

A Quantitative Analysis of 3PL Providers and Their Workload in Automotive Industries

S. Yeshwant Raj, G. Sathish, C.P. Selva Kumar and R. Sairam

Department of Mechanical Engineering, Sri Venkateswara college of Engineering, Chennai, India

Abstract: Productivity advancement has been a trend and a challenge to every industry in day-to-day life. To sustain the marketplace and to have constant growth, productivity plays a vital role. There are n number of productivity improvement tools such as fish bone diagram, Method Study, Time Study, Total Quality Management (TQM), Just In Time (JIT) and more. From the above tools Motion and Time Study is the best ones which could be implemented. This paper illustrates two phases, Jobs per Hour (JPH) study in the Material Planning and Logistics area and productivity enhancement by work balancing among the normal company laborers and the 3PL (third party laborers). Balancing and optimizing the workload of operators increase efficiency in productivity. Work-study and method study are basically used to inspect and analyze the operators workload in Material planning and Logistics (MP&L) area. Eliminating the unwanted usage of 3PL workload and thus by increasing the same in context to the normal company laborers would be the agenda of the paper. The main focus of this paper is to reduce the cost spends on laborers and to increase the production and in order to illustrate the effectiveness of this method, this methodology is applied to three companies (automobile industries). So increasing the production efficiency to any company is a way to maximize the profit and provides the helping hand to the company in the present scenario.

Key words: 3PL • Productivity • Work balance • MP&L • Time • Method study

INTRODUCTION

The greatest challenge for the managers nowadays is to face the productivity scenarios (excess or scarce) in the present competitive industrial market. This challenge would lead to the revolution of quality and quantity life cycle. Productivity boons are more vital to the global economy as they allow us to achieve more with excess with less.. Productivity is measured and tailed by many financial experts as inkling for predicting future stages of GDP aggrandizement. Concerning the modern business, both capital and labor are sporadic and thus has to be maximized or minimized according to the environmental impact. Productivity intensification comes from the latest technology advances, such as IT, cyberspace, supply chain improvements and inflation skill levels within the workforce. When new and excess productive rookies enter a sector previously screened from global competition, the sector's overall consistency of productivity rises [1]. The degree of Outsourcing has increased in the recent past where the ultimate usage of work has from the 3PL laborers only, but have faced some

problems, outsourcing can only be a concern with respect to logistics (transportation, warehousing, picking, packing, light assembly and more) and management but not in other fields which is a negative impact on 3PL. Outsourcing has led to many opportunistic behavioral impacts were such behavior can damage the inbound relationship between the third party laborers and other users. The important characteristic is a trust, which enables 3PL users to share group culture, and if the trust fails motivation factor would be lacking in them. Commitment should be in terms of Quanxi [2] network, which is built upon mutual interests and reciprocity. To defend Mianzi in the above network the outsourcing people and 3PL should restrain their inclinations towards opportunism. The opportunity was thereby achieved by decision-making process, which dwell of implementation, training, commitment towards the work, organizational impact and plans for the future [3]. With the usage of 3PL the profit margin would be very minimal as the experience and academic status of each would be very less when compared to the other workers, but the positive thing is that wages are less to 3PL. In order to sustain that thin

margin of profit one has to do the work of 3PL simpler or to keep the 3PL operation Lean [4]. The outsourcing of the logistics function for a third party worker has become an progressively uplift in the most of the multinational companies [5]. The latest trend in outsourcing is lean logistics and strategic logistics in terms of cost reduction.

The growths of 3PL are numerous now days in the competitive global market. The positive approaches of the outsourcing companies are the one, which still results in a good working environment. They are available in all fields such as highways, railways, waterways, and air transportation; however, highways are the backbone of transportation [6] in most parts of Asia (China and India). The industry era has still not changed or still not adapted the latest technology such as usage of IT and limited educational specialization. Consider the automotive industry in today's highly competitive market where trade impediment in the international market is collapsing, the survival of all these industries depends on its cost asset over the others. The rising productivity stages that are correlated to lower costs and increase in production plays a crucial role. 3PL laborers are the root cause for the hike in production and also cost reduction. This paper projects the reduction of 3PL laborers in terms of work and that work load would be compensated to the normal workers who are inside the plant. In USA and Europe focus on tactical, integrated functions and cost reduction when using 3PL [7] but when compared to Mexicans firms they use 3PL for customer service and core activities mainly. The [8] Indian approach towards 3PL were that more the firm size better the 3PL's attention towards the work, to understand the testing of this hypothesis a survey methodology was conducted where a questionnaire was designed which included the financial and operational performances of the 3PL workers as well as the firm size.

The ratio of the workload is being dissipated through the no. of years worked and the amount of experience got. In USA [9] it was found that in a 500-company survey more than 50% of 3PL workers serviced for more than 5 years. The efficiency of the 3PL workers was found out using a 2 step DEA model. It was mainly focused on 3PL workers getting their best offers (IT industries) in the quest for bolstering efficiency [10] where resources (Inputs) and demands (outputs) played a major role. Logistics is one of the important chauffeur in [11] Supply Chain Management (SCM) where outsourcing is mainly used to reduce capital investment in IT, manpower, facilities and equipment's which adapt market volatility, improve inventory turnover and reduce the transportation. As the generation of 3PL was getting extinct, people started concentrating mainly on transportation and distribution. In the above two departments one has to mainly catch in the hold of the customer, so in order to compete in consumer markets firstly [12] negotiation mechanism was done by fuzzy logics and then to choose the best alternative Analytic Hierarchy Process (AHP) was implemented which was proved the most effective way.

Methodology Adopted: The full study was being done by a statistical analysis of the collected data from three different companies: working on the motion and time study of each and every worker, reducing the time and workload according to the necessity and expectations. A session of brainstorming was done with all the company's managers for the problem identification, the solutions for the problems and more. PDCA tool was implemented in each and every stage of the process (During work measurement and method study). The 3PL workers had to only concentrate on major activities, such as lead, operate and architect [13]. The step-wise statistical analysis are given below:

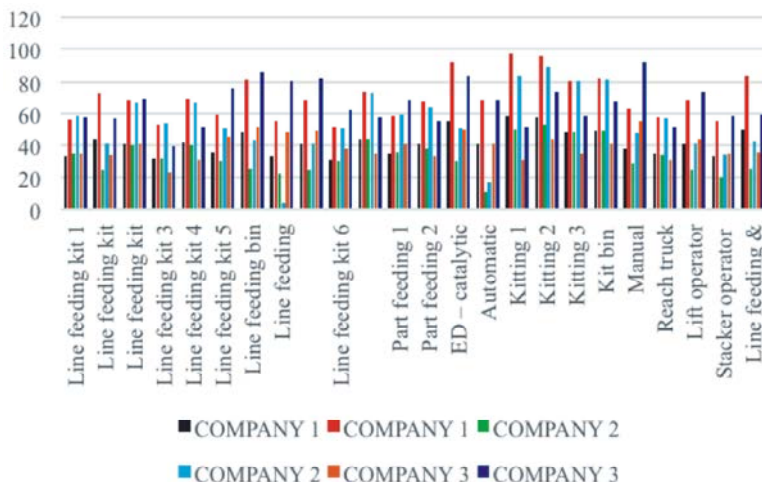


Table 2.1: Insourcing Details

S. No	Shops	Company-1				Company-2				Company-3			
		Current Head Count		Future (Insource)		Current Head Count		Future (Insource)		Current Head Count		Future (Insource)	
		CL*	3PL	CL*	3PL	CL*	3PL	CL*	3PL	CL*	3PL	CL*	3PL
01	Line feeding	0	3	3	0	0	3	3	0	0	2	2	0
02	Handling of crank and head	0	2	2	0	0	3	3	0	0	1	1	0
03	Kit 1	2	0	0	2	0	2	2	0	0	2	2	0
04	Kit 2	1	1	1	1	0	4	4	0	0	2	2	0
05	Kit 3	0	3	3	0	0	4	4	0	0	2	2	0
06	Kit4	0	3	3	0	0	2	2	0	0	2	2	0
07	Kit5	0	2	2	0	0	2	2	0	0	2	2	0
08	3c line feeding	1	1	1	1	0	2	2	0	0	3	3	0
09	Kitting market place billing	0	3	3	0	2	0	0	2	0	1	1	0
10	Auto feeding	0	3	3	0	0	2	2	0	0	1	1	0
11	Lockable parts feeding sequencing	0	2	2	0	0	2	2	0	0	1	1	0
12	Empty management	0	2	2	0	2	0	0	2	2	1	1	1
13	Market place binning	2	0	0	2	0	4	4	0	1	0	0	1
14	Export engine vaning / shipping	0	2	2	0	0	3	3	0	0	1	1	0
15	sequencing	0	2	2	0	0	2	2	0	0	1	1	0
16	Kit1	0	2	2	0	0	2	2	0	0	2	2	0
17	Kit 2	0	2	2	0	0	2	2	0	0	2	2	0
18	Kit 3	0	3	3	0	0	2	2	0	0	2	2	0
19	Kit 18	0	2	2	0	0	2	2	0	0	2	2	0
20	Sequencing	0	1	1	0	0	2	2	0	0	1	1	0
21	Manual transmission sequence	0	2	2	0	0	2	2	0	1	0	0	1
22	Auto transmission sequence	0	2	2	0	0	2	2	0	0	1	1	0
23	Rejection/ shipping	2	0	1	1	2	0	1	1	1	0	0	1

CL* - COMPANY LABOUR

Different shops require different company labors and 3PL such that the unwanted 3PL laborers are eliminated and thereby the company laborers are filling up that place.

The comparison of the head count ad the future insourcing has been shown for 3 different automobile companies. The colored columns show the change in laborers.

Table 2.2: Work Load Sheet

S. No	Profile Description	Company 1		Company 2		Company 3	
		Avr (Min)	Work Load' (%)	Avr (Min)	Work Load (%)	Avr (Min)	Work Load (%)
1	Line feeding kit 1	33.5	55.8	35.0	58.4	34.7	57.9
2	Line feeding kit 2-1	43.8	73.0	24.6	41	34.2	56.9
3	Line feeding kit 2-2	41.2	68.6	40.2	67	41.2	68.7
4	Line feeding kit 3	31.8	53.1	32.1	53.5	23.4	39.1
5	Line feeding kit 4	41.3	68.8	40.3	67.1	31	51.7
6	Line feeding kit 5	35.4	59.1	30.3	50.5	45.4	75.7
7	Line feeding bin load unload	48.6	81.1	25.7	42.9	51.2	85.4
8	Line feeding lockable parts trolley	33.1	55.2	22.9	3.2	48.4	80.7
9	Line feeding kit trolley & head trolley	41.1	68.6	24.6	41.1	49.3	82.2
10	Line feeding kit 6	30.7	51.2	30.5	50.8	38	62.3
11	Line feeding non kit trolley	44.1	73.5	43.6	72.8	34.7	57.9
12	Part feeding 1 (market place binning)	34.8	58.1	35.3	58.9	40.9	68.1
13	Part feeding 2 (market place binning)	40.5	67.6	38.1	63.5	33.2	55.3
14	ED – catalytic converter	55.0	91.7	30.5	50.8	50.1	83.4
15	Automatic transmission sequence	41.1	68.5	10.4	17.3	41.2	68.6
16	Kitting 1	58.4	97.4	50.28	83.8	30.7	51.2
17	Kitting 2	57.3	95.6	53.2	88.8	44.1	73.6
18	Kitting 3	48.4	80.6	48.1	80.3	34.9	58.1
19	Kit bin	49.3	82.1	48.9	81.5	40.5	67.5
20	Manual transmission sequence	38	63.3	28.5	47.5	55	91.7
21	Reach truck operator	34.7	57.8	34.2	57	30.7	51.2
22	Lift operator	40.8	68.1	24.5	40.7	44.1	73.6
23	Stacker operator	33.2	55.3	20.3	33.9	34.9	58.1
24	Line feeding & fastner	50.2	83.7	25.5	42.5	35.3	58.9

Work load factors differ from each profile to profile, the average time has been calculated by using three trials and the average of 3 trials are

projected in the above table and by adding up all the work load of laborers the load factor is elaborately shown.

