. This difficult watering schedule would require extreme diligence of an employee since plants don't pause their growing for our convenience; this would include monitoring soil conditions during the nights and weekends. This schedule would make it difficult to grow clematitis cuttings completely through employee hours. The production and sale of clematitis, which is sixty percent of Donahue's business, is greatly dependent upon automation (Zweber).

To regulate the environment, Donahue's has installed a sunlight sensor. Simply from knowing the intensity of the sunlight and temperature, the whole environment can be adapted. For instance, if night temperatures gets below thirty eight degrees fahrenheit, the computer will fire the heaters. Depending on the heat during the day, the shade curtains expand or contract. The frequency of irrigation depends on calculations of the evaporation level. All of these general maintenance jobs are regulated by a computer, to save labor (Zweber).

The greatest benefit to automation is freeing workers of simple repetitive jobs. "Irrigation is the easiest and most practical area to automate," says Zweber. Many greenhouses spend hours and hours watering the plants every day. Simply having an employee walking around with a hose is not the best use of labor. Automated irrigation allows workers to multitask, and focus on tasks that may not be able to be automated. For Zweber, the biggest advantage of automation is the ability to multitask. While the irrigation is going, a worker can be spacing product or labeling new plants. "There is always something to do in the greenhouse," says Boe. The ability to get more done has allowed growers to focus on more important tasks and grow their business as a result.

A uniform product is often the result of an automated system. However, a different business approach may include customizable products. This is indeed the case at Faribault Garden Center. Boe sells large planters and baskets with multiple varieties. He creates variety in the foliage and contrasts with colors that customers enjoy. A popular seller in planters, are red or pink geraniums with an ivy centered in the middle. The ivy will grow down the side of the pot, adding a nice touch. Some of the large sixteen inch baskets are sold for around sixty dollars, which is equal to three of the regular ten inch baskets. In this case, the additional hand-care and individual attention to the plants are worth the time (Boe).

Although it is not a major part of their business, Faribault Garden Center will provide an additional service of transplanting customer's planters. Some people may want a few plants around their home, but they don't have the 'green thumb.' Clients can either bring in their own planters or buy planters there. They'll then select plants for their planters. A grower will then fill the planters with soil and plant the plants. This service increases his business and the customers really appreciate. With automation, planting a variety of plants is difficult, but not impossible. It would require breaking up the assembly line and will often confuse workers. Boe has found a unique niche of nursery products desired in the Faribault community that could not be done with automation.

Faribault growers have remained competitive by adapting their business practices to increase productivity. Automation has proven effective at achieving a solution to labor struggles in the nursery industry. While the financial risks are high at first, benefits of reaping efficient production are well worth the chance taken. Both nurseries and customers have benefited from the results of a uniform product, by reducing the human error and variation in product quality. Growers of Faribault have joined the nursery industry in enhancing their business with automation.

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Appendix