

Relationship of Production control with Time, Cost and Quality

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Abstract

Production control is widely adopted by many organizations in account to get the higher benefits as it is helpful in finding the correct course of process functions, budgeting, delivery times of products, secure constant Production, Proper teamwork, supervision of planned process or targets as well as assist in creating the mission and visions of an organization and many more. So, here this paper used to present the relationship of production control (PC) for achieving benefits in sense of time, cost and quality. This paper determines the correlation of all trio constraint with production control as well as among with one another. This study follows the literature review methodology and point out the benefits can be achieved if the trio (time-cost-quality) is considered to worked by production techniques in corporations.

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1. Introduction

The total aggregate of an entity that is produced is called as production and these entities vary among several organizations [2]. Harding H. A stated that Production belongs with those processes in which inputs (raw materials, labor, machines, methods) are converted into outputs (goods and services) [3]. The evolution or reshaping of unprocessed material into end results or formation of facilities having the target of achieving the client satisfaction by adding the appropriate economics without quality compromise is named as the production while production section produces the products in required quantity at required time [1]. Production or manufacturing has aimed to fulfil the needs of the society members by changing unprocessed materials in to the finished products [3]. Besides that, the term control expresses as the enclosed framework of all tasks of corporation keeping the specific emphasis on the budgetary functions. Control assists the firm's executives for gathering data which lead them to prepare future recommendation of the firm [2] as Control conceptual models are used to point out the basic or active possessions of structure covering many variants like as time [4]. The intent of control is to identify, rectify and prevent from flaws and deficiencies. For that, Material, equipment, men, operations, and everything is considered. Control can be affected by applying it within time and follow up method [5]. Therefore, Production control can be taken as the methodology of keeping up the procedure of planning, implementation and supervision of manufacturing backgrounds through smooth setup and circulation of information. It is useful for overseeing the corporation activities and assists managers to identify the required areas of improvement [2] so it can be commented that the combination of Production control and human conduct enhances production performance [6] as its use mostly noticed at machine foundry or at the technological shop floor (ground level) where production is taking place in the real terms [1]. Besides that, it works on the consumption of business goals (mission and vision). It is stated that production control was correlated with the cost-effective pilot of manufacturing enterprises through which variety of products and their quality can be supervised with the effectiveness of time [2]. Further it is defined as, production management used to achieve target of organization as desired pieces in required quality at the given time duration concerning affordable pattern of scientific regulation of material flow and co-ordination among the operations.

Other essential terms mean as: **Time** is considered as the operated interval spent on anything. In the corporations mostly it is taken as cycle time or normal time of each product. Besides that, it has essential value in the sense of achieving the targets in given periods as well as time is taken as that resource which is mainly compared with cost in various research studies [7]. **Cost** is the amount of imposed charges to be shell out for procuring or purchasing something. In the organization it is mostly perceived as the invented monetary quota for the manufacturing of a product or whole production. It is essential because it has main intent of achieving feasible objectives and progression state of an organization. It tries to fulfil the increasing demand with the optimization of resources and processes through which

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inputs are converted into outputs in sense of economic growth[8]. Besides that, it is demonstrated by Logistics (IFA) and other research institutes that results of Supervisory, Attitudinal and economic factors are the exact obstacles of production planning and control if these are inappropriate (WIENDAHL et al. 2003; WIENDAHL 2003) [9]. **Quality** is the mark of distinction or brilliance of something. In the firm's quality is taken as achieving given requirements or getting the predefined standards with the minimization of defected ratio. It is expressed in the forms of color, length(size), finishing and others as Spiegel claimed that Quality is explanation of Features or aspects as proportions, appearance, construction, finish, adaption, strength worship and color [3]. According to Deming 1982; Kennedy 1987; Rust, Zahorik, and Keiningham 1995, Quality is perceived essential and complicated part of corporation strategy. Number of competitions associated with quality take place among organizations like quality search of customer and others. It can be said that quality is leading factor in firms in sense of profitability, customer satisfactions and Nation's economic progress[10]. While, according to Karsak & Tolga, 2001; Morgan & Daniels, 2001, it is harmful to have only consideration of performance by managers which may not lead them in better directions for achieving production goals as many scholars pointed out to work on both dimensions either financial or non- financial (Kaplan & Norton, 1996; MacDougall & Pike, 2003). As, procedure revolutions helps firms in enhancement of quality as well as reduction of time and cost [11].

As, production control provides more benefits to organizations but this study is only concerned with few of them (time-cost-quality) because we noticed these trio-constraints are mostly similar in all type of business corporations. Besides that, these constraints have essential effect among one another, production and also on the applied production control techniques. So, here is some self-assessment questions we have considered:

Is the time, cost and quality have any relationship with one another?

