STUDY OF THE EFFECT OF PRACTICE ON THE ELEMENTS OF A FACTORY OPERATION pdf

1: Allowances in Time Study: Definition, Reasons and Types

A study of the effect of practice on the elements of a factory operation. Iowa City: State University of Iowa, Iowa City: State University of Iowa, (University of Iowa Studies in Engineering, 22).

Human Resources and Capacity Planning Operations is the engine that drives a business. Play begins with an overview of the heart of that engine â€" managing the production process. Players review the contract specifications as well as the production process by walking through the Production Floor and Shipping area. Players then analyze the receiving department ftions of managing the supply chain and material inventories to ensure client needs can be met. In order to grow the business, players choose which new contracts to pursue and then optimize their receiving, production, and shipping departments accordingly. As the business grows, players manage both the human and facility resources in order to meet capacity challenges. Customer satisfaction is a key metric for success. In the final stages of the game, the company puts players in complete control over all areas of operations at the New Branch, with the challenge to build the most profitable company possible. How to Win Your goal is to make the most money possible. This will happen if you run your operation efficiently. Getting orders out to customers on time, with the correct quantity and quality will make your customers happy, which in turn raises your reputation. As your reputation increases, you will be able to successfully bid on contracts from a larger pool of customers, which will generate more revenue. If you run your operation poorly and your customers receive orders late or with errors in quality or amount, your sales force will lose bids to your competitors and you will make less money, or even run a deficit! Gameplay The game is turn-based. Each turn is one week. Each module is a specific length and has objectives that must be achieved before time runs out. Overview of Modules Module 1: The Production Process Operations is the engine that drives a business. This module focuses on the heart of that engine, managing the production process. Module 1 should take minutes to complete. Managing Suppliers This module unlocks the receiving department, putting players in charge of managing the supply chain and material inventories to meet client needs. Module 2 should take minutes to complete. Forecasting and Contracts In this module, players choose which contracts to pursue, and optimize their receiving, production, and shipping departments accordingly. Module 3 should take minutes to complete. Human Resources and Capacity Planning In this challenging scenario, players will manage both human and facility resources to meet capacity challenges. Module 4 should take minutes to complete. Module 5 should take 1 to 2 hours to complete. Maximize Net Worth In this capstone module, players again have complete control over all areas of their operations. The goal is to maximize the net worth of the firm over 50 turns. Module 6 should take 2 to 3 hours to complete. Must have OS X Must support OpenGL 1. Firefox version 31 or above OR Safari 7. There are two ways to register for Practice Operations and log in: If you are registering for the first time, the following screen will appear. If you have already registered, simply click the Login button. If you are registering for the first time, you will see the following screen; enter the code from the card included with your textbook, or the code that you purchased separately. The Production Process In this module, you will learn to manage the basic production process. This product flow appears in the Production Floor panel below , and you can also see the progression of products through the various machines. The managers in the game will help guide you through the process. In Practice Operations, the production floor uses a workcenter or job shop layout, where machines are grouped by type, with products traveling from one machine to the next as they are completed. Products start in Cutting and then move through Sewing, Press Transfer for some products , and finally arrive at Packaging. Additional workcenters will be added in later modules, and each station can be upgraded for a one-time cost to increase the speed and maximum amount that can be processed. McGraw-Hill Practice Operations Make-to-Order Processes By following the screen prompts, a production order that precisely matches the customer order is started on the production floor. For example, review the open contract from Stallion Apparel below , highlighting the importance of individual orders in a make-to-order system. In particular, the key elements are

the client, item ordered, order quantity, unit price, and due date. The side arrows let you quickly cycle through all products currently in production. The icons under Production Tasks let you see which machines are required for the specific product. You can view the material required per unit and see how much of that material you have in stock. You can view the current status, the amount being produced, what priority you have it set for, and finally the quantity of finished product you have in stock. Priority and Utilization One of your key decisions is the sequencing of jobs. By varying the priority of jobs, the quantity of each item produced during a given period can be varied widely. In this example, the priority of three jobs shirts, shorts, and pants is varied to show how this can impact total output. Prioritization of jobs is established in the Production Area. The Production Plan panel shows which machines are in use and how much of their total capacity is being utilized. Prioritizing jobs can save players from several utilization mishaps such as being on track to complete orders for your customers on time only to have several products all arrive at the packaging station at the same time NOTE: Probably not, but the higher that score, the more efficient you are managing your operations. See the equation below: Good writing and was dedicated to creating a good paper.

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2: Operations management - Wikipedia

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He used it to encompass the studies in which he had been engaged during and after World War II. A "human factor" is a physical or cognitive property of an individual or social behavior specific to humans that may influence the functioning of technological systems. The terms "human factors" and "ergonomics" are essentially synonymous. There are many specializations within these broad categories. Specialisations in the field of physical ergonomics may include visual ergonomics. Specialisations within the field of cognitive ergonomics may include usability, humanâ€"computer interaction , and user experience engineering. Some specialisations may cut across these domains: Environmental ergonomics is concerned with human interaction with the environment as characterized by climate, temperature, pressure, vibration, light. For instance, "user trial engineer" may refer to a human factors professional who specialises in user trials. According to the International Ergonomics Association , within the discipline of ergonomics there exist domains of specialization: Physical ergonomics[edit] Physical ergonomics: Physical ergonomics is concerned with human anatomy, and some of the anthropometric, physiological and bio mechanical characteristics as they relate to physical activity. Physical ergonomics is important in the medical field, particularly to those diagnosed with physiological ailments or disorders such as arthritis both chronic and temporary or carpal tunnel syndrome. Pressure that is insignificant or imperceptible to those unaffected by these disorders may be very painful, or render a device unusable, for those who are. Many ergonomically designed products are also used or recommended to treat or prevent such disorders, and to treat pressure-related chronic pain. Work-related musculoskeletal disorders WRMDs result in persistent pain, loss of functional capacity and work disability, but their initial diagnosis is difficult because they are mainly based on complaints of pain and other symptoms. These types of jobs are often those involving activities such as repetitive and forceful exertions; frequent, heavy, or overhead lifts; awkward work positions; or use of vibrating equipment. Cognitive ergonomics Cognitive ergonomics is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system. Organizational ergonomics[edit] Organizational ergonomics is concerned with the optimization of socio-technical systems, including their organizational structures, policies, and processes. History of the field[edit] In ancient societies[edit] The foundations of the science of ergonomics appear to have been laid within the context of the culture of Ancient Greece. A good deal of evidence indicates that Greek civilization in the 5th century BC used ergonomic principles in the design of their tools, jobs, and workplaces. In industrial societies[edit] In the 19th century, Frederick Winslow Taylor pioneered the " scientific management " method, which proposed a way to find the optimum method of carrying out a given task. Taylor found that he could, for example, triple the amount of coal that workers were shoveling by incrementally reducing the size and weight of coal shovels until the fastest shoveling rate was reached. They aimed to improve efficiency by eliminating unnecessary steps and actions. By applying this approach, the Gilbreths reduced the number of motions in bricklaying from 18 to 4. Bekhterev argued that "The ultimate ideal of the labour problem is not in it [Taylorism], but is in such organisation of the labour process that would yield a maximum of efficiency coupled with a minimum of health hazards, absence of fatigue and a guarantee of the sound health and all round personal development of the working people. Dull monotonous work was a temporary necessity until a corresponding machine can be developed. He also went on to suggest a new discipline of "ergology" to study work as an integral part of the re-organisation of work. The war saw the emergence of aeromedical research and the need for testing and measurement methods. Studies on driver behaviour started gaining momentum during this period, as Henry Ford started providing millions of Americans with automobiles. Another major

development during this period was the performance of aeromedical research. Many tests were conducted to determine which characteristic differentiated the successful pilots from the unsuccessful ones. During the early s, Edwin Link developed the first flight simulator. The trend continued and more sophisticated simulators and test equipment were developed. Another significant development was in the civilian sector, where the effects of illumination on worker productivity were examined. This led to the identification of the Hawthorne Effect , which suggested that motivational factors could significantly influence human performance. It was no longer possible to adopt the Tayloristic principle of matching individuals to preexisting jobs. Now the design of equipment had to take into account human limitations and take advantage of human capabilities. There was substantial research conducted to determine the human capabilities and limitations that had to be accomplished. A lot of this research took off where the aeromedical research between the wars had left off. An example of this is the study done by Fitts and Jones , who studied the most effective configuration of control knobs to be used in aircraft cockpits. Much of this research transcended into other equipment with the aim of making the controls and displays easier for the operators to use. The entry of the terms "human factors" and "ergonomics" into the modern lexicon date from this period. It was observed that fully functional aircraft flown by the best-trained pilots, still crashed. In Alphonse Chapanis , a lieutenant in the U. Army, showed that this so-called " pilot error " could be greatly reduced when more logical and differentiable controls replaced confusing designs in airplane cockpits. After the war, the Army Air Force published 19 volumes summarizing what had been established from research during the war. It was the climate for a breakthrough. Alphonse Chapanis , Paul Fitts , and Small. Also, many labs established during WWII started expanding. Most of the research following the war was military-sponsored. Large sums of money were granted to universities to conduct research. The scope of the research also broadened from small equipments to entire workstations and systems. Concurrently, a lot of opportunities started opening up in the civilian industry. The focus shifted from research to participation through advice to engineers in the design of equipment. After , the period saw a maturation of the discipline. The field has expanded with the development of the computer and computer applications. Tolerance of the harsh environment of space and its effects on the mind and body were widely studied [19] Information age[edit] The dawn of the Information Age has resulted in the related field of humanâ€”computer interaction HCI. Likewise, the growing demand for and competition among consumer goods and electronics has resulted in more companies and industries including human factors in their product design. Using advanced technologies in human kinetics , body-mapping, movement patterns and heat zones, companies are able to manufacture purpose-specific garments, including full body suits, jerseys, shorts, shoes, and even underwear. Present-day[edit] Ergonomic evaluation in virtual environment In physical ergonomics, digital tools and advanced software allow analysis of a workplace. The body structure, sex, age and demographic group of the mannequin is adjustable to correspond to the properties of the employee. The software provides several different evaluations such as reachability test, spaghetti diagram, or visibility analysis. Human factors organizations[edit] Formed in in the UK, the oldest professional body for human factors specialists and ergonomists is The Chartered Institute of Ergonomics and Human Factors , formally known as the Institute of Ergonomics and Human Factors and before that, The Ergonomics Society. According to it mission statement, ACE unites and advances the knowledge and skills of ergonomics and human factors practitioners to optimise human and organisational well-being. The mission of the IEA is to elaborate and advance ergonomics science and practice, and to improve the quality of life by expanding its scope of application and contribution to society. As of September , the International Ergonomics Association has 46 federated societies and 2 affiliated societies. From the outset the IOM employed an ergonomics staff to apply ergonomics principles to the design of mining machinery and environments. To this day, the IOM continues ergonomics activities, especially in the fields of musculoskeletal disorders ; heat stress and the ergonomics of personal protective equipment PPE. Like many in occupational ergonomics, the demands and requirements of an ageing UK workforce are a growing concern and interest to IOM ergonomists. The International Society of Automotive Engineers SAE is a professional organization for mobility engineering

professionals in the aerospace, automotive, and commercial vehicle industries. The Society is a standards development organization for the engineering of powered vehicles of all kinds, including cars, trucks, boats, aircraft, and others. The Society of Automotive Engineers has established a number of standards used in the automotive industry and elsewhere. It encourages the design of vehicles in accordance with established human factors principles. It is one of the most influential organizations with respect to ergonomics work in automotive design. This society regularly holds conferences which address topics spanning all aspects of human factors and ergonomics. Designers industrial, interaction, and graphic , anthropologists, technical communication scholars and computer scientists also contribute. Though some practitioners enter the field of human factors from other disciplines, both M. Methods[edit] Until recently, methods used to evaluate human factors and ergonomics ranged from simple questionnaires to more complex and expensive usability labs. Using methods derived from ethnography , this process focuses on observing the uses of technology in a practical environment. It is a qualitative and observational method that focuses on "real-world" experience and pressures, and the usage of technology or environments in the workplace. The process is best used early in the design process. This can be on a one-to-one interview basis, or in a group session. Can be used to gain a large quantity of deep qualitative data, [26] though due to the small sample size, can be subject to a higher degree of individual bias. Can be extremely costly. Also known as prototyping, the iterative design process seeks to involve users at several stages of design, to correct problems as they emerge. As prototypes emerge from the design process, these are subjected to other forms of analysis as outlined in this article, and the results are then taken and incorporated into the new design. Trends among users are analyzed, and products redesigned. This can become a costly process, and needs to be done as soon as possible in the design process before designs become too concrete. A supplementary technique used to examine a wide body of already existing data or literature to derive trends or form hypotheses to aid design decisions. As part of a literature survey, a meta-analysis can be performed to discern a collective trend from individual variables. Two subjects are asked to work concurrently on a series of tasks while vocalizing their analytical observations. This is observed by the researcher, and can be used to discover usability difficulties. This process is usually recorded. A commonly used technique outside of human factors as well, surveys and questionnaires have an advantage in that they can be administered to a large group of people for relatively low cost, enabling the researcher to gain a large amount of data. The validity of the data obtained is, however, always in question, as the questions must be written and interpreted correctly, and are, by definition, subjective. Those who actually respond are in effect self-selecting as well, widening the gap between the sample and the population further. A process with roots in activity theory , task analysis is a way of systematically describing human interaction with a system or process to understand how to match the demands of the system or process to human capabilities. The complexity of this process is generally proportional to the complexity of the task being analyzed, and so can vary in cost and time involvement.

STUDY OF THE EFFECT OF PRACTICE ON THE ELEMENTS OF A FACTORY OPERATION pdf

3: Human factors and ergonomics - Wikipedia

A study of the effect of practice on the elements of a factory operation. By Ralph Mosser Barnes, James S. Perkins and J. M. Juran. Abstract.

History[edit] The history of production and operation systems began around B. The next major historical application of operation systems occurred in B. It was during this time that the Egyptians started using planning , organization , and control in large projects such as the construction of the pyramids. In large cities, on the other hand, inasmuch as many people have demands to make upon each branch of industry, one trade alone, and very often even less than a whole trade, is enough to support a man: It follows, therefore, as a matter of course, that he who devotes himself to a very highly specialized line of work is bound to do it in the best possible manner. This hierarchical organization in which people were divided into classes based on social position and wealth became known as the feudal system. Although a large part of labor was employed in agriculture, artisans contributed to economic output and formed guilds. The guild system, operating mainly between and , consisted of two types: Although guilds were regulated as to the quality of work performed, the resulting system was rather rigid, shoemakers , for example, were prohibited from tanning hides. They provided service to the nobility for cooking, cleaning and entertainment. Court jesters were service providers. The medieval army could also be considered a service since they defended the nobility. The industrial revolution was facilitated by two elements: Division of labor has always been a feature from the beginning of civilization , the extent to which the division is carried out varied considerably depending on period and location. Compared to the Middle Ages, the Renaissance and the Age of Discovery were characterized by a greater specialization in labor, one of the characteristics of growing European cities and trade. It was in the late eighteenth century that Eli Whitney popularized the concept of interchangeability of parts when he manufactured 10, muskets. Up to this point in the history of manufacturing, each product e. Interchangeability of parts allowed the mass production of parts independent of the final products in which they would be used. In , Frederick Winslow Taylor introduced the stopwatch method for accurately measuring the time to perform each single task of a complicated job. He developed the scientific study of productivity and identifying how to coordinate different tasks to eliminate wasting of time and increase the quality of work. The next generation of scientific study occurred with the development of work sampling and predetermined motion time systems PMTS. Work sampling is used to measure the random variable associated with the time of each task. PMTS allows the use of standard predetermined tables of the smallest body movements e. PMTS has gained substantial importance due to the fact that it can predict work measurements without observing the actual work. The Gilbreths took advantage of taking motion pictures at known time intervals while operators were performing the given task. At the turn of the twentieth century, the services industries were already developed, but largely fragmented. In the U. Services were largely local in nature except for railroads and telegraph and owned by entrepreneurs and families. Ransom Olds was the first to manufacture cars using the assembly line system, but Henry Ford developed the first auto assembly system where a car chassis was moved through the assembly line by a conveyor belt while workers added components to it until the car was completed. During World War II, the growth of computing power led to further development of efficient manufacturing methods and the use of advanced mathematical and statistical tools. This was supported by the development of academic programs in industrial and systems engineering disciplines, as well as fields of operations research and management science as multi-disciplinary fields of problem solving. While systems engineering concentrated on the broad characteristics of the relationships between inputs and outputs of generic systems, operations researchers concentrated on solving specific and focused problems. The synergy of operations research and systems engineering allowed for the realization of solving large scale and complex problems in the modern era. Recently, the development of faster and smaller computers, intelligent systems , and the World Wide Web has opened new opportunities for operations, manufacturing, production, and service

systems. The textile industry is the prototypical example of the English industrial revolution. Industrial Revolution and Productivity improving technologies historical Before the First industrial revolution work was mainly done through two systems: In the domestic system merchants took materials to homes where artisans performed the necessary work, craft guilds on the other hand were associations of artisans which passed work from one shop to another, for example: The beginning of the industrial revolution is usually associated with 18th century English textile industry , with the invention of flying shuttle by John Kay in , the spinning jenny by James Hargreaves in , the water frame by Richard Arkwright in and the steam engine by James Watt in In at the Crystal Palace Exhibition the term American system of manufacturing was used to describe the new approach that was evolving in the United States of America which was based on two central features: The model T car was introduced in , however it was not until Ford implemented the assembly line concept, that his vision of making a popular car affordable by every middle-class American citizen would be realized. The first factory in which Henry Ford used the concept of the assembly line was Highland Park , he characterized the system as follows: That is the real principle of our production, and conveyors are only one of many means to an end" [9] This became one the central ideas that led to mass production , one of the main elements of the Second Industrial Revolution , along with emergence of the electrical industry and petroleum industry. The post-industrial economy was noted in by Daniel Bell. Since all sectors are highly interconnected, this did not reflect less importance for manufacturing, agriculture, and mining but just a shift in the type of economic activity. Operations management[edit] Although productivity benefited considerably from technological inventions and division of labor, the problem of systematic measurement of performances and the calculation of these by the use of formulas remained somewhat unexplored until Frederick Taylor, whose early work focused on developing what he called a "differential piece-rate system" [11] and a series of experiments, measurements and formulas dealing with cutting metals [12] and manual labor. One of the problems Taylor believed could be solved with this system, was the problem of soldiering: In Taylor published his "The Principles of Scientific Management", [14] in which he characterized scientific management also known as Taylorism as: The development of a true science ; The scientific selection of the worker ; The scientific education and development of the worker; Intimate friendly cooperation between the management and the workers. Taylor is also credited for developing stopwatch time study, this combined with Frank and Lillian Gilbreth motion study gave way to time and motion study which is centered on the concepts of standard method and standard time. Frank Gilbreth is also responsible for introducing the flow process chart in Also in Hugo Diemer published the first industrial engineering book: Factory Organization and Administration. In Ford Whitman Harris published his "How many parts to make at once" in which he presented the idea of the economic order quantity model. He described the problem as follows: Experience has shown one manager a way to determine the economical size of lots" [16] This paper inspired a large body of mathematical literature focusing on the problem of production planning and inventory control. In Walter Shewhart introduced the control chart through a technical memorandum while working at Bell Labs , central to his method was the distinction between common cause and special cause of variation. In the s methods-time measurement MTM was developed by H. MTM was the first of a series of predetermined motion time systems , predetermined in the sense that estimates of time are not determined in loco but are derived from an industry standard. This was explained by its originators in a book they published in called "Method-Time Measurement". Harris to the more elaborate techniques of the calculus of variations developed by Euler in or the multipliers employed by Lagrange in , and computers were slowly being developed, first as analog computers by Sir William Thomson and James Thomson moving to the eletromechanical computers of Konrad Zuse and During World War II however, the development of mathematical optimization went through a major boost with the development of the Colossus computer , the first electronic digital computer that was all programmable, and the possibility to computationally solve large linear programming problems, first by Kantorovich [20] in working for the Soviet government and latter on in with the simplex method of Dantzig. These methods are known today as belonging to the field of operations research. From this point on a curious development took place: Toyota

evolved a unique manufacturing system centered on two complementary notions: SPC and worker responsibility over quality Easy able -to-see quality: Plossl and Oliver W. One of the key insights of this management system was the distinction between dependent demand and independent demand. Independent demand is demand which originates outside of the production system, therefore not directly controllable, and dependent demand is demand for components of final products, therefore subject to being directly controllable by management through the bill of materials , via product design. Orlicky wrote "Materials Requirement Planning" in , [26] the first hard cover book on the subject. Enterprise resource planning ERP is the modern software architecture, which addresses, besides production operations, distribution , accounting , human resources and procurement. Dramatic changes were occurring in the service industries, as well. While modeled after manufacturing in the production of the food in the back-room, the service in the front-room was defined and oriented to the customer. This was based on the innovative idea of flying all packages into the single airport in Memphis Tenn by midnight each day, resorting the packages for delivery to destinations and then flying them back out the next morning for delivery to numerous locations. This concept of a fast package delivery system created a whole new industry, and eventually allowed fast delivery of online orders by Amazon and other retailers. This was accomplished by adhering to their system of delivering the goods and the service to the customers at the lowest possible cost. The operations system included careful selection of merchandise, low cost sourcing, ownership of transportation, cross-docking, efficient location of stores and friendly home-town service to the customer. There standards apply to both manufacturing and service organizations. There has been some controversy regarding the proper procedures to follow and the amount of paperwork involved, but much of that has improved in current ISO revisions. With the coming of the Internet, in Amazon devised a service system of on-line retailing and distribution. With this innovative system customers were able to search for products they might like to buy, enter the order for the product, pay online, and track delivery of the product to their location, all in two days. This required not only very large computer operations, but dispersed warehouses, and an efficient transportation system. Service to customers including a high merchandise assortment, return services of purchases, and fast delivery is at the forefront of this business. Recent trends in the field revolve around concepts such as: Business Process Re-engineering launched by Michael Hammer in [32]: BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. Lean systems is a systemic method for the elimination of waste " Muda " within a manufacturing or service process. Lean also takes into account waste created through overburden " Muri " and waste created through unevenness in work loads " Mura ". The term lean manufacturing was coined in the book The Machine that Changed the World. Six Sigma an approach to quality developed at Motorola between Six Sigma refers to control limits placed at six 6 standard deviations from the mean of a normal distribution , this became very famous after Jack Welch of General Electric launched a company-wide initiative in to adopt this set of methods to all manufacturing, service and administrative processes. Production systems[edit] In a job shop machines are grouped by technological similarities regarding transformation processes, therefore a single shop can work very different products in this picture four colors. Also notice that in this drawing each shop contains a single machine. Usually in the back there is a similar system for managing the set of tools required for different machining operations. A production system comprises both the technological elements machines and tools and organizational behavior division of labor and information flow. A first possible distinction in production systems technological classification is between continuous process production and discrete part production manufacturing. Another possible classification [36] is one based on Lead Time manufacturing lead time vs delivery lead time: According to this classification different kinds of systems will have different customer order decoupling points CODP , meaning that work in progress WIP cycle stock levels are practically nonexistent regarding operations located after the CODP except for WIP due to queues. See Order fulfillment The concept of production systems can be expanded to the service sector world keeping in mind that services have some fundamental differences in respect to material goods: Services can be classified according to a service process matrix:

STUDY OF THE EFFECT OF PRACTICE ON THE ELEMENTS OF A FACTORY OPERATION pdf

4: A study of the effect of practice on the elements of a factory operation - CORE

The term 'Hawthorne effect' was derived from the location where the phenomenon was first witnessed during a series of experiments designed to find ways to increase worker productivity.

Received Aug 27; Accepted Nov This is an open access article distributed under the terms of the Creative Commons Attribution License http: This article has been cited by other articles in PMC. Abstract In recent years, inventory management is continuous challenge for all organizations not only due to heavy cost associated with inventory holding, but also it has a great deal to do with the organizations production process. This study attempts to identify the key strategies for successful implementation of just-in-time JIT management philosophy on the cement industry of Pakistan. The results show that implementing the quality, product design, inventory management, supply chain and production plans embodied through the JIT philosophy which infect enhances cement industry competitiveness in Pakistan. JIT implementation is a vital manufacturing strategy that reaches capacity utilization and minimizes the rate of defect in continuous flow processes. The study emphasize the need for top management commitment in order to incorporate the necessary changes that need to take place in cement industry so that JIT implementation can take place in an effective manner. Just-in-time management, Production process, Structural equation model, Cement industry, Pakistan Introduction In the face of current economic crunch, companies are looking for the ways to cope with the situation by opting for cost reduction and quality products at the same time. Referring back to Japanese manufacturing success in s, companies find the TQM and just-in-time JIT inventory management systems are some of most popular ways to have lower cost and high quality products Daniel and Reitsperger Advantages of implementing JIT are enormous. Klein and Devens argued that it leads to efficiency and effectiveness. JIT increases communication inside the organization as well as outside the organization with other organizations such as vendors and distributors Inman and Mehra JIT implementation also leads to the reduction in the cost of purchase which has been the major expense for many industries Gargeya and Thompson Just in time tries to promote managerial involvement and organizational discipline Ptak ; Bolander et al. JIT also tends to combine the different organizational functional areas. It specially endavour to make connection between accounting and production Johansson ; Sandwell and Molyneux ; Green et al. Biggart and Gargeya found that JIT implementation helps to minimize the amount of work-in-process inventory, raw material and the finished goods. Thus all these advantages are contributing in lowering the costs of production and the product itself. However, implementation of JIT has posed many setbacks to the firms who are actually following this philosophy. For example, Japanese faced several problems while implementing this philosophy such as suppliers have been blamed for inconsistency in the delivery process due to traffic problems. Some experts also blamed that JIT philosophy switches the responsibility of this inefficiency from more powerful and large manufacturing companies to smaller, lesser powerful vendors. JIT is also vulnerable in the management of natural catastrophes such as earthquakes, floods, storms etc. Beyond these above mentioned barriers to the successful implementation of JIT approach, companies may also find problems due to gaps between the communication facilities available to manufactures and suppliers. Proper training of the employees as well as the top management involvement is the important factors for the successful implementation of JIT Minahan Presence of accurate data including the accurate and reliable forecast of demand is a key for JIT to operate smoothly Francis Given the potentials of the JIT, implementation of this philosophy will be of great help to Pakistani companies in this current economic downturn. Pakistan cement industry has exposed marvelous development since the time of independence. In the year , there were just 4 operational cement units in West Pakistan having round about half a million tons per annum of production capacity. Total demand through the same period was estimated at over a million tones. For the duration of these 3 decades, BY production went up from 3. And in to Government policy of Pakistan moved towards denationalization and had complete focus towards construction and housing. In s in order to meet demand, the government permitted to set up 7 more

units by the private sector housing units having total capacity of 2. On the other hand, there were huge price differentials between public and private sector manufacturing units in Pakistan as SCCP i-e the scientific committee on consumer products fixed cement prices much lower for the public sector companies. During to , in hand capacity of the cement plants was not able to meet the local demand mainly in the north of Pakistan resulting an imminent and enormous need of increasing the in hand capacity of the cement plants in order to satisfy the growing need. At the same time a few plants were also shut down due to different reasons resulting the dramatic increase in the prices in s. The shortage of local cement and high cost of import were a few main reasons behind this huge increase in the price at that time. In the world and the local economy, by the projections for accelerated growth in demands, 5 more plants were set up to satisfy cement requirements at local level. To overcome this problem, cement industry should rethink on the reduced deficits and focus on infrastructure building to meet the market demand and to maximize profit from its operations. Just-in-time JIT management philosophy focuses on the reduction of wastes and improves the efficiency of the manufacturing process. Same problem exists in the cement industry of Pakistan and the manufacturers are continuously looking the ways to reduce defects and efficient inventory management to increase the capacity utilization during the production processes. The most imminent barriers to the successful implementation of JIT in Pakistan are electricity crisis, terrorism, natural catastrophes, economic crises, technology gap between the power manufacturers and the weak suppliers to name a few. Keeping in view, the more specific objectives as follows: To investigate the imminent factors which somehow influences the cost associated with production process, reduce the inventory costs and smooth running of production process in cement industry of Pakistan. To identify those factors which eliminate and reduce the waste of resources; inappropriate processes and redundant waiting time in the production processes. The main building blocks of the study are divided in the following sections. After introduction which build up Section 1, Section two discusses the review of literature. Methodological and results are discussed in Section 3. Final section concludes the study. Literature review The manufacturers operating in the moeren era face a lot of challenges among them the factors of most pivotal focus are making operations faster, customer service improvement, and cost reduction. In order to compete globally, US companies are looking for new ways for improving their abilities. Wafa and Yasin pointed out that JIT is a continuous goal oriented process in order to remove waste and increase productivity. They also mentioned that JIT is used for the description of manufacturing system where different parts are produced that are essential to complete finished products or delivered where needed. Missing to which the firm may encounter some of the problems like losing market shares, high scrap, high levels of inventory, low quality in labor and products, longer lead times and the survival of many sources of waste in the process of production Salaheldin and Francis Studies proved that the successful implementation of JIT can help better to lessen many of the obstacles that are mentioned above Vuppalapati et al. Though, relevant literature review reveals that the philosophy of successful implementation of JIT is based mainly on the efforts regardingseveral modifications that are to be undertaken before this implementation process. One major change that should be undertaken before the JIT implementation is that it demands a major change in the attitudes of the people and work habits as well Gupta ; Norris and Swanson ; Yasin et al. Some literature has shown the positive impacts of JIT when applied on the strategic and operational aspects of an organization especially in the private sector. The phenomina explaining the importance of JIT and its efficacy for the modern organizations can easily be understoor from the concluding remarks of Pandya and Boyd i. JIT improves communication between and within an organization, and its vendor and customers Inman and Mehra It may also remove the waste in production process Tesfay Practitioners and researchers indentified that several modifications in the existing systems should be undertaken before the implementation of JIT. Secondly, for the engineering of JIT modifications the organization need to incorporate some important changes which may involve the need forcombining several operations for minimizing the distance traveled; changing work center layout; combining machines in cells; buying equipment with short setup Wafa and Yasin ; product design responsibility; reliability and quality; using experiment designs for improving quality inorder to succeed in the

cost reduction. The adaptation of the machanisim also encourages the manufacturing unit for looking for product standardization whereever feasible; to concentrate on continuous progress in product design Theng ; using TPM total productive maintenance as an integral part of a JIT system Bamber et al. Furthermore the implementation requires more sophisticated operations where the implemented operational machanisims are in anycase re-analyzed for the successful implementation for identifying the needed adjustments where simplifications, standardization and automation are required Yasin et al. Worth mentioning that the success of JIT also depends on design of the product in any business. Tan shows that JIT strategy influences product design and development strategies significantly. On the basis of above cited literature, this study posits that product design affect JIT implementation positively: It is very important, to mention about the difficulties during the implementation of JIT since the conception stage of the implementation the top management should wholeheartedly be into it and in an agreement for this implementation recognizing it as the most important strategic consideration and intent to reduce the cost and increase the overall profitability of the firm. Monitoring the whole process is another important aspect as it is pivotally needed to observe how efficiently and smoothly the process is being implaced. Kazazi and Banerjee and Kim opened that cooperation among buyer and vendor is an imperative ingredient for effective and successful implementation of JIT. So employee commitment during the implementation process is needed most, which can be increased by educating the employees first about the overall process of JIT and their responsibilities i-e by making them aware about their contributions to JIT implementation process. On the other way around, Inman and Mehra survey findings do not show the significant relationship between JIT educational strategy and management commitment and successful implementation of JIT. JIT requires significant modifications during its implementation it is like designing a model organization which could transform itself completely by integrating strategy with people to achieve JIT objectives, i. TQM principle is implemented on each and every worker in an organization who should be involved throughout the process particularly related to the improvement of products and services in terms of quality but as mentioned earliar this process is mainly dependent upon the top management commitment. TQM Total quality management has widened the production process to the whole company and suppliers not only manufacturing. In Japan, quality controls is an amelgimation of some diverse activities ranging from research and development, top management support, purchasing, finance, marketing, and all the aspects of facility operations. In the final stages of implementation after the completion of the necessary training, formation of team and thegoal setting the implementation of the JIT or TQM system is good to go. Total quality management in the US has the similar aspacts but they are implemented differently than implementation in Japanese firms. Reducing defects or increasing the quality of products is an important aspect of JIT initiative. Thus we advance the following hypothesis: Spencer and Guide conducted a survey and asked several questions regarding the inventory management aspects of JIT from the respondents divided into two groups. Results showed that both the groups were not agreed with the idea that JIT is largely a matter of inventory reduction but agreed on that its goal is the removal of non value added activities. This study also suggests that Quality is one of the important components of JIT implementation. This study identified some of the important elements that are essential for the successful implementation of JIT mechanisms like proper physical resource management that include reduction of setup and preventive maintenance, human resource and quality management. The understanding of the importance of inventory management by all the levels of organization is essential for the core philosophy of JIT. Salaheldin study also supports the above argument that for the successful implementation of JIT philosophy, effective modifications are necessary for inventory management as well as for purchasing methods. For this purpose the openness of communication between management and employees is the pivotal necessity. The implementation of JIT can assert marvelous impacts on different factors like production lead time, cost of labor, inventory level and manufacturing space requirement, only when it is implemented correctly. Its effectiveness mostly depends on the technique used while implementation Groebner and Merz JIT management theory is a wide concept of business and is related to inventories directly. But it is not the whole story yet. Just in time process is the removal of waste including

