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IMPORTANCE OF TURNAROUND TIME IN INDUSTRIAL PROCESS AND INNOVATIVE IDEAS TO REDUCE IT

Aniket Sanjay Shitole
Institute of Chemical Technology, Mumbai, Marathwada Campus Jalna 431 203
aniket.shitole.ict@gmail.com

ABSTRACT

The role of the turnaround time (TAT) in the industry is a very important. It not only helps to increase the effective-ness of the working of the industry and laboratories but also helps strengthen the relationship of the customers with the industry authorities. Moreover the effective implementation of the techniques for reduction of turnaround time helps in creating a better atmosphere for the workers in the indus-try by proper time management and its utilization. Various studies have been conducted for the same. There are vari-ous tools and techniques available out there that can help cut down the total TAT in any chain process. Moreover the the reduction of TAT will itself help increase the revenue of the company. Also a new idea of using Internet of Things (IOT) in the industries can along with the systematic practice of 5S system can help further cut down the TAT.

Keywords: Turnaround Time (TAT), PDCA cycle, Thera-peutic TAT, 5S system

INTRODUCTION

Quality of the result has been the ulimate goal of any in-dustry. This quality helps increase the customer satisfac-tion. Quality can be defined as the ability of a product or service to satisfy the needs and expectations of the cus-tomer [1]. TAT has been briefly defined by each other dif-ferently based upon their domain. Turnaround time is the key word used to denote the utilization of time in the pro-cess of the production of any product or getting result of any process. This term has been also used in the comput-ing sector as the total time taken between the submission of a program/process/thread/task for execution and the re-turn of the complete output to the customer/user[2]. Turn around time is one of the metrics used to evaluate an op-erating system's scheduling algorithm[2]. There are various types of other metrics which can be compared with the TAT. There is lead time, response time and wait time, each of which differs from turnaround time in their own way. Lead time is the time gap between the order placed by the cus-tomer and the time when the customer gets the final deliv-ery. Response time is the average time elapsed form sub-mission until the first response is produced. Whereas wait time is the amount of time a process has been waiting in the ready queue[2]. There has been and a hefty amount of research in the turnaround time field mainly in clinical laboratories and industrial environments. Also the results have been innovative and feasible for its reduction. Also the study of turnaround time in hospitals has helped reduce the time of stay of a particular patient in the hospital. This pa-per involves the review of the research about turn around time each in different domains. One in hospitals one in clinical laboratories and the last one is in food processing industry[3]. Each review provides a brief discussion about the problem faced and solution the authors has come up with the adequate numerical data.

In review of the paper about TAT at academic hospitals [4], the author has collected the data of the turnaround time in various process involved. But hasn't showed any specific numerical value of the reduction of the TAT after the imple-mentation of the solutions. In the second study about the TAT in the clinical labrotaries [5] the author has provided some innovative methods and implemented. In the last pa-per the author skillfully implemented the Plan, Do, Check, (PDCA) cycle method and was able to drop down the TAT by a significant level. All the three studies together give us a clear idea if the concept of the TAT and provides us with some concrete solutions for its cutting down [6].

CASE STUDY

Going through three diffrent scenarios of turn around time. There is breif elobration on each of them in the follow-ing case studies. TAT is being defined in all three cases diffrently.

TAT at Academic Hospital

Reduction of the TAT in labrotaries is an important task as it is an most noticleble sign of labroatry testing and is of-ten used as a key performance indicator of labrotary perfor-mance [4] [7]. From the paper it can be extracted that the author was able to decrease the TAT from 8% to 3.7% [4].

They had classifed the analytical process of any lab into three stages namely pre-analytical, post-analytical and an-alytical respectively. Turnaround time is defined in differ-ent ways based on the test type of analyte. It is commonly defined as a time from the test is ordered until the result is reported. In this paper [4] turnaround time is defined as the time of the sample collection till the report is dis-patched to the patient. Chauhan et al.,2014 has studied the number and the percentage of specimens that exceeds stip-ulated turnaround time, with the main purpose to provide guidance for monitoring and identifying the cause of delay in turnaround time. Suggesting actions to eliminate them to make improvement in turnaround time of laboratory test results. Chauhan et al,.2014 have come up with various so-lutions to the problems according to the stages involved in the whole process. Chauhan et al,.2014 suggests that most of the delay in turnaround time are seen in the stage of the laboratory and has also referenced in balwani study that the delay was due to pre-analytical cause in 74.2 % of samples. In the author's study 45% of the specimen exceeded its turn around time was due to various non analytical delays and al-most 35% were due to all phase delay. Goswami et al.,2010 observed that 40% of the TAT was due to machine break-down. At the end it is being claimed that with effective implementation of the solutions to the problems they could reduce the turnaround time to a significant level.

Turn Around time in Clinical Laboratories

In this study Dey et al.,2010 as defined turnaround time in his own words stating that the turnaround time can be defined by clinicians and laboratory personals differently. For laboratory personals TAT includes the time from re-ceipt of sample in laboratory to generation of report whereas for clinicians it is considered from the time of test requis-tion till receipt. Turn around time defined by laboratory is mostly different from that as required by the physician [3]. report [8][9]. Dey et al.,2010 has introduced first a new term of therapeutic turnaround time which is defined as time from a test is being order to the time treatment decision is made based on the result of the test [8] [9]. The causes the delay in turnaround time as per the author is due to delay in collection of samples and transport and communication gap between the clinicians. The most important factor is the deficiency of the

lab equipments which hamper the overall TAT majorly. The solutions proposed by Dey et al.,2010 are installations of proper equipments and employing proper trained personals moreover using barcode readers for ac-cessing the samples. The preanalytical phase (Fig. 1) can be shortened by entering the test online and generating the labels at the same time. The main area concern is the time taken for samples transport to the laboratories which is done manually at most places [3] . Laboratories can be computer-ized to improve the productivity of fastest turnaround time.Moreover looking forward for customers needs could also help cut down turn around time.