Is production control have any correlation with time-cost-quality?

Is production control depending upon time-cost-quality or not?

2. Literature Review

Production control is essential for production proficiency as it is a moneymaking speculation. Efficiency of this department is key factor for success of an enterprise as [5] it is practice of management tasks in affirm. In account to produce the desired goods or services in required specifications, quantity, time with minimum cost production control is used as decision making technique in production processes [3]. Production control is monitoring system for implementation of production plans as it ensures the right time and place of operations [1]. All resources (man, method, machine, material and money) are placed together for manufacturing single unit in production. It is hard for production planner to manage the inputs although he used to establish a control system for achieving targeted outputs and it isn't similar for all corporations, changes from one firm to another due to the major aspects of nature of production and tasks as well as volume of activities [5]. Quick shop floor control is observed through the use production planning and control in 20th century as well as beneficial results had been achieved. It greatly work on the operations sequence and working [12].

In addition, time is needed to complete the specific task which can be done by a skilled worker at a define Level of performance. The purpose of time measurement is to record the time needed to perform a certain task if the worker is working in an ideal condition [3]. While, the total time "to achieve the order may be change, depends on the real actions that obtain. The simplest concept is one of observe each action takes a fixed amount of time [13] and Soeharto concluded that cost is the very important thing in planning and also in controlling there is less time to manage the schedule, then we identify the point on which the work is started or when the job can be ended [14]. Hence, the normal time for working is multiplication of observed time into and performance rating (in percentage) [3].

There are various approaches have been established for reducing the time in production areas for maintaining cost and quality as the Critical Path Method (CPM): It is a deterministic technique use for scheduling the activities going on in a firm [15]. This approach shows the appropriate way or path of carrying out the Product through the production line or procedure as it consumes least time for completion, Line balancing is to do programming and controlling of the project, defined that the tasks should be fully planned within the limits of production or it can be said that number of unit which can be produced in a particular time period. It was basically introduced in 1942 by manufacturing industry in U. S navy Department. Howell and Ballard introduced last planner system which enhances trust of planning for improved performance of the project/production. It provides effective planning and controlling for weekly work basis and comparison practice is used to identify the gaps covered in production control field [15]. Time study can be take in account at the strategic, tactical, and operational levels of planning phase so smart organization can be developed by reducing the division impact of time horizon [16].

According to Plich et al. (2011) the great influential purpose of implementing profit-making tasks is to achieve best outcomes by coming to conclusions or decisions in the less amount of time while it can be propped up by control gadgets[2]. Anthony, et al (2005) claimed that monetary containment is an extensive set of cost accounting practices

count cost control having main goal for betterment of business and economic efficiency as we can reduce the growth ratio of cost in production. Progress or standards of any products are essential in the its economic or cost performance [17]. Cost control is the comparison of the cost on the corporation task with the proposed economic of that activity according to Locker (2002) as cost methodology is to manage, plan and structures the firm in three phases named perspective phase (establishment of control for making performance grades and mention data in quantitative forms, operation phase (working or operating development) and feedback phase (analyzation and revision state of decision). Further, Anthony et al (2005) mentioned few Conditions for effective Cost Control administration as data collection and analyzation, managing budget and regulation. While Sika (2003) described steps of efficient economic control of corporation asset the objectives, calculations of original data, comparison of real data with variances, finding out the reasons of variations and strategies to remove them [18]. Cost control has become essential in organizations (Douglas (2009)). Economic surroundings has made the cost control competitive around the world for being best in the completion reduction of cost become basic stone (Rasamanie and Kanapathy (2011)) [19]. Defected products enhances the cost so preventive measures should be taken place carefully for reducing the defects and saving the cost by attaining the quality grades [20].

Alford and Beatty stated that, “Quality control relates with the scientific management of variables (materials, men, machines and manufacturing conditions) which are considered in a manufacturing process and can impact on the goodness of the end product [3]. Skrzypek, 2014, (p. 136) mentioned European perspective that it is the action of market requirements and seller decisions [21]. Quality control is defined as production of best quality products at lower cost. Quality control works on with when, what and how much to inspect [3]. Therefore, Quality is referred as the Perfection measurement [22]. Quality can improve at either strategic or operational levels. Strategic planning can be explained as choosing an appropriate technology which may produces the quality products but sometimes it also reduces the reliability of production procedures besides that It is center of attention or major study at the operational level (Plich et al., 2011) [2]. Flanagan and Tate, 1997 claimed that Quality is importance of money in client’s perspective. Quality management by Vincent and Joel (1995) defined as: co-relation of all consequences as well as operations of any corporation for achieving unbroken betterment of the quality in sense of products and services with main purpose of obtaining customer satisfaction [23]. In recent years, a growing number of businesses have implemented various sorts of quality programs in attempt to improve customer satisfaction while also lowering quality costs. Six Sigma is a statistically-based quality improvement program that aids in the improvement of business processes by decreasing waste and expenses associated with poor quality, as well as increasing process efficiency and effectiveness (Breyfogle, 1999). Spiegel et al. (2006) elaborated that the company must choose and execute certain quality management activities that are appropriate for their scenario in order to improve production quality. In the end, these approaches should result in better customer happiness and profitability (Antony and Banuel as, 2001) [24].