dead inventory, but also including scrap, indirect labor, rework, activities that are not value adding for the firm, machines that are non-productive and the quality of materials as well. The impact on labor and cost controls are also evidently seen. Inventory reduction is only the reduction of cost of in hand inventory to a satisfactory levels, with a least amount of safety level for definite unexpected cycles or demands. There are lot of different methods used for inventories forecasting like product order quantity, quantity of economic order, and discount models of quantity that may trim down the amount of cost that is included in the inventories themselves contributing towards the savings of capital. We can draw another hypothesis on the basis of above discussion i. The proposal of implementing Just in time JIT practices upstream with the supply chain is possibly as old as the concept of JIT itself. Regarding the impact of JIT supply practices, many authors have the same opinion that implementation of JIT at the manufacturer supplier interface may contribute to the production planning processes, which significantly streamline procurement processs and this efficiency results in cost saving and smoothening the material flow Jones et al.

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Emphasis in CIM has been on automation, advanced machining capabilities, new organizational structures for facilities and personnel, and information acquisition, storage, transfer, and use. This paper examines CIM from the perspective of the integration of functions associated with management of manufacturing capacity. The premise of the paper is that manufacturing operations should be driven by capacity considerations, not material availability. The manufacturing enterprise must have proven techniques for managing capacity: Total capacity management is a vital foundation to a corporation seeking to achieve a competitive edge and superior productivity. One of the main goals of the CIM architecture is to provide for capacity management. This paper advocates simulation as the primary means for achieving total capacity management. It proposes the use of a common modeling language and common data to support simulation analyses across the many tasks related to TCM. In the physical sciences, models are usually developed based on theoretical laws and principles. Foundations of World-Class Practice. The National Academies Press. The usefulness of models has been demonstrated in describing, designing, and analyzing systems. Model building is a complex process and in most fields involves both inductive and deductive reasoning. The modeling of a system is made easier if 1 physical laws are available to describe the system; 2 a pictorial or graphical representation can be made of the system; and 3 the uncertainty in system inputs, components, and outputs is quantifiable. Because of the complexity of manufacturing systems, a model builder must decide on the elements of the system to include in the model. To make such decisions, a purpose for model building must be established. Typically, a purpose for modeling is related to a stated manufacturing problem or project goal, which helps set the boundaries of the manufacturing system and the level of manufacturing detail necessary to solve the stated problem. The modeling of a manufacturing system is sometimes difficult for one or more of the following reasons: The last decade has seen a tremendous increase in the modeling and simulation of manufacturing systems. This can be attributed to recognition of the need to improve manufacturing operations, and recognition that the impact of decisions need to be assessed before the decisions are implemented. The availability of simulation languages to build and analyze manufacturing models has stimulated this growth. Another contributing factor is the availability of knowledgeable industrial engineers who have a simulation language background Pritsker, a. As Simon points out: When we model systems, we are usually not always interested in their dynamic behavior. Typically, we place our model at some initial point in phase space and watch it mark out a path through the future. Such models are built without having to fit the manufacturing system into a preconceived model structure because the analysis is performed by playing out the logic and relationships included in the model. For this reason, simulation models can be built at either an aggregate or a detailed level. Of fundamental importance is the building of simulation models iteratively, allowing them to be embellished through simple and direct additions. Page Share Cite Suggested Citation: AN OVERVIEW Simulation has been used to support many different manufacturing activities, including product design, process design, facility design, operational scheduling, and schedule management Pritsker, Fundamentally, models developed for simulation analysis relate to the setting of capacity requirements for the manufacturing facility and the determination of how to use the capacity to process orders through the facility. Simulation is further used to manage these activities over time to achieve continuous improvements in manufacturing capabilities. Figure 1 presents a schematic of the manufacturing production-scheduling-operations environment. Capacity management using simulation involves six functions, indicated by the six shaded blocks of Figure 1: Design assessment; Capacity requirements planning and analysis; Scheduling; Schedule management; Schedule execution and dispatching; and Status presentations and statistics. For this paper, no assumption is necessary regarding the need to perform these two functions or whether simulation is used directly or indirectly to accomplish the functions.

