

# Material Management

**Marwan Mattar**

Technology Management, School of Engineering  
University of Bridgeport  
Connecticut, United States of America  
Supply Chain Management  
King Faisal Specialist Hospital and Research Center  
Jeddah, Saudi Arabia  
mattar.marwan@gmail.com

**Abstract**—Materials management true has existed for a long time as far as systems for purchasing and preparing material to meet requests for completed items. No particular view regarding what materials management truly is and the materials management idea has been given numerous definitions. The philosophical contentions for embracing material management as an organizational approach are impressive. They grasp thinking which imagines an organization all in all as opposed to as a progression of components. They advance the possibility of successful joint effort between the different components of a method towards the accomplishment of generally concurred destinations. They show the issues brought on by endeavoring to upgrade at the "component" level instead of in regard of the venture all in all. Furthermore, they suggest that numerous issues happen between divisions (components) as opposed to in them.

**Keywords**—Materials Quality; Suppliers; Inventory System; Warehousing; Integration; Supply Chain.

## I. INTRODUCTION

There is developing literature on material management theory material management is another place where the WBSEB Engineers' Association has been requesting a careful upgrading of the framework, however again with no achievement. The Association had engaged the present Chief Minister to reconstitute the Board however to the shock of all, the new set-up that appeared in February 1979 was a long way from tasteful. The administration of the Board and in addition the administration, which depends altogether on one individual in power matters, are hesitant to break the organization together with DCPL. Therefore, exactly 700 architects in WBSEB keep on being denied the chance to demonstrate their ability, while DCPL, BHEL and ABV have efficiently disabled the Board, erne as specialists and laborers of the Board are charged for the collapse [1]. The idea of incorporating each one of those elements of mechanical administration which influence the stream, protection, quality and cost of materials under 'materials management', is extremely recent source. Some of these capacities are materials arranging and programming, acquiring, stock control, accepting and

warehousing, transportation, transfer of scrap and excess. The fundamental motivation behind bringing these capacities under a materials supervisor is to give coordination and control. Since material costs frame the greater part of the aggregate cost of a fabricated item, productive utilization of materials management strategies decreases expenses and in this way increment benefits [2].

With materials management which starts with the idea that there ought to be produced a coordinated office grasping the accompanying capacities: acquiring; stock control and material control; movement control; storekeeping; documenting transportation assets, and getting and examining the approaching material. These capacities as a unit empower the prerequisite of senior supervision which is replied by the arrangement of a "Materials Manager" reporting specifically to top administration. From here on the accentuation is given to basic administrative leadership, utilizing complex judgment bolstered by present or potential methods of operation and control. An early and brief presentation of the material cycle gives a decent foundation to the starting understudy and a valuable study for the more experienced [3]. Recently introduced coordinated MRP and cost-bookkeeping frameworks did exclude approaches to computing formulas an ideal cost given plant raw material and limit imperatives. A lopsidedness of free market activity facilitates entangled this issue in raw materials management. The cross-practical group is accountable for overseeing raw materials invested expanding measures of energy choosing what formulas to use at every plant.

There is a lack of research pertaining of the full materials management software has advanced around the idea of a dynamic shadow cost for all assets. Each asset has an ascribed value, and exchange offs are assessed on the premise of an underlying direct condition. This idea is operationally straightforward, reasonable and vigorous, but then uses full examination to create ideal shadow costs. It likewise has the preferred standpoint that it can be physically redesigned on the "floor" with changing working conditions. The achievement of the framework has been in its viability in changing the working arrangements of the organization and its utilization as a control as opposed to data software [4]. Recharging of stock is a creation procedure for a generation site and is an acquirement method for a material

management stocking site. Requests are thought to be ordinarily circulated. Once more, this suspicion has been observed to be fitting for the Vancouver HP division that we worked with, whose items are of a high volume nature. We accept that for each SKU at each site in a production network either an actual administration level (fill rate) or an actual base stock level has been indