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OPTIMIZATION MODEL SUPERVISOR INDUSTRY IN WORKFORCE MANAGEMENT BASED DETERMINATION OF MODEL

Husain Syam

Abstract: *The research was conducted in the Industrial Area of Makassar, South Sulawesi, Indonesia, with the aim of designing a model of optimization of industrial supervisors in managing a workforce that is based on the determination of the model. Research conducted for the industry supervisor, the problem refers to the method of research, in which: optimization models in workforce management, conducted by Goal Programming Design Analysis for the optimal solution and objective function scale supervisors Likers for optimization of industrial conformity, over seven instruments with 16 indicators of 23 KPIs (*key performance indicators*). The results of this study indicate, that the solution of the goal programming for instruments: (1) the determination of analytical calculations have been highly optimized workload management. This is evident from the obtained solution, that the indicator evaluation and analysis of the workload has been manageable with highly optimized; (2) the calculation determining the needs of already highly optimized workforce. This is evident from the obtained solution, that both indicators of workforce management is highly optimized, although the need for workforce planning has not managed optimally; (3) the determination of the calculation of available production capacity is optimal. This is evident from the obtained solution, that both indicators of workforce, the availability of certain equipment, availability of time, and labor standards, highly optimized management, although in calculating the router level, the level of outcomes, efficiency hours, and shift work have not managed optimally; (4) the calculation of highly optimized product pricing. This is evident from the obtained solution, that indicator plus price costing, break-even cost, and determination in relation to the market price has been highly optimized management, although the mark-up pricing has not managed optimally; (5) determination of the calculation method of work has been highly optimized. This is evident from the obtained solution, that work measurement indicators and measurement work has been managed optimally; (6) the calculation determining the optimal scheduling of the work already. This is evident from the obtained solution, that the calculation of the indicator forward and backward calculations have been managed optimally; and (7) the calculation of incentive wage determination has been highly optimized. This is evident from the obtained solution, that the indicator calculations based incentive units are produced and managed by time already highly optimized.*

Keywords: *Optimization, workload, needs, capacities, products, methods, scheduling, incentives*

INTRODUCTION

Optimization of the determination of the model in managing the workforce, calculated with reference to the determination of workload analysis, determining

workforce needs, determination of available production capacity, product pricing, determination of work scheduling, and determining incentive pay. Where, Hermawan (2011: 1)[1] states the purpose of the workload analysis to obtain information on the efficiency and performance of the unit/organizational unit/ office holders and their use in order to improve the quality of work. Meanwhile, according to Nicosimu (2010: 4)[2], the suitability or unsuitability of inter-output, became the basis for decision making on workforce, which by Wrestiandi (2004: 2)[3] is considered as a process of identifying, calculating optimal, and conclusions of the work unit and the type and amount average unit required by the workforce in completing the work.

The calculation determining workforce requirements intended Nicosimu (2010: 5)[2] to determine how much of the required workforce. Pratama (2008: 1)[4] describes four steps in calculating the amount of workforce needs, namely: (1) retrieving data/conduct research on the amount of workload per day, for example in a day on average do the job; (2) data collection/or research on what jobs are performed each section; (3) data collection/research to calculate the time needed to complete a series of jobs in one piece; and (4) perform calculations with formulas. While Jappy (2008: 38-39)[5] outlines two key points in determining the amount of the workforce, namely: (1) analysis of workload include: sales forecasting, scheduling work time, and the determination of the amount of workforce that is needed to make one unit of goods. The results of this analysis will be the basis for determining the amount of workforce needed to carry out the work load at a particular period; and (2) a workforce analysis to calculate the actual amount of workforce that can be available at a particular period. It is made considering all the available workforce that can fully work, in accordance with the procedures specified time due to various reasons, such as: absent, release, retirement, and so on.

Calculations determining the available production capacity is intended to predict the capacity of production. Capacity is defined Murray (2012: 1)[6] the ability of an object, whether it is a machine, work center, or workforce to produce output for a certain period of time, which could be an hour, a day, and others. Production capacity by Hot (1999: 1)[7], is the measurement of output (production) manufacturing for a specific time period. According Nicosimu (2010: 5)[2], the number of workforce and the availability of certain equipment, coupled with the availability of time, labor standards can predict the industry's production capacity available. In addition, Garside and Heather (2012: 1)[8] emphasize the need to know the capacity that is available on the production facilities and the main supplier, as it is very important to verify that the production plan can be delivered on time. Spinler and Huchzermeier (2006: 915)[9] also ensures increased flexibility to respond to uncertain market conditions and enable a superior capacity planning for early information on future demand. It is also supported by Sankaran (2007: 663)[10] that in his research have presented two sets of results related to the problem solution capacity facilities great location.

While working standard measurements obtained through work, according Nicosimu (2010: 5)[2], is one element in determining the cost price and selling price. The success of product pricing will determine the viability of the industry. For this, Nip-Nip (2010: 1)[11] do the two approaches: (1) the cost approach, which is cost plus pricing, mark-plus pricing, break-even and pricing; and (2) the market approach or competition. If the evaluation is being carried out and an assessment of several different methods, as confirmed Nicosimu (2010: 5)[2], the standard work can provide a basis for comparison economies over these methods.