Turn around time in food processing industry

This study revolves ariund the TAT for outbound logistics in food processing industry and define various terms like supply chain management and logistics. Supply chain man-agement involves facilities functions and activities for pro-ducing and delivery products or services from suppliers to customers. Logistics reports to management of flow of re-sources between the point of origin and the point of con-sumption in order to meet some requirements. [11] [12] Moreover mistakes in moment of material associated with storing transporting and distributing goods to its customers from distribution centres. The author has studied about the company Nestle which has their mission as 'Good Food Good Life'. The author has carried out research in sup-ply chain management department of the Nestle company in Karnataka.The company has two main warehouses of Mag-gie and Coffee. The objective of the study was to find the turnaround time and find some steps to reduce its signifi-cantly. Authorities define turnaround time in his own words as the time taken by transport vehicles to complete the whole process of loading finished quotes starting from the point of entry to its exit from factory premises [11]. The flowchart of the whole process from start to end. 1 The main objec-tive of this study was to increase efficiency of overall lo-gistics inside the factory and improve safety by using min-imal vehicles inside the factory. The author has tried to tackle this problem using the PDCA cycle technique. A Scientific method that can be written as 'hypothesis' 'ex-periment"evolution' or plan do and check. They first col-lected and analyse the data of 50 trucks net time consume by them interval activities throughout the whole process for 10 days. This data was later analysed using various tools one of which is Pareto chart. According to this chart three ma-jor processes took the most time namely documentation and processing followed by ideal time. After systemetic imple-mentation of the solutions, documentation and processing reduced by around 92%. Whereas ideal time before load-ing decreased by 80% and in total the turnaround time was reduced to 125 minutes and drop of around 47%. [11].

The Table 1 displays the improvement in the TAT after implementation of the solution. The major diffrence is seen in the documentation and processing step and followed by idle time before loading which is 70.98 minutes and 42.26 minutes resepctively. There are some processes where it took more time for its completion that is negative diffrence. At the end the total time difference noted was 112.68 min-utes, which is a significant number

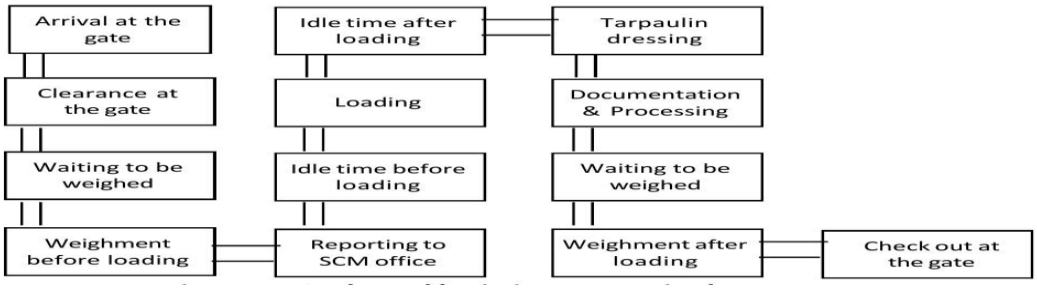

Figure 1: Flowchart of the each step

Activity	Average time taken (in min.)		Difference
	Before Implementation	After Implementation	
Clearance at the gate	4.94	3.50	**1.44**
Waiting to be weighed(in)	0.80	1.75	**-0.95**
Weighment (in)	4.70	3.25	**1.45**
Reporting to SCM office	2.80	3.25	**-0.45**
Idle time before loading	52.76	10.50	**42.26**
Loading	44.64	38.75	**5.89**
Idle time after loading	14.68	9.50	**5.18**
Tarpaulin dressing	24.16	39.00	**-14.84**
Documentation & Processing	76.98	6.00	**70.98**
Waiting to be weighed(out)	0.80	2.50	**-1.70**
Weighment (out)	5.10	3.25	**1.85**
Check out at the gate	5.82	4.25	**1.57**
Total time taken	**238.18**	**125.50**	**112.68**

Table 1: Improvement table

CONCLUSION

The main focus of the three research articles boils down to the point that irrespective of the domain of the place the concept of the around time can arise and it's effective re-duction can be done. This is possible by proper utilization of the tools. With this, the authors if the papers were able to cut down the time by an average of around 30 to 47%. And the recommendations for the reducing the same cov-ers not only technical, but also non technical and practical methods which were fruitful in dropping the TAT. After re-goursly going through the three studies implementation of a new techniwue can be proposed. An idea of live monitoring at each stage of the process to the customer using Internet of Things (IOT).And also the practice of 5S system which re-
duces lead times thereby improving product delivery times. This will bind the workers to work efficiently and reaching the goal before the target date. Moreover costumers will be confident with the delivery of the finished goods and qual-ity of the process indeed strengthen their bond with the in-dustrial officials. Hourly progress of the production can be displayed in the working premises, and also can be accessed by the managers from any part of the world. Displaying of the amount of production on the screens of each department will itself create a healthy competition between the work-ers further increasing working efficiency. Reducing the turn around time is itself a healthy practice for the industry and our cost effective solution will definetly help gaining fruit-ful result

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