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Design assessment involves the use of a model of manufacturing operations to estimate the performance of the manufacturing system for different levels of demand in conjunction with designed or actual process plans and resource allocations. The process plans are part of the model and specify the job steps, including resource requirements, to make the product. A separate model is sometimes developed to characterize the orders that make up future demand. Before detailed scheduling can be done, a finite capacity analysis determines the level of resources required to meet current demand. When capacity levels are set, detailed scheduling can be accomplished by using the model to simulate allocation of available resources at specified start times to the actual jobs included in the shop orders. Since the model contains the detailed process plans or job steps, the start and completion times of each operation can be established, and hence the order can be scheduled. These schedules can then be distributed for schedule management, which entails the use of current operational status and critical issues to adjust the schedule. Maintaining shop floor discipline when adjustments are made is important. The outputs of schedule management are dispatch lists detailing the scheduled time to perform each job and prescribing the required resources. In addition, methods for improving the scheduling process through the collection of data and the parameterizing of rules to improve the scheduling Page Share Cite Suggested Citation: For example, the application of artificial intelligence tools in conjunction with simulation models can lead to better scheduling practices. The dispatch lists are the basis for schedule execution and dispatching, that is, the actual resource allocations to jobs. Data on operational status are fed back to scheduling and schedule management to determine the frequency with which new schedules need to be prepared. The display of this status information provides a basis for ongoing decision making. Through this feedback link, continuous improvements in manufacturing operations can be made and information gathered for future design assessments and new scheduling algorithms. The feasibility of TCM relies heavily on the ability to build on existing data and models. The use of a common simulation language to obtain a common basis for modeling across the functional problems of TCM makes the evolutionary problem solving described above plausible. Models contain information about manufacturing processes, and by using such models continually, the processes will be better understood. Understanding leads to improved manufacturing and information for improv ing design. Thus, TCM is a mechanism to achieve, using simulation, a new form of Kaizen Imai, by which the processes of manufacturing and decision making can be continually evaluated, changed, and improved. The need for such a mechanism is described in detail in Dynamic Manufacturing Hayes et al. Innovation also is enhanced, because a model developed in one functional area can be used to indicate the possibility of new constructs for another functional area. Thus, improvement cycles in a single functional area may be used to foster new models and concepts in other functional areas. The common model, common data foundation presented for TCM, when fully implemented, provides a basis for achieving world-class manufacturing. TCM functions are performed repetitively to achieve continuous manufacturing improvements. Thus, the sequence in which they are performed or discussed is of minor concern. Design Assessment Simulation has had its most extensive use in the assessment of manufacturing designs where comparisons of different facility organizations group technology cells, transfer lines, job shops, etc. There is no need in this paper to present a catalog of simulation applications for design problems. Because simulation has been used at many levels across a wide spectrum of systems designs, many types of Page Share Cite Suggested Citation: To illustrate this variety of model uses, the primary simulation outputs associated with different levels of model use are given in Table 1. Of course, any simulation output could be employed at any level. Capacity Requirements Planning and Analysis Capacity requirements planning entails evaluating the ability of current resource levels to meet current orders and projected demand. The current shop floor status and inventory levels are considered and process plans are used to calculate the load at work centers. In the planning stage, the load at each work center is evaluated with regard to the actual capacity of the work center. Corrective actions are made as required by rescheduling orders, hiring and layoff reassignments, overtime, outsourcing, alternate routing, tooling changes, and so on.

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6: Practice Operations Simulation Analysis Part 1

in the supply chain management practices (Li et al.,), leading to information sharing, which is one of the five pillars in achieving a solid supply chain relationship (Lalonde,). Two sub-factors are considered in the model re lationship with suppliers and customers.

Allowances in Time Study: Definition, Reasons and Types Article shared by: Definition, Reasons and Types! Allowances in time study can be defined as the extra time figures which are to be added to the basic time of an operation to account for personnel desires, delays, fatigue of operators, any special situation and the policies of the firm or organization. Standard time of a job is obtained by adding various allowances to the basic or normal time of the job. For example the delay may occur due to operators personnel needs such as drinking water, taking tea, going to toilet etc. The fundamental purpose of allowances is to add enough time to the basic time of the production in order to enable the average worker to meet the standard while performing at a normal pace. The determination of allowances is probably the most controversial part of work study. Some of the reasons due to which this difficulty is experienced are: A thin, alert and active worker requires a smaller allowance to recover from fatigue than an inept, dull and obese worker. In the similar manner, every worker conducts his work according to the Learning Curve which is unique for everyone. Allowances calculated or determined for light or medium work are not acceptable for operation involving very hard work and which is done under very difficult conditions. For example, the work involving more eye movement, more physical work by hands or by legs or more mental work needs greater allowances than that of light easy and work involving very less physical work or movements. Some factors inherent to the job such as gloves or masks to be worn while working, constant danger or risk regarding the surface finish or quality of the work etc. Thus, the determination of allowances becomes more difficult and controversial. While determining the relaxation allowance, certain factors like heat, humidity, vibration, dust, light intensity, noise level etc. These are called the environmental factors and these factors are of seasonal nature. These factors are more significant for workers conducting the work under open air or where the environmental factors affect the work such as work in a construction company or in shipyards. Relaxation allowance is the most essential part of the time added to the basic time. Other allowances like contingency allowances, policy allowances or other special allowances are applied under certain conditions only. Relaxation allowances are added so as to allow the worker or operator to recover from fatigue. Fatigue can be defined as mental or physical weariness, existing in a person which adversely affects his efficiency in working. Now, this fatigue can be licensed to come extent by some rest breaks, during which the body part, gets relaxed and recovers from exertion. It can also be lessened by lowering down the rate of working. Relaxation allowances are added element by element to their basic times so as to obtain the work value of each element separately. After that, the element standard times are added so as to obtain the standard time for the job or operations. Allowances for climatic conditions are applied to the working shift rather than to element or the jobs. Relaxation allowances itself can be sub-divided into two categories: Fixed allowances consist of the allowances given for personnel needs or desire. These personnel needs includes going for watching getting a drink etc. It is also agreed that women need more personnel time than man. Fixed allowance also includes the allowances for the basic fatigue. This allowances is given to take account of the energy expanded during work and to remove the monotony. In calculating the relaxation allowance, variable allowances are added to the fixed allowances which are made, depending upon the circumstances of the job. Variable addition is given be improved. Following factors are to be taken into account:

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