While the determination of the method of work, leading to labor and employment. The first, Gill (2011: 1)[12] using the MOST (*managerial operation sequencing technique*) work measurement systems, as Accenture managerial operation sequencing technique to achieve high performance. Secondly, Ansari and Garg (2012: 1)[13] develop standard work, in which to evaluate, compare, and improve workforce productivity; and determine how much the average hourly workforce needed to produce one unit of output is desired for a workforce trained in normal operating conditions. The third, Chen and McGinnis (2007: 277)[14] uses DEA (*Data Envelopment Analysis*) in the assessment of our operating performance as one of the methods developed in the theory of production and applied by researchers to study the industry group.

One data input for all scheduling system, according Nicosimu (2010: 5)[2], is the estimated time for work activities. The time estimates are usually derived from the measurement of work. The assumptions used Noerbiant (2010: 3-4)[15] in the calculation are: (1) industry/company only has one initial event and a terminal event; (2) the fastest time of the initial event is a day-to-zero; and (3) no later than the time of the terminal event is TL (latest event occurrence time, which is the slowest time of the event) = TE (earliest event occurrence time, the fastest time of the event) for this event. In the meantime, Zafra-Cabeza et al. (2008: 708)[16] introduces a risk-based optimization method for scheduling work. The method uses risk mitigation and optimal control techniques to minimize variables, such as duration of employment or estimated costs at completion. Reduce the impact of risk mitigation actions that can affect the system. A model predictive control approach is used to determine a series of mitigation measures that will be executed and the time at which they were taken. While Quadt and Kuhn (2007: 686)[17] presents a taxonomy for procedure scheduling flexible flow line scheduling of the scope of work. Flexible flow lines are flow lines with parallel machines at some or all stages of production. Taxonomic groups in accordance with the procedures common solution approach. It distinguishes optimal and heuristic procedures. Heuristic procedure is divided into a holistic approach and decomposition. While a holistic approach considering the complete problem in an integrated scheduling, decomposition approach divides the problems related to the production stage, individual work, or sub-problems to be solved. Coverage of other work scheduling,

production scheduling is studied Loukil *et al.* (2007: 709)[18] with a multi-purpose, which is considered simultaneously, among the average completion time, maximum delay, the delay means. The study was based on a real case study in the industry. Proposed a multi-purpose simulated annealing to tackle this problem and propose to the manager over the estimate of the set of efficient schedules.

For Jappy (2008: 42)[5] wage incentive is intended to encourage the workforce to work more productively. Viklund (2009: 2)[19] considers the wage incentive is intended to provide a different wage or salary. So two people have a workforce that same position could receive different wages due to different performance. Nicosimu (2010: 5)[2] ensure the workforce will receive incentives and higher wages if it can reach or exceed a certain output. Standard usability work in this regard is the determination of wage rates based on the standard of work at 100%. Therefore, the Dance (2010: 1)[20] suggests to establish communication focuses on the notion that incentive pay is for the results above and beyond normal expectations.

Referring to the above background and the scope of discussion on optimizing workforce management is performed using the analysis of the design goal programming, in particular the study aims to design optimization models in the industry supervisor workforce management that is based on the determination of management models.

RESEARCH METHOD

1. Locations and Research Time

Location of the study conducted in Makassar Industrial Area (KIMA), Makassar, South Sulawesi, Indonesia with consideration, that the location is easy to find various types of industries and are also concentrated in the bonded area. While during the study period of 6 months, ie December 2013 - May 2014 and the test instrument for a month.

2. Population and Sample

To define a sample of the population of industrial supervisors, we need a more complex sample design, which by Morissan (2012: 131-132)[21] called multi-stage cluster sample, with the following stages: (1) selecting a sample of 219 types of business/production; (2) make a list of industrial categories [Domestic Investment (DCI), Foreign Direct Investment (FDI), State-Owned Enterprises (SOEs), and industry-managed (Non-Facility)] and the category designation (shelter, clothing, food, etc.); (3) selecting a sample based on its category. Industrial category selected, is **non-facility category** by category designation is the **category board**. Consideration, are: a) approaching the field of basic science researchers; and b) the work allegedly done workforce, which is optimized by industry supervisors are manual handling work, in addition to work with the machine; (4) make a list

of the entire industry sample, which was **devoted to produce** (in which the work is concentrated workforce) as many as 16 industries; and (5) selecting the sample was selected. Of the 16 industries non-facility/board to be selected for the sample of supervisors, but only one was selected industries, namely the industry PT. Sekishin Farina Indonesian Wood.

Thus, the sample determined in accordance with industry supervisors who work on industry workforce is, as the sample is saturated, which according Ihsanuddin (2008: 5)[22], is a sampling technique used when all members of the population as a sample. The industrial supervisor sample set (and also for his willingness), is Production Manager (which employs a workforce) and HRD/PR Manager (who prepared workforce resources). Supervisor of the industry, will further assessed the suitability of the optimization aspects of workforce management.

3. Instruments Research

The details of the instrument with the indicators/KPIs are used for industrial supervisors, as shown in Table 1, which includes supervisors in managing a workforce optimization based on the determination of the model.