Table 2.3: Man Power Saved

S.No	Saving (Comp1)	Saving (Comp1)	Saving (Comp2)	Saving (Comp3)
1	Assy kit-2	2	2	2
2	Assy kit-3 & kit-4	4	2	2
3	kit-5 improvement	2	2	2
4	Market place binning and Lockable parts feeding	2	2	1
5	Kitting market place binning	3	2	1
6	E/D automatic transmission sequence	2	2	1
7	E/D kitting	2	2	2
TOTAL		17	14	11

Man power saving is one of the major factor in this study, 3 companies having 3 different values and the

interesting fact is that all the three companies have saved the man power in the respective profiles only.

Table 2.4: Work Load Factor For Revised Workers

S.No	Profile	Workload (Comp1)	Workload (Comp2)	Workload (Comp3)
1	Line feeding kit 1	55.8	58.42	57.9
2	Line feeding kit 2-1	99	89	89
3	Line feeding kit 2-1	98.3	87.09	94.7
4	Line feeding kit 3&kit 4	95.7	58.81	96.2
5	Line feeding lockable Parts trolley	88.9	58.98	95.3
6	Line feeding kit trolley& head trolley	82.9	41.1	98.7
7	Line feeding 3C's Movement	81.2	50.8	62.3
8	Line feeding non kit Trolley	73.5	72.8	57.9
9	ED- Catalytic Convertor	98.7	66.9	98.1
10	Kitting 1	99	98.7	82.7
11	Kitting 2	99	98.7	89.2
12	Kit bin	82.1	81.57	67.5
13	Manual transmission Sequence	70.1	48.9	98.7
14	Reach truck operator	57.8	57	51.2
15	Fork lift operator	68.1	40.79	73.6
16	Stacker operator	55.3	33.9	58.1
17	Line feeding & Fastner	83.7	42.5	58.9

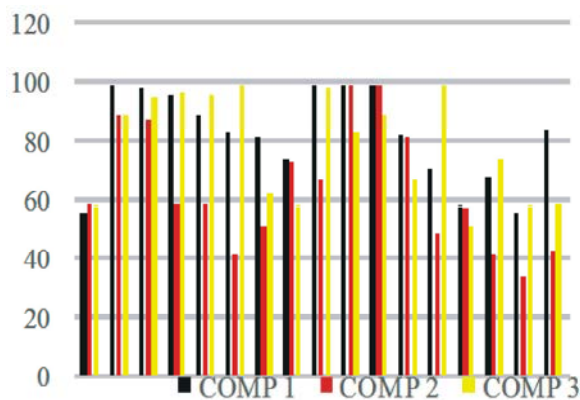


Fig. 2.2: Work Balance Sheet

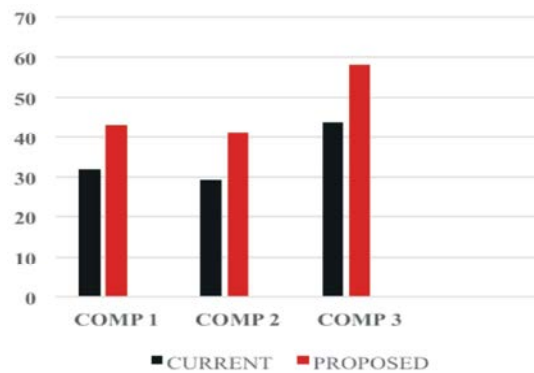


Fig. 2.3: Average Work Force Increase (Current Vs Proposed)

Model Calculation

Cost Estimation

Current Scenario: All Companies are maintaining 70:30 ratios for cost on employee wages. That is 70% permanent workers and 30% temporary workers. of 44 people we considered, 31 workers are permanent and 13 workers are temporary.

Average wages for permanent workers = Rs 5,00,000
 Average wages for temporary workers = Rs 2,00,000
 Total cost on wages = total wages to permanent employee+ temporary Employee.
 Total cost on wages (for 44 employee) = (31*5,00,000)+(13*2,00,000) =15500000+2600000
 Total cost on wages = Rs. 1,81,00,000

Cost Saving on Proposals:

Manpower saved = 14 workers.
 As per the ratio (70:30), 10 workers are permanent and 4 workers are temporary.
 Amount saved on wages = (10*500000) + (4*200000)
 Total cost saved on wages = RS.58, 00,000.

