Analytics to Reduce Turnover Costs: Improving Organizational Health Using an Operations Research Decision-Making Algorithm

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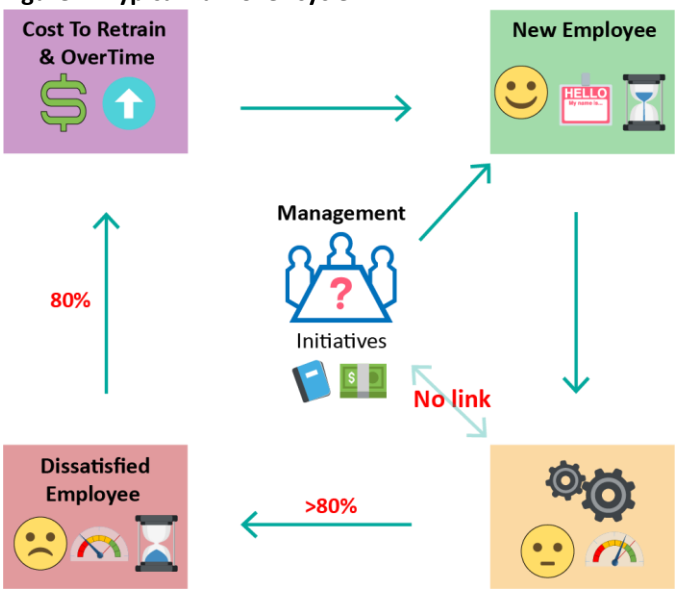
Introduction and Problem Statement

There is currently no scientific way to reduce the turnover of employees in the farming and repacking produce industry. Turnover rates in this industry are often greater than 80%, so there is clearly an opportunity for reducing variable cost by tackling the contributing factors.

Many companies in this industry track turnover rates of employees on a weekly basis and are usually uninformed of the contributing factors. Organizations oftentimes end up spending money and resources on programs that are not necessarily the main causes for the churn. This is usually due to the lack of strategy and visibility due to a missing link of communication between the employee on the production floor and upper management.

eHawk has a 2-step approach to tackle this problem. First, organizational strategic alignment is needed with what is known to work well in reducing turnover. Second, eHawk's novel innovation focuses on the decision-making and methodical plan of the controls and inputs available to management.

Figure 1: Typical Turnover cycle



Background

There are two elements that we want to research as key drivers affecting morale and turnover of farming and repack jobs:

1. Employee Satisfaction
2. Pay – food manufacturing jobs are typically minimum wage with only lead or supervisory positions making significantly more

In order to tackle both of these factors, we employ a Total Quality Management (TQM) 2-step approach to align the organization in the proper format before we dive into our quantitative approach to mathematical modeling.

Step 1 – TQM: Strategic Alignment

Employee Satisfaction

In order to quantify the first key factor we need to establish what is important to the employees in this industry. We know from research that there are a number of contributors typically associated with positive employee satisfaction, which include:

- Growth: A clear path for opportunity to grow within the organization in one of two ways:
  1. Becoming highly skilled, better known as a SME (Subject Matter Expert), at a given job
  2. Being able to move within the organization into different roles to learn several facets of the organization and eventually move into leadership positions

  Constant feedback from management is requisite.

- Work-life balance:
  1. Flexibility of work hours, sick pay and PTO
  2. Ability to take vacation/PTO when desired

- Benefits:
  1. Health insurance
  2. Retirement

Pay

The second key factor has to be structured on a scale based on position title and tenure in a format similar to the one shown in Table 1 below.

Table 1: Sample Step Pay Scale

	Company X					
Step			0.1	0.2	0.3	0.4
	Position	Start	**Year 1**	**Year 2**	**Year 3**	**Year 4**
0	**Staffing Agency**	$ 11.00				
1	Packer, Sanitation Tech	$ 12.00	$ 12.75	$ 13.50	$ 14.25	$ 15.00
2	Admin Assistant, Inventory Control, Production Lead	$ 14.00	$ 14.75	$ 15.50	$ 16.25	$ 17.00
3	QA Tech, Sanitation Lead, Receiving, Floor Operator, Maintenance Tech	$ 16.00	$ 16.75	$ 17.50	$ 18.25	$ 19.00

Step 2 – TQM: Process and Our Qualitative Approach

By quantifying key factors, constantly gathering data, and simulating them out into the future, we can mathematically predict the outcome of putting Employee Satisfaction and Pay increase programs in place.