Table 1
Optimizing the determination of the model in managing the workforce

Variable/Instruments	*Indicator Details*	*Code*	*Number of KPIs*
1. Determination of workload analysis	1) Evaluation of performance	WA1	1
	2) Workload analysis	WA2	1
2. Determination workforce needs	1) The number of workforce	WN1	1
	2) Plan workforce needs	WN2	1
3. Determination of production capacity available	1) The number of workforce, availability of equipment	PC1	1
	2) The level of the router, the output, efficiency hours, and shift work	PC2	1
4. Determination of the price of the product	1) Determination of the cost price plus	PP1	1
	2) Determination of price mark-ups	PP2	1
	3) Determination of cost break-even	PP3	1
	4) Determination in relation to the market price	PP4	1
5. Determination of work methods	1) Measurement of work	WM1	4
	2) Measurement of work	WM2	1
6. Determination of work scheduling	1) Calculation of forward	WS1	1
	2) Countdown	WS2	1
7. Determination of incentive pay	1) The calculation of incentive based units produced	WI1	3
	2) The calculation of time-based incentives	WI2	3
		Total	23

4. Goal Programming Design Analysis

In this design, the suitability values obtained from industry supervisors based Likers Scale (with range 1-5), and then analyzed in the management workforce optimization models are based on the determination of the model, using Goal Programming Analysis of LiPS-e Program (*Linear Programming Using the Excel*), which is done by following the steps and methods of solution, as suggested Siregar (2011: 3-4)[23], as follows.

The steps, namely: (1) determining the decision variables, ie parameters that influence the decision; (2) formulation of the objective function; (3) develop mathematical equations for its intended purpose. Each objective function is described as a function of the decision variables. The gi = fi(x), fi(x) = function of the decision variables on the objectives to (i). Each function has a right-hand and left-hand side. Price (di-) indicates the magnitude of the negative deviation fi(x) of bi, while the value (di+) indicates the value of a positive deviation. With fi(x) + di− di + = bi where i = 1, 2, 3, ... m; (4) selecting the absolute goal, namely the goal to be met and establish priorities set as a function of achievement; (5) to set goals at the appropriate level of priority; (6) simplifies the model. This step is performed to obtain a model that is sufficiently large, so that the model can represent all purposes; and (7) prepare the achievement function.

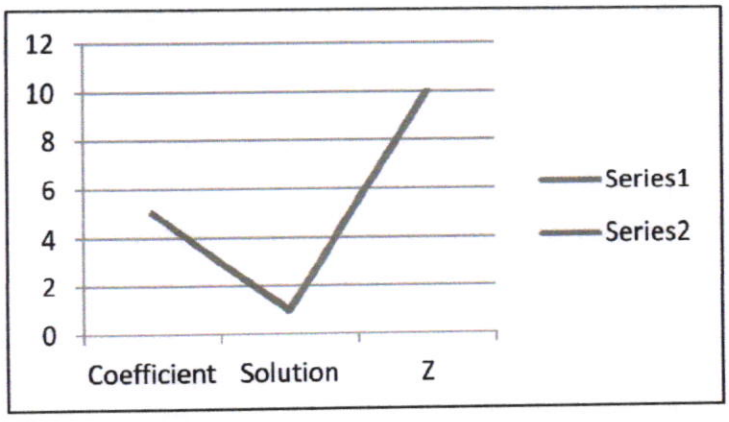
While the method of solving the problem, by: (1) a graphical method, used to solve multi-objective problem with two variables. Completion of the graphical method: a) describe the function of the constraints on the areas of work, in order to obtain the area that meet the constraints; and b) in order to minimize the variables deviational desired goals achieved by shifting the function or line formed by the deviational variable region that satisfies the constraints; and (2) method of the simplex algorithm, used to solve the problem using the decision variables more than two. Completion method, are: a) to form the initial simplex table; b) select the key column (pivot column), where Cj-Zj has the largest negative value; c) selecting rows based on the bi/aij with the smallest ratio, where bi is the value of the right side of each equation. The key line is called the pivot row; d) looking for a canonical system, ie a system in which the value of the pivot element is 1 and other elements zero pivot row by multiplying by -1, then add it to all the elements in the first row. Thus, the first iteration of the simplex table is obtained; and e) examination of optimality, which is to see whether a solution is feasible or not. Solution is feasible if the variable is positive or zero.

RESULTS AND DISCUSSION

1. Results

Distribution for setting instruments workload analysis, analysis of the calculation results is shown in Figure 1.

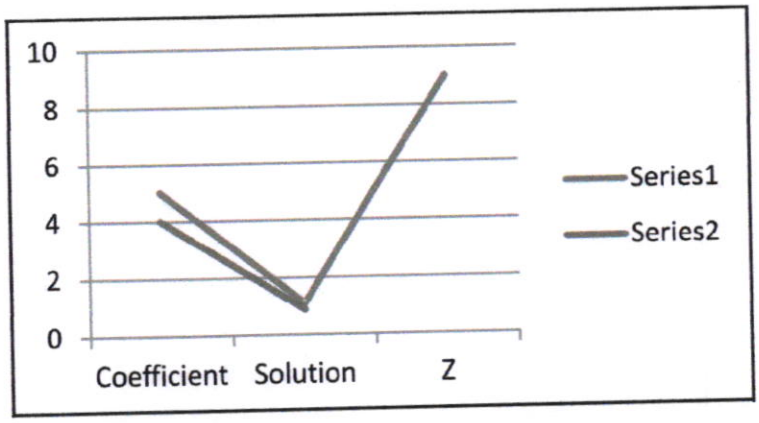
Figure 1: Analysis of the calculation results of the workload analysis setting instruments



From the results shown in Figure 1, that if the higher coefficients of each indicator on the instrument determining the workload analysis, the optimal solution is also given, so that the objective function or goal programming can also be achieved with highly optimized. The solution of the goal programming instrument for the determination of the calculation workload analysis with two indicators of the two KPI, overall has one solution, namely indicators: WA1 'performance evaluation'; and WA2 'workload analysis', and has the purpose or goal programming functions for Z = 10. This means, that for the calculation of analytical determination has been highly optimized workload management. This is evident from the obtained solution, that the evaluation indicators and analysis workloads have been managed optimally.

While setting instruments workforce needs, analysis of the calculation results is shown in Figure 2.

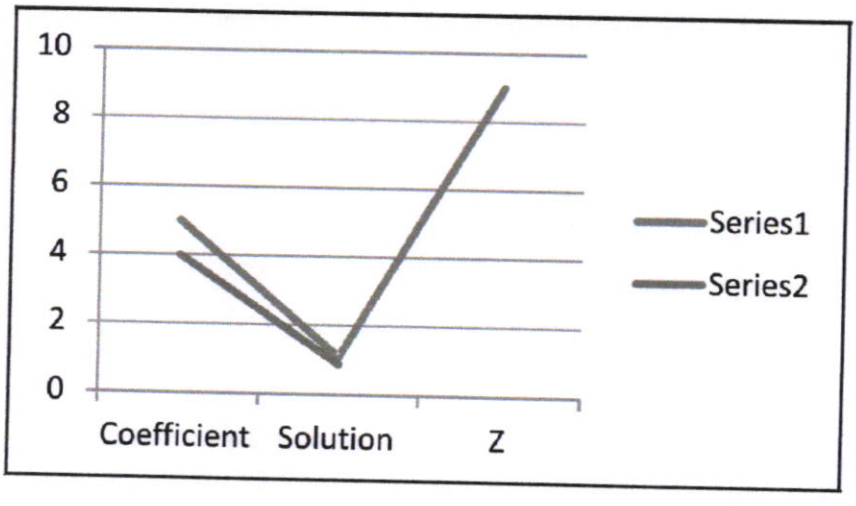
Figure 2: Analysis of the results of the calculation setting instruments workforce needs



From the results shown in Figure 2, that if the higher coefficients of each indicator on the instrument identifying the needs of the workforce, then the solution is given also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The goal programming solution for the calculation of the instrument identifying the needs of the workforce with two indicators of the two KPI, has a solution to 1.097561 indicator WN1 'number of workforce' and 0.878049 for the indicator solution WN2 'plan workforce needs', and has the purpose or goal function programming at Z = 9. This means, that for the determination of the calculation has been highly optimized workforce needs. This is evident from the obtained solution, that both indicators of workforce management is highly optimized, although the need for workforce planning has not managed optimally.

As for the instruments available production capacity determination, analysis of the calculation results is shown in Figure 3.

Figure 3: Analysis of the calculation results of the determination of the instruments available production capacity

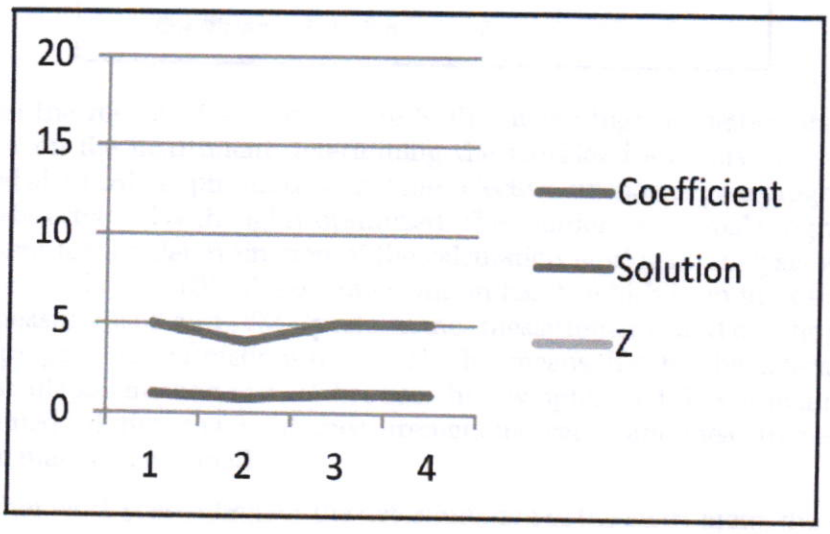


From the results shown in Figure 3, that if the higher coefficients of each indicator on the instrument determining the available production capacity, then the solution is given also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The goal programming solution for the calculation of setting instruments available production capacity with two indicators of the two KPIs, has a solution 1.097561 for indicator PC1 'number of workforce, the availability of certain equipment, availability of time, and labor standards' and 0.0878049 for the indicator solution PC2 'router level, the level of outcomes, efficiency hours, and shift work', and has the purpose or goal

programming functions for Z = 9. This means, that for the calculation of the determination of the available production capacity is optimal. This is evident from the obtained solution, both indicators of workforce, the availability of certain equipment, availability of time, and labor standards, highly optimized management, although in calculating the router level, the level of outcomes, efficiency hours, and shift work have not managed optimally.