2.1. Relationship among time cost quality

Soeharto explained that the cost and time have a very close relationship in projector production tasks. The triangle was given the moniker Iron Triangle because the sides remain indestructible, despite the fact that they can shrink or lengthen. The mutual dependency between the three limitations is consumption of high time for lifting up the quality levels which leads the increase in cost. The strict scheduling of time will result in increase in price and decrease in quality. In this scenario, one parameter has a direct impact on the others [14]. In case of controlling and planning project, we consider three very important aspects one is time, second is cost and the third one is quality. Hughes and Williams (1991), stated these valuable guidelines to obtain the main goal so it is a triangle of main trio-parameters and neglecting one of them can be resulted in failure. Time cost and quality interdependence might helpful in recognition of customer needs [23]. It is good for producers and manufacturers that are pursuing the strategy that simultaneously work on product quality, and service quality related to product delivery. This is contingent on the essential elements of a producer's strategy (time and costs) [21]. Hamilton and Martha (2007) make postulations related with cost’s interactions with the market, sales, and demand of right quality and quantity of products [18]. Quality management work on the elimination of all kinds of wastages and idle time in terms men, machinery, and other resources and time study works on establishment of standard costs for resources [3] with making appropriate basic working times and managing the quality of products. control attempt is required for the completion of projects or products (construction or production) on time and this also helps us in managing cost and quality (NEDO 1983). Charles and Andrew, 1990 said, Enhanced cost of production or construction are caused due to delays duration of projects [23]. The use of objects (cost) is involved in many, the activities and practices involved in constructing/producing time and Material culture is rich in time, and vice versa [25]. To boost efficiency and lower costs, a manufacturing framework requires not only teamwork but also it works on manufacturing or production planning, organization, conservation, and standards for quality. Keller and Noori (1988) claimed that Quality investments were evaluated in constant as well as exponential lead time demand [26]. The success of a future product is determined by the combination of economics or cost, standards of quality, and time development Cooper

(1995) and Rosenthal (1992). It is suggested for reducing quality can be simple method for meeting the challenges of targeted cost Cooper and Slaginulder (1997) [27]. Cost or money is quoted as scarification for fulfillment of quality products (Üstün, 1994, p.31). Corporations have the objective of achieving high quality standards by reducing cost. Perfect establishment of standards reduce the production cost [22].

2.2. Relationship of trio-constraints with PC

Production is the process of converting raw materials into completed goods or services in order to meet customer needs. Production entails the use of procedures to turn inputs into a desired product (output) with the aim of achieving possible profits by brushing up qualities and additional cost in most efficient manner possible without sacrificing quality [1]. Production control belongs to the economic control of production, which describes impact on the production structure in forms of product verities, quality, time and space in order to achieve firm's objectives under demanded requirements (Izdebski et al., 2013). Production Planning and control (PPC) is a comprehensive approach to production system optimization that incorporates time, money flow, and material flow [2]. It is difficult aspects of production control to maintain the performance standards over time and under several conditions [28]. Eschenbach (1996) described production management/control as approach for monitoring planning, implementation and supervision of production settings. While Nesterak and Bobáková (2004), in Polish enterprises stated that manufacturing management has played a vital role in ensuring that the manufacturing process runs smoothly. Its responsibilities include generating production plans of impermanent and intermediate terms, building up the monetary accounts for well-defined production products of the organization and monitoring how the plans are carried out [2]. The leading responsibilities of production management are to minimize the cost and maintain the time of product by proper utilization of resources, reduce the setup cost, reduce delay time by providing smooth flow of materials at desired time and place and maintain the quality standards of product or service [5]. Kimemia & Gershwin are first founders of production control in manufacturing industries (stochastic capacity) for obtaining targeted results in lowest cost [29]. They explained Hedging point policy in (1983) that is the easiest way for production planning and fixing the schedules for different activities that are the best in sense of control approach or hierarchical control patterns can work on the working framework [30]. Cost and manpower is crucial factors of Production [17]. PPC can be improved while reducing Time and cost of any project by using Look head planning technique [31]. There are basically four main reasons in increasing the productivity of the firm: The first is high level of rationalization the components arrive in combined as decreased in supply of the component time (Appendix 3, November memo). Second: it reduces the down time this helps to save the labor time. The third: that the reduction in jobs and by eliminating indirect workers. The fourth is change and adjustment in seasonal factor. In a specific manner time can be saved for four reasons [32].

