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COMPANY REORGANIZATION

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A company wants to reorganize its labour force. It currently has 3 different kind of employees; untrained, moderately trained and highly trained. Over the next 3 years, the company expects a necessary shift to more trained employees. How should the company reorganize to minimize cost? Or minimize the number of employees that have to be laid off?

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Employee information

	Cost of lay-off	Available to be hired per year	Cost of hiring	Retraining of employees
Highly Trained	\$700	500	\$250	Untrained -> Moderately trained
Moderately Trained	\$500	800	\$150	Moderately trained-> Highly trained
Untrained	\$350	1200	\$100	

Estimated number of employees that are required.

	Current	Year 1	Year 2	Year 3
Highly Trained	800	1200	1500	2000
Moderately Trained	1500	1500	2000	2500
Untrained	2000	1600	1000	0

Number of employees that are trained, hired or laid off.

Number of employees trained					
	Year 1	Year 2	Year 3		Cost
Untrained -> Moderately trained	0	0	0		\$0
Moderately trained-> Highly trained	0	0	0		\$0
Number of employees hired					
	Year 1	Year 2	Year 3		Cost
Highly Trained	0	0	0		\$0
Moderately Trained	0	0	0		\$0
Untrained	0	0	0		\$0
Number of employees laid off					
	Year 1	Year 2	Year 3		Cost
Highly Trained	0	0	0		\$0
Moderately Trained	0	0	0		\$0

USER TYPE

Please select

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Untrained	0	0	0	\$0
Total number of employees laid off				0

Number of employees working				
	Year 1	Year 2	Year 3	
Highly Trained	800	800	800	
Moderately Trained	1500	1500	1500	
Untrained	2000	2000	2000	
Total cost of reorganizing				\$0

At least 7 printable characters that you can remember.

FIRST & LAST NAME

COMPANY OR UNIVERSITY

Problem

A company has three different kinds of employees. These are highly trained, moderately trained and untrained workers. The company expects a shift towards more highly trained employees necessary over the next few years. It is possible to train people at a certain cost Laying people off also costs a certain amount. How should the company reorganize to save costs and/or have as few lay-offs as possible?

Solution

1) The variables are the number of people that are trained, hired and laid off. On worksheet HireFire these are given the names Trainees, Employees_hired, and Employees_laid_off.

2) The constraints can be divided into 2 parts.

First, there are the logical constraints, all of which are defined via the Assume Non-Negative option:

Trainees >= 0

Employees_hired >= 0

Employees_laid_off >= 0

Second, we have the training, laying off and hiring constraints. These do not use defined names, but are represented on the worksheet by the following cells:

C22 <= B17

C23 <= B16

C26 : C28 <= C9 : C11

C31 : C33 <= B15 : B17

C40 : E42 = C15 : E17

D22 <= C41

D23 <= C42

D26 : D28 <= C9 : C11

D31 : D33 <= C40 : C42

E22 <= D41

E23 <= D42

E26 : E28 <= C9 : C11

E31 : E33 <= D40 : D42

In general, these constraints reflect the movement of employees from being hired untrained to becoming moderately trained or highly trained.

COUNTRY CODE

TELEPHONE

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3) The main objective is to minimize cost. This is defined on the worksheet as Total_cost.

Remarks

The model as presented here will find the method of organization that has the lowest cost. It can involve large lay-offs. It is even possible that there are alternate solutions that require fewer lay-offs! To check this, you can add the constraint Total_cost = Solution, where Solution is the amount previously found by the solver. Then change the objective to minimize lay-offs. This way you are sure to find the solution that is least expensive and involves the fewest layoffs. If the number of lay-offs is still unacceptable, you could solve the original problem again and this time include a constraint like total_laid_off = 0, or * 1000. When this problem is solved you can use the sensitivity analysis report to see how much an extra lay off would cost.

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