For product pricing instruments, analysis of the calculation results is shown in Figure 4.

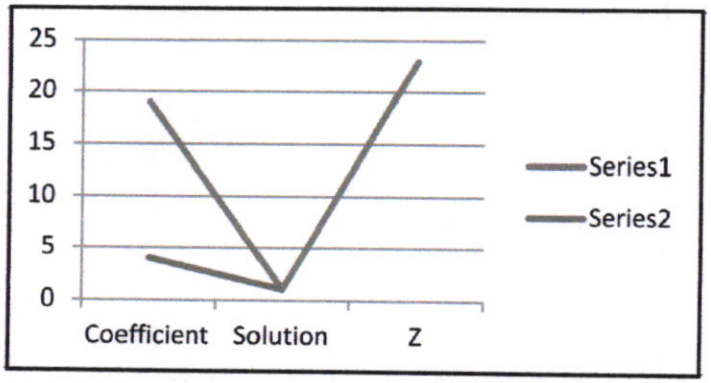
Figure 4: Analysis of the calculation results of product pricing instruments



From the results shown in Figure 4, that if the higher coefficients of each indicator on the instrument product pricing, then the solution is given also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The solution of goal programming to product pricing calculation instrument with four indicators of four KPIs has a solution 1.043956 for each indicator PP1 'costing price plus'; PP3 'costing the break-even'; and PP4 'determination in relation to the market price'; while the solution 0.835165 to the indicator PP2 'pricing mark-up', as well as having the purpose or goal programming functions for Z = 19. This means, that for the calculation of highly optimized product pricing. This is evident from the obtained solution, that indicator plus price costing, break-even cost, and determination in relation to the market price has been highly optimized management, although the mark-up pricing has not managed optimally.

While setting instruments working methods, analysis of the calculation results is shown in Figure 5.

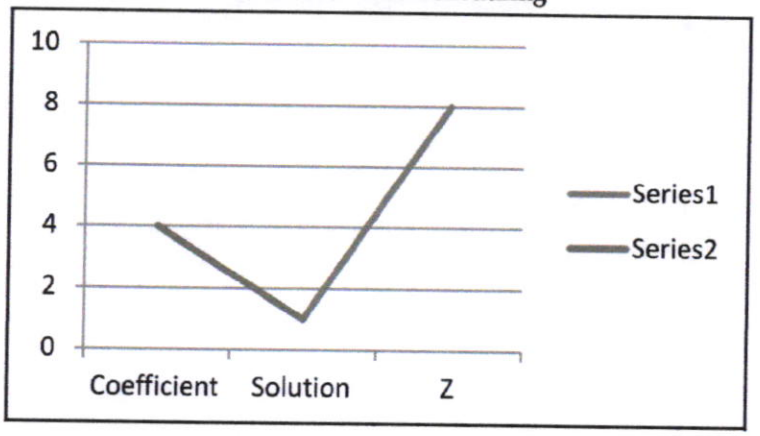
Figure 5: Analysis of the calculation results of the working methods of setting instruments



From the results shown in Figure 5, that if the higher coefficients of each indicator on the instrument determining the workload analysis, the solutions provided also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The solution of the goal programming instrument for the determination of the calculation workload analysis with two indicators of the five KPI, the overall solution has 1, which is an indicator WM1 'work measurement' and WM2 'performance measurement', and has the purpose or goal programming functions for Z = 23. This means that, for the determination of the calculation method of work has been highly optimized. This is evident from the obtained solution, that work measurement indicators and measurement work has been managed optimally.

Further work scheduling for the determination of the instrument, the analysis results of the calculations is shown in Figure 6.

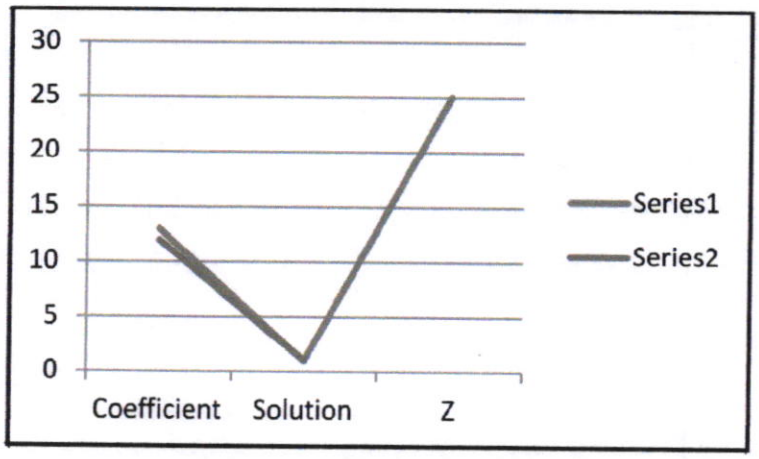
Figure 6: Analysis of the calculation results of the determination of the instrument work scheduling



From the results shown in Figure 6, that if the higher coefficients of each indicator on the instrument determining the scheduling of work, then the solution is given also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The solution of the goal programming for scheduling work setting instruments calculations with two indicators of the two KPI, overall solution has 1, which is an indicator WS1 'forward calculation' and WS2 'countdown', as well as having the purpose or goal programming functions for Z = 8. This means, that for the calculation of the determination of the optimal scheduling of the work already. This is evident from the obtained solution, that the calculation of the indicator forward and backward calculations have been managed optimally.