Efficiency Calculation:

No of workers planned before proposal = 97
 No of workers after proposal =75
 Efficiency increase =
 (Plan Proposed)/Plan = (97-75)/ 97
 = 22.6%

Result and Inferences:

Category	Comp-1	Comp-2	Comp-3
No of Workers	51	44	36
70:30 Ratio	36:15	31:13	25:11
Wages (Rupees) Permanent	4,00,000	5,00,000	3,50,000
Temporary	2,04,000	2,00,000	1,92,000
Total Wages (Rupees)	1,74,60,000	1,81,00,000	1,08,62,000
Man Power Saved	17	14	11
70:30 Ratio (Man Power Saved)	11:6	10:4	7:4
Wages Saved (Rupees)	56,24,000	58,00,000	32,18,000
Efficiency Increased (%)	24.5	22.6	21.5s

CONCLUSION

- 51 3PL, 44 3PL AND 36 3PL have been replaced by 34, 30 and 25 employees in the respective companies. Therefore, man power saving (17,14 and 11 employees) are achieved.
- Efficiency of MP&L area are increased by 24.5%, 22.6% and 21.5% in the respective companies
- Average workloads are improved from 45.25% to 63.88%.
- Annual wages of workers INR 56,24,000; INR 58,00,000; INR 32,18,000 have been saved to the company.

- Morale of personnel is improved.
- Man utilization is improved.
- Employee involvements are improved.
- Layout modifications are done to improve productivity.

REFERENCES

1. Tugrul U. Daim, *et al.*, 2012. Use of analytic hierarchy process (AHP) for selection of 3PL providers, Journal of Manufacturing Technology Management, 24(1): 28-51.

2. Baofeng Huo, *et al.*, 2015. The impacts of trust and contracts on opportunism in the 3PL industry: The moderating role of demand uncertainty, *International Journal of Production Economics*, pp: 160-170.
3. Birdogan Baki and Ilker Murat Ar, 2009. A Comparative Analysis of 3PL Applications in Manufacturing Firms from Seven Countries, *Supply Chain Forum: An International Journal*, 10(1): 16-30.
4. Hokey Min, *et al.*, 2013. Evaluating the comparative managerial efficiency of leading third party logistics providers in North America, *Benchmarking: An International Journal*, 20(1): 62-78.
5. Rajesh, R., *et al.*, 2011. Influence of 3PL service offerings on client performance in India, *Transportation Research Part E* 47, pp: 149-165.
6. Albert Wee Kwan Tan, *et al.*, 2014. State of third party logistics providers in China, *Industrial Management & Data Systems*, 114(9): 1322-1343.
7. Pilar Arroyo, *et al.*, 2006. A survey of third party logistics in Mexico and a comparison with reports on Europe and USA, *International Journal of Operations & Production Management*, 26(6): 639-667.
8. Mothilal, S., *et al.*, 2012. Key success factors and their performance implications in the Indian third-party logistics (3PL) industry, *International Journal of Production Research*, 50: 2407-2422.
9. Robert Lieb and John Miller, 2002. The Use of Third-party Logistics Services by Large US Manufacturers, The 2000 Survey, *International Journal of Logistics Research and Applications: A Leading Journal of Supply Chain Management*, 5: 1-12.
10. Peter F. Wanke, 2012. Determinants of scale efficiency in the Brazilian 3PL industry: a 10-year analysis, *International Journal of Production Research*, 50: 2423-2438.
11. Satyendra Kumar, *et al.*, 2015. Optimal selection of third-party logistics service providers using quality function deployment and Taguchi loss function, *Benchmarking: An International Journal*, 22(7): 1281-1300.
12. Yee Ming Chen, *et al.*, 2011. Selection process in logistics outsourcing – a view from third party logistics provider, *Production Planning & Control: The Management of Operations*, 22: 308-324.
13. François Fulconis, *et al.*, 2011. The 3PL Provider as Catalyst of Coopetitive Strategies-An Exploratory Study, *Supply Chain Forum: An International Journal*, 12: 58-69.