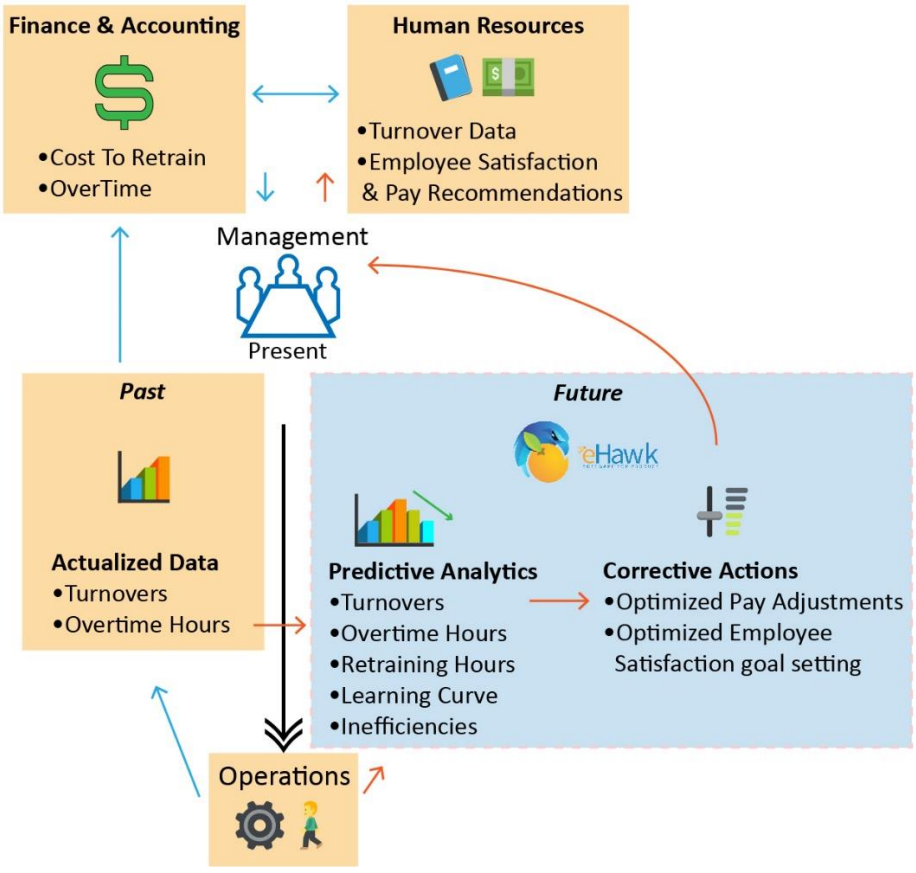
We propose measuring the current state of the two factors in a metric form so that we can optimize them through the use of data.

We believe that optimizing these two factors, and their associated sub-categories, will in turn minimize overall unit cost associated with retraining a labor force often described as a "revolving door".

The big question here is whether the costs associated with increasing employee engagement and pay will be offset by the reduction in cost associated with retraining employees.

eHawk's vision is to offer an objective data-driven analytics system.

Figure 2: Data Flow and the role of eHawk in Decision-Making and Analytics



Methods

As part of our research, we plan to marry turnover data with actual $-labor cost of production. We believe that, since we know the engineered labor cost of manufacturing any SKU via our software, we can investigate the delta between engineered and actual costs. This will give us an initial estimate of how much cost is being incurred as a function of turnover.

In order to know cost to retrain, we define several time buckets of unproductive time during the period while a new employee is coming up to speed, which include:

- On-Boarding Training, which includes any training that does not involve production (OJT)
- Learning Curve Inefficiency while new operators are working towards full proficiency of the job
- Cost associated with time spent by trainers bringing new hires up to speed

Hence, we propose that the three variables described above are the **Cost to Retrain**.

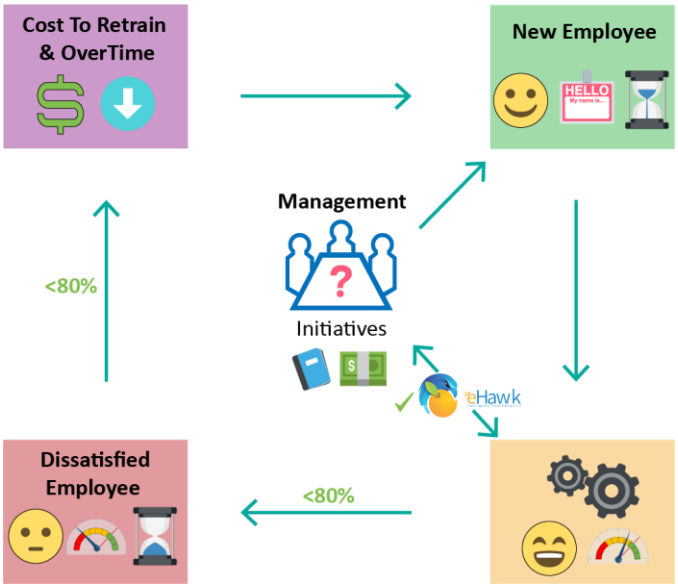
Cost to Retrain = Cost of On-Boarding Training + Cost of Learning Curve + Cost of Trainer Time

Where

- Cost of On-Boarding Training is logged in its own time bucket via eTime
- Cost of Learning Curve is approximated from data gathered after the employee has been trained but has not mastered the job yet, and approximated with a simulated model for inefficiency during this period and then compared to the engineered labor model where $T_N = K*N^{\wedge(\ln(\text{learning rate})/\ln(2))}$
  - T_N = time to process the nth unit
  - N = the observation number
  - K = linear regression slope parameter
- Cost of Trainer Time is also logged in its own time bucket via eTime

If we correlate turnover data with Cost to Retrain via software, and then add cost of employee engagement programs and additional pay, then we will have actual data to optimize and have data-driven pay increase and employee engagement program recommendations that would reduce the Total Cost (TC) to the business.

Figure 3: Proposed turnover cycle with eHawk



Next Steps

After gathering data on Cost to Retrain and how it ties to turnover, we will have all the data to propose the formulation of an optimization algorithm that seeks to minimize total cost of production.

We will define our Decision Variables (DV) as:

- $\boldsymbol{P_t}$ = Target average Pay rate for period t
- $\boldsymbol{S_t}$ = Target average Employee Satisfaction as measured by the survey
- $\boldsymbol{E_t}$ = Target cost expenditure on Employee Engagement Initiatives

Ultimately our goal is to build a model that incorporates Artificial Intelligence so that the optimal relationship between Pay, Employee Satisfaction, and related expenditures will reduce turnover costs and inefficiencies.

From the standpoint of societal impact and other potential applicable areas, there is an opportunity to improve the value, pay, and stability of food manufacturing jobs in the United States, which is congruent with governmental goals for a healthy economy without sacrificing profits for the enterprise.