While the determination of incentive pay for instruments, analysis of the calculation results is shown in Figure 7.

Figure 7: Analysis of the calculation results of the determination of incentive instruments



From the results of which are also shown in Figure 7, that if the higher coefficients of each indicator on the instrument determining incentive pay, then the solution is given also further optimized, so that the objective function or goal programming can also be achieved with highly optimized. The solution of the goal programming instrument for the determination of incentive pay calculations with two indicators of the six KPIs, the overall solution has 1, which is an indicator WI1 'calculations based on units produced incentives' and WI2 'incentive calculations based on time', and has the purpose or goal programming function at Z = 25. This means, that for the calculation of incentive wage determination has been highly optimized. This is evident from the obtained solution, that the indicator calculations based incentive units are produced and managed by time already highly optimized.

2. Discussion

There are seven instruments of the optimization model of the determination of the model discussed in workforce management with analysis of the design goal programming, as follows.

a. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management workload analysis

Based on the analysis of the results in Figure 1 with the goal programming solution of the analysis, the obtained results are highly optimized for the determination of analytical instruments workload calculation with two indicators of two KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, in which the indicator WA1 (performance evaluation) management is optimal, where the industrial supervisor in determining the workload analysis based on his performance evaluation sample of sixty minus sixty-five, sixty further subdivided then multiplied by one hundred percent. Optimization of the industrial supervisor, also in accordance with the formula Nicosimu (2010: 4)[2], in which the actual output in a period divided by the specified standard output.

Similarly, the industry is very appropriate supervisor in determining indicators WA2 (workload analysis) by taking the example of one cubic meter divided by eight hours of work, it will obtain the results of 0.125 workloads. In one day, a maximum of seven hours of work effectively. For example, the industry generates four cubic meters for the equivalent of four workforce that depends on the product. So, at least for one cubic meter cubic fifteen. Optimization of the industrial supervisor, also in accordance with the formula Hermawan (2011: 2)[1] in analyzing workloads, where the results obtained by the volume of work divided by the number of hours worked. Or by Wrestiandi (2004: 2)[3] who regard it as a process of identifying, calculating the optimum, and the conclusions of the types and work units, and the average number of units of work required by a workforce in completing the work.

b. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management needs of workforce

Based on the analysis of the results in Figure 2 with a solution of goal programming analysis, the obtained results are highly optimized for the determination of the calculation instrument needs a workforce with two indicators of two KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, in which the indicator WN1 (number of workforce) management is optimal, where the supervisor in determining the needs of the industry workforce based on

performance evaluations and analysis of workload per number of workforce is needed, in order to obtain the number of days in a year multiplied by the time to finish the task of which is further divided by the number of working days per year multiplied by the number of effective working seven hours per workforce. Optimization of the supervisor, also in accordance with the formula Pratama (2008: 1)[4], where the number of days in a year multiplied by the time to finish the task of working days a year divided by the number of hours worked multiplied by the number of effective.

But in indicators WN2 (planning workforce needs), needs to be managed more optimally, in which a solution of goal programming analysis result proved that only reaches 0.878 rounding. Therefore, not only the industrial supervisor should adjust its calculations are based, on: (a) an example for the 50 workforce that can meet or achieve the target of 5 containers, to 200 m^3/50 = 4 m^3/day/workforce, assuming an average workforce resulting in a minimum 3 m^3/day; and (b) the main calculations for the workforce needs of the plan, is the raw material. Suppose industry is to obtain permission for 15,000 m^3/year, the assumptions used refers to the count of tithing, which is the basis of 1500 m^3 per month divided by 12. While assuming for a total of 125 m^3 per month divided by the plan workforce needs for 35 people, the obtained results 3.5 m^3, but should look at re-formulation Nicosimu (2010: 4-5)[2] in workforce planning needs, where a certain level of output in the future, must be divided by the availability of labor time is clear.

c. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management available production capacity

Based on the analysis of the results in Figure 3 with a solution of goal programming analysis, the obtained results are highly optimized for the determination of the calculation of the instruments of production capacity available with two indicators of two KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, that indicators PC1 (number of workforce, the availability of certain equipment, availability of time, and labor standards) management is optimal, where the industrial supervisor in determining the production capacity available, very appropriate based optimization of sample acquisition rate 35 + 7 hours effectively. Optimization of the industrial supervisor, also in line with Nicosimu (2010: 5)[2] that establishes the calculation based on the number of workforce and the availability of certain equipment coupled with the availability of time, and work standards in the industry owned predicting production capacity available, which by Garside and Heather (2012: 1)[8] is seen as a very important factor to verify, that the production plan can be delivered on time. Where delivery of this kind, by the industry supervisor studied, has the advantage, because of the insurance and warranty terms of legality and quality.

However, in calculating the indicator PC2 (router level, the level of outcomes, efficiency hours, and shift work) need to be managed more optimally, in which a solution of goal programming analysis result proved that only reaches 0.878 rounding. Therefore, supervisors should not only be based on industry evaluations only if it does not achieve the desired target, it is considered inefficient. For example, to output per day than the machine or the work of manual handling, but should look at re-formulation of the industrial supervisor Hot (1992: 2)[7] in calculating the level of routers that must be multiplied by the rate of return then multiplied again by the efficiency of hours, and finally multiplied by per shift, where the router level, is the time or the necessary production standards.

d. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management product prices

Based on the analysis of the results in Figure 4 with a solution of goal programming analysis, the obtained results are highly optimized for product pricing calculation instrument with four indicators of four KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, that indicator PP1 (costing price plus) management is optimal, where the industrial supervisor in determining the price for the product plus the price costing, calculated based on the plan reduced the break-even sales divided by sales for later multiplied by one hundred percent. Optimization of the industrial supervisor, is in accordance with the formula Nip-Nip (2010: 1)[11], in which the total cost coupled with its margin. In addition, industry supervisors in determining the price of the product for the indicator PP3 (costing break-even), calculated from fixed costs (such as salaries, etc.), variable cost (the cost of unexpected), and profit and volume, in which: fixed costs plus variable costs and reduced sales as a result of production volume. Optimization of the industrial supervisor, also still in accordance with the formula Nip-Nip (2010: 2)[11], where the industry is said to make a profit if sales are above the break-even point and vice versa if the loss below the break-even point. Similarly, industry supervisors in determining the price of the product for the indicator PP4 (determination in relation to the market price), refers to the preservation of the quality of the product coupled with the terms specified by the purchaser. Optimization of the industrial supervisor, still fully compatible with the formulation of Nip-Nip (2010: 2)[11], by determining the price equal to the market price level in order to compete, or can also be specified higher or lower than the price level in the competition.

However indicator PP2 (mark-up pricing), need to be managed more optimally, in which a solution of goal programming analysis result proved that only reaches 0.835 rounding. Therefore, not only the industrial supervisor should adjust its calculations based on the results rather than the purchase price plus the mark-up

itself, but should examine and recalculate the formulation of Nip-Nip (2010: 1)[11] the mark-up pricing which appropriately.

e. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management working methods

Based on the analysis of the results in Figure 5 with the goal programming solution of the analysis, the obtained results are highly optimized for the determination of the working methods of calculation instrument with two indicators of the five KPIs, which leads to the measurement of work and employment, as well as Gill (2011: 1)[12] ever using the system in the form of MOST work measurement to achieve high performance. Or by Ansari and Garg (2012: 1)[13], which develops standards of work, in which to evaluate, compare, and improve workforce productivity; and determine how much the average hourly workforce needed to produce one unit of output is desired for a workforce trained in normal operating conditions. Similarly, Chen and McGinnis (2007: 277)[14] that uses the data in the assessment of the operational performance of the DEA as one of the methods developed in the theory of production and applied by researchers to study the industry group.

To the above, also visible from the solution obtained, that the indicator WM1 (work measurement) management is optimal, where industrial supervisor in determining working methods for the measurement of work based on: **1)** general move (displacement general), in which the guide movement a sheet of wood from one location to another, freely through space work area; **2)** controlled move (move controlled) which refers to manual shift (workforce) to automation (machine): KD → planner → cross cut → a multi-rip → molding → repair → packing, which is through the control of their own ways; **3)** use the tool refers to: (a) the sharpness of the blade and the conveyor (planner); chalk on wood that has been chosen for the size of its length (grading); tilt angle cuts with the tolerance (cross cut); slicing left and right side of the timber in accordance with the orders (ripsaw); checking a knife to get the results that square (molder); and the numbering and labels used on the set of blades (finger joint); and (b) binding or loosening, cutting, cleaning, measuring and writing, as well as additional activities that require mental processes, such as reading and checking; and **4)** equipment use, especially checking the supporting equipment that has been prepared for each cross-cut; and preparation of the necessary equipment for repair. Optimization of the studied industrial supervisor, also in accordance with the formula fourth Gill (2009: 2-4)[12], for the measurement of the work based on the determination of the method is working.

Similarly, industry supervisors in determining indicators WM2 (measurement of work) is optimal management, which refers to the number of workforce per

average cost of production of actual performance. Optimization of the industrial supervisor, and also in accordance with the exact same formula Ansari and Garg (2012: 2)[13] in determining the measurement of the work, in which the results obtained by the number of workforce divided by the average cost performance.

f. Discussion of results above goal programming optimization models in a model of the determination of the appropriateness of the management workforce scheduling work

Based on the analysis of the results in Figure 6 with the goal programming solution of the analysis, the obtained results are highly optimized for the determination of the calculation instrument scheduling work with two indicators of the two KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, that indicator WS1 (forward calculation) management is optimal, where the industrial supervisor in performing advanced calculations are in accordance with the movement of follow calculation based on production targets, of the work leading to the final product. Due to the optimization of the studied industrial supervisor is not too high level of compliance, it should examine the calculation Noerbiant (2010: 4)[15] that directly leads to the calculation of the move from the initial event leading to the terminal event, in which the goal is to calculate the fastest time of the occurrence of events and time of commencement and completion fastest activities.