Production control, according to Nowosielski (2002), is linked to the economic steering of a manufacturing process. The victorious execution of a control system makes sure that the uninterrupted corporation's economic tasks are carried out in the most cost-effective manner possible, given the existing circumstances. Production control operations have a direct impact on the efficiency and cost of manufacturing by influencing the effective utilization of available resources. Only by possessing the requisite knowledge of phenomena and interactions in the production flow can efficient production control be attained [33]. Since at least the early 1800s, economists have been comparing output to inputs for Obtaining consistent estimations of the parameters of the production function will always be vital [34]. Koskela (2000) has been suggested that production can be thought of in three ways: transformation, flow, and value generation, and that each of these aspects should be addressed simultaneously in production management and the traditional quality perspective is the focus of value, i.e. compliance to specification [35].

The responsibilities of production-related control, according to rule of Niedbaa (2004), are a derivative of the basic objective of managing is to "strive to optimize benefits while trying, at the required time, to retain payment capacity [2]. The production planning and control has purpose of delivering those items that customer wants at the time, location, and quantity that he wants, while also allowing for variable delivery conditions. It is related to measurement or pulse of operations and production succession, among other things [Mo et al., 2009, p. 98] and procedure enhancement of production planning and control (PPC), like consistent allotment of a producer's quality maneuvering [21]. In addition, Control approach of production focuses mainly on: planning and supervision of production or PPC (raw material to finished items in the manufacturing procedures) for establishment of production (through minimizing its time), defining members rectitude/equity (allow to use one's static assets) related with its compression, with a focus on expenses (expenditures management of fixed manufacturing), required time horizon for the production procedures, as well as time measurement of storage (volume of production, number of refitting) according to Plich et al. (2011) [2]. PPC must seek two primary production logistics objectives: maximize delivery reliability and minimize logistic and production expenses. The central purpose of PPC is to develop the best production plan based on these targets with limited time for decision-making; production control must balance a variety of criteria. Shafaei & Brunn presented a total cost model for

evaluating scheduling solutions and hence maximize profit [36].

Production control adoption assist in customers' orders, including any conceivable or hidden changes made by customers, it might be completed within specified time frame. The duration employed on portraying the client's assortment and completion of it, required changes respondent time, planning build-up time horizon, or reduce amount of consignment or delivery, as well as the budgetary proportions: items price, are the key operating measures associated with those goals. Customers are more satisfied when actions are performed to minimize the numerical value of the metrics. The emphasis on a strategy that established through quality which transcribes the fixate on exceeding consumer expectations [21]. Production control aims to simplify the entire process by using the best and cheapest method possible in order to produce goods or services in accordance with needs of clients, like in required quality, quantity (cost), and time [5].

3. Methodology

This study is conducted through literature review (review of research papers, notes, websites and concerned books) in order to answer the research questions. It also defines every term individually, shows significant conclusions as well as suggests future area to be worked on.

4. Conclusion

By working time, cost and quality with production control techniques in the production areas number of benefits can be achieved as time study can save the idle time of resources and lead to save the money and maintain the quality. It broadly makes monitoring system easy by scheduling the operations/activities in a time horizon besides that cost control works as: it provides separate economic centers for complex organization, it enhances efficiency by providing better working environment and irrelevant expenditures are avoided. As well as it helps corporations for formation of accurate financial statement which assist them in checking of organizational monetary use[18].In addition, quality can be helpful in cost reduction, increase customer satisfaction, productivity evaluation and better competitiveness[37] as well as aim at maximum utilization of resources and increase the morale of employees[3].

benefits of production control can be concluded as: it attains maximum utilization of resources, produce quality products, minimize manufacturing cycle and achieve cost reduction and cost control prepare and maintain the production schedules achieve the goals at minimum cost ensure quality management[3].In short words of Henry Fayol, production control relates to certification of all those activities which occurs is in accordance with the developed rules as well as issued instructions of planning[38]. Hence, this study determines that time-cost-quality has great relation among one another as variations of one variable leads changing in others as well as has great impact on production control technique. As, production can effect through these variables so these has major value in study of production control. Therefore, Better working on time, cost and quality assist enhancement of production and also helpful in proper implementation of production control strategy in the organizations.

AS, this is the theoretical and brief study so the room for practical work is vacant for interested future researchers as well as it can be done in more detail in order to analyze additional and more accurate results.

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