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Managerial Costing

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JDR GREENHOUSES

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Honor's Senior Project

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Better determining the cost of the perennials and vegetables grown at JDR Greenhouses. Kelson Glashower displays his ideas on costing and how he came to his conclusions, but most importantly what needs to be done for further costing.

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Company Description

JDR Greenhouses is a perennial and vegetable grower. They have been a family operated partnership for the last 25 years growing from a 6,000 sq. ft. greenhouse to a medium sized greenhouse of 85,000 sq. ft. JDR Greenhouses originally formed with Jack, Doug, and Randal Glashower, hence the initials JDR, but since then Jack has been bought out and now is owned by Doug and Randal. Because JDR Greenhouses only grows perennials and vegetables, JDR Greenhouses only grows from January to June instead of year round. While costs are being accrued over the course of the entire year for preparation for the growing season, most of the workers are only around for that time period. Since the growing season ends in June, the fiscal year for greenhouses is best identified to be from July to June as this is when the growing season comes to an end, preparations and expenses for the next season start up right away in July.

For operations JDR begins in January growing its own plants from seeds and the plants that do not grow from seed, it grows from cuttings off of other plants that have been purchased. As of 2012, JDR Greenhouses grows 55 different varieties of plants (not including color variations) and sell seven different products: annual baskets, promotional baskets, premium baskets, flats, 10” pots, promotional 8”square pots, and premium 8” square pots. JDR also decompresses its dirt and fills its own products as well as delivers the product to the distributor.

JDR is not in business by itself, but rather part of a larger group of independently owned greenhouses who grow for a trucking company called Luurtsema Trucking Ltd. Luurtsema not

only does the distribution of the products, but also does the sales and marketing for the independently owned greenhouses within the group. Luurtsema gets the orders for what the stores want to sell, divides up among all the greenhouses the labor, and JDR is told what to grow for the year. Within that order, JDR has only a few choices of what to grow, but for the most part it does what it can to grow and supply Luurtsema and ultimately the stores that Luurtsema distributes to decide the plants need to grow. So JDR Greenhouses has power only over the costs that they incur, which leads to the problem.

Problem

With 55 different plants and 7 different products, the possible variety comes to 385 different possible items to track. This is not including color variations or combinations of plants. With such a high amount of product variety, accounting and managerial costing have not been a central focus for Doug and Randal Glashower. As entrepreneurs, they were more concerned about the bottom line of whether or not they have made money for the year rather than further investigating why they were making money and what products were costing them.

Adding to the problem of finding the cost of the products is the idea that even though the plants are in a more controlled environment, weather is still a major factor in selling and growing plants. Leaving out the fact that people's choices to buy flowers depends on how the weather is on the weekends or how quickly the weather warms up or how well the economy is doing (interestingly people buy more flowers when the economy is down), the weather still impacts the bottom line for greenhouses. If the weather is cloudy for long periods of time, the plants will not grow quickly and will create a perfect environment for mold and mildew, which

in turn will either kill the plants or stunt their growth and/or will require the herbicides to be sprayed on them. If the weather stays cold for a long time, the cost of heating the greenhouses increases significantly. If the weather gets extremely warm, the plants need extra watering and run the risk of drying out and dying or growing too quickly with the extra water and sunshine and become over grown requiring pruning or growth stunters to be sprayed.

With this extra added variable it became very difficult to find more concrete numbers for costing, which lead Doug and Randy to feel overwhelmed and not knowing the significance of what this knowledge could bring them, they decided to not worry with the cost of each product that they sold. The purpose of this research paper is to create a managerial costing platform to jumpstart the identification of high costs that can be avoided or where improvements are needed in reducing JDR's costs, since adjusting the price is not a viable option.

Method for Solving the Problem

Originally, the plan was to find the cost of each plant per product type and then figure out how much money they were costing and what plants are more profitable compared to other plants and finding ways to reduce the cost of the expensive plants. As the shuffling through available data and organizing of the data, I realized that this was not going to be possible with the data available. Then the project needed to take a turn and rather than finding the cost of each plant per product type with 355+ possible combinations, it was narrowed down to finding the cost of six manageable product categories:

1) Annual Baskets
2) Promotional Baskets
3) Premium Baskets
4) Flats
5) 10” Annual Pots
6) 8” Square Pots (for this project the promotional 8” square pots and premium 8” square pots are both included in the same product)

For these six products come four variable costs: dirt, container, plant, and tags. Dirt was calculated by finding the volume of compressed dirt per bail (***b*****1**) and then from a chart from Fafard, the dirt supplier, calculated the estimated uncompressed volume (***b*****2**) from a ratio of 2.2 units of uncompressed dirt from every 1 unit of compressed dirt (fig 1). Then the estimated volume of the containers (***c***) was taken from the manufacturer’s website to come up with a percentage of how much of an uncompressed bail was needed for each container. Using this new percentage, the cost of the bail was then multiplied by the new found percentage to find the estimated cost of the dirt per container (***D***).

$$2.2\,b1 = b2 \qquad \frac{b2}{c} = D$$ fig 1

The plant cost (***P***) was found from finding the cost of all the seeds and then finding the mean cost of the seeds (***s***). Then finding the cost of all the cuttings and finding the mean cost of the cuttings (***u***). Then since the number of plants per product type varies depending on the plant and the container the weighted average of number of plants per container type was found (***p*****1-6**). After finding that, the percent of seeds (***S*****1-6**) and the percent of cuttings (***U*****1-6**) per product category was needed. This was found by taking the weighted amount of what was planned to be grown in each product category and dividing by the weighted amount of seeds or cuttings in each category resulting in this:

Table 1

Product	% that is from Seeds	% that is from Cuttings
Annual Baskets	25.34%	74.66%
Promotional Baskets	100%	0%
Premium Baskets	25.34%	74.66%
Flats	100%	0%
10” Annual Pots	100%	0%
8” Square Pots	16.67%	83.33%

Resulting in the following equation given the s, t, and p are corresponding containers:

$$(s * S + u * U)p = P \qquad \text{fig 2}$$

The container costs (***C***) and the tag costs (***T***) were taken from the receipts of the company that made them and broken down into per unit costs. The only exception is the tag costs of flats, which were multiplied by six because they required six tags compared to every other product category needing only one tag. Resulting in the following equation:

$$D + P + C + T = VC \qquad \text{fig 3}$$

where VC is the total Variable Cost.

Note: Normally Labor would be a variable cost, but given the lack of sufficient data it was impossible to accurately predict how much labor costs were included into each product category.

Now that the variable costs have been figured out, we take the revenues (***R***) and subtract the variable costs to find the contribution margin (***CM***).

$$R - VC = CM \quad \text{fig 4}$$

Table 2

Product	Revenue Per Item	Variable Costs	Contribution Margin
Annual Baskets	$4.05	$1.31	$2.74
Promotional Baskets	$3.28	$0.74	$2.54
Premium Baskets	5.78	$1.31	$4.47
Flats	5.73	$0.74	$4.99
10" Annual Pots	4.5	$0.97	$3.53
8" Square Pots	3	$0.91	$2.09

Then after finding the variable costs of each product category, the fixed costs were found including, but not limited to: gas, electric, trash, maintenance, labor, internet, telephone, petty cash, insurance, and miscellaneous. Taking the total fixed cost (***f***) and dividing it by the total number of items sold (***n***), I found the fixed cost per unit (***F***).

$$\frac{f}{n} = F \quad \text{fig 5}$$

From here, I took the contribution margin and subtracted the fixed cost per unit to find gross profit per unit (***GP***).

$$CM - F = GP \quad \text{fig 6}$$

Table 3

Products	**Contribution Margin**	**Fixed Cost per Unit**	**Gross Profit per Unit**
Annual Baskets	$2.74	$2.66	$0.08
Promotional Baskets	$2.54	$2.66	-$0.12
Premium Baskets	$4.47	$2.66	$1.81
Flats	$4.99	$2.66	$2.32
10” Annual Pots	$3.53	$2.66	$0.87
8” Square Pots	$2.09	$2.66	-$0.57

Knowing that in the greenhouses space is a limiting factor, I took the dimensions of each product in square feet (***d)*** and multiplied it by the gross profit per unit and the contribution margin to find the gross profit per square foot (***GP/ft^2***) and the contribution margin per square foot (***CM/ft^2***).

$$d * GP = \frac{GP}{ft^2} \qquad d * CM = \frac{CM}{ft^2} \quad \text{fig7}$$

Table 4

Products	Dimensions in ft^2	Contribution Margin per ft^2	Gross Profit per ft^2
Annual Baskets	328.02	$3.95	$0.11
Promotional Baskets	293.37	$3.66	-$0.18
Premium Baskets	328.02	$6.44	$2.61
Flats	39.06	$4.49	$2.09
10” Annual Pots	362.67	$5.08	$1.25
8” Square Pots	208.4775	$5.36	-$1.46

Conclusion on Data

From these last calculations, it would seem that flats and premium baskets are the best items to grow and promotional baskets and 8” square pots should not be grown. From experience working for JDR Greenhouses, I know that these items bring in money. So instead of using the gross profit I will use the contribution margin to determine what product is better to sell. If we compare just the normal contribution margin, flats and premium baskets take the lead by a long shot, but if we adjust the numbers by how much floor space they take up and use the contribution margin per square feet instead, we find that premium baskets take a commanding lead in the value per square feet and 8” square pots actually are second most profitable. Contribution margin per square foot makes more sense to use because the greenhouse is limited in the area that a plant can grow in before it reaches a limit, so it would therefore make sense to find a gross profit that factors in the limited space. On the other hand, it cannot be overlooked that the gross profits are negative for promotional baskets and for 8” square pots. Therefore I would conclude that the data is inconclusive and needs further research.

Further Research

The research that would be most beneficial to help determine closer costs is the breakdown of labor costs per product. Normally you would have this easily available, but with each product category it changes drastically and direct labor has multiple stages. First the average time it takes to fill the product with dirt and stack it up and how much the average wage for filling. Then a breakdown of the average time to plant, tag, insert fertilizers and iron and possibly put a hanger on each product. Then multiply that number by the average wage of people working on it. Finally adding these two numbers together to get a variable direct labor cost for each product would distribute the costs more evenly and find better numbers to the real cost per unit. Unfortunately, how quickly the workers work for each product type have not been found and long term averages should be found before a proper statement can be made.

A close second idea to find a closer variable cost would be to find the length of time the plants are in the greenhouses for and during what time of the season. Knowing how much gas/electric/water/fertilizer is spent per plant for the duration of growing can help even some of the costs as promotional baskets and square pots do not need to grow as long as premium baskets and flats. Adding this data to the overall outcome has a potential to drastically change the contribution margin for every product.

Overall this research has created a platform to investigate more costing measures and finding weaknesses in assumptions previously made. From here JDR Greenhouses has new ideas of what to measure and record for the next growing season. As data from additional

years are acquired, the variable of weather can be negated and a cost analysis can become closer to the real cost of each product.