Similarly, industry supervisors in determining indicators of WS2 (countdown) management is optimal, where it is appropriate that the final product when the target has been determined earlier than the latest of a completed job. Due to the optimization of the studied industrial supervisor is not too high level of compliance, it should examine the calculation Noerbiant (2010: 4)[15] that directly leads to the calculation of the moving of the terminal events leading to the initial event. The goal, to calculate the slowest time of the occurrence of events and the slowest time of commencement and completion activities.

g. Discussion of results above goal programming optimization models in a model of determination of the suitability of workforce management incentive pay

Based on the analysis of the results in Figure 7 with a solution of goal programming analysis, the obtained results are highly optimized for the determination of incentive pay calculations instrument with two indicators of the six KPIs, which in this discussion, the researchers of the highest sort of optimization and compliance. This is evident from the obtained solution, that indicators WI1 (calculation based incentive units produced) management is optimal, where the supervisor determines industry: ***first***, the calculation of wages per piece proportionally very appropriate, where wages (salaries) paid workforce by entire timber products multiplied wage rate per piece and is based on the minimum

wage or city (MSE). ***Second***, the calculation of wages per piece taylor determined in accordance with rates that are very different for the workforce who work above and below the average output, where the rating difference corresponding hierarchy: workforce → coordinator → head → supervisor → manager. Both optimization of the industrial supervisor, is in accordance with the formula Viklund (2009: 4)[19], that the wage per piece proportional is a system most widely used, in this case the work is paid by all products produced multiplied by the wage rate per piece, so the wage per piece taylor, in which the system determines a different rate for the workforce who work above and below the average output. For a workforce that successfully meets or exceeds the average output, then it will receive the wage per piece larger than the work gets output below average. ***Third***, the calculation of wages per piece group is quite in accordance with the standards for determining a group can not be found as the calculation based on the hierarchy. Although supervisors studied industrial management is highly optimized, but compliance is still at a considerable rate, it should, listen back to the formulation Viklund (2009: 4)[19] in calculating the wage per piece group, where I calculate this remuneration is to set a standard for a group. Those who are above the standard group will be paid as units produced multiplied by the rate per unit. While working under standard hours of work will be paid multiplied by the work rate.

As for indicators WI2 (incentive calculations based on time), the supervisor is optimal in its management industry, where: ***first***, the calculation of premiums over time the work is very appropriate, as it is based on increased efficiency workforce increased in accordance with increased efficiency according to a defined percentage, with a period of 3 months as a trial first, then the next 6 months, until designated as a contract workforce. ***Second***, the premium over the standard time is not given as a percentage of the standard, but the hierarchy and transition probation until the contract. ***Third***, the premium over the corresponding time saved enough by the time labor standards and wages per hour worked effectively, which in real terms in the industry has not been determined. Although the management of industry supervisors in the calculation of the incentive is based on time already highly optimized, but compliance still at an average of 4 out of a maximum of 5, the supervisor should examine again the formula industry Viklund (2009: 4)[19] in calculating the time-based incentives, with: 1) premium based on time saved: (a) Halsey plan, determine the standard time and certain hourly wage. Given percentage of the premium is 50% of the time saved. The reason is the lack of proper standards of work at all; (b) the premium plan, which basically means the same incentives to Halsey plan, but the percentage of the premium is 100% of the time saved; and (c) bedaux plan. The provision of incentives in the workforce by 75% of the normal wage per hour multiplied by the time saved; 2) the premium is based on the time of work: (a) rowan plan, incentives based on working time; and (b) emerson plan. To implement this incentive system, it would require an efficiency

index table. So the incentive will increase with increased efficiency workforce in accordance with increased efficiency according to percentage (efficiency index table) that has been established; and 3) the premium is based on the standard time. In this system is given premium of 20% of the standard.

CONCLUSION

Optimization of the industrial supervisor of workforce management that is based on the determination of the model, it was concluded that:

1. the whole of the two indicators on the instrument determining the workload analysis has been managed with a highly optimized, ie indicators: 1) the evaluation of work performance; and 2) analysis of the workload;
2. contained one of the two indicators on the instrument identifying the needs of the workforce has been managed with a highly optimized, ie the number of workforce indicators; whereas indicators of workforce planning needs, not optimal in its management;
3. contained one of the two indicators on the instrument determining the available production capacity has been managed with a highly optimized, ie the number of workforce indicators, the availability of certain equipment, availability of time, and work standards; while the router level indicator, level outcomes, efficiency hours, and shift work, not optimal in its management;
4. contained three of the four indicators on the instrument product pricing has been managed with a highly optimized, ie indicators: 1) the determination of the cost price of the product; 2) the determination of the cost break-even; and 3) the determination in relation to the market price; whereas the other indicators, the indicator mark-up pricing, not optimal in its management;
5. entirety of the two indicators on the instrument the determination of the method of work has been managed with a highly optimized, ie indicators: 1) measurement of the work; and 2) measurement of the work;
6. entirety of the two indicators on the instrument determining the scheduling of work has been managed with a highly optimized, ie indicators: 1) advanced calculations; and 2) the countdown; and
7. entirety of the two indicators on the instrument determining incentive pay has been managed with a highly optimized, ie indicators: 1) the calculation of the incentive is based on units produced; and 2) the calculation of time-based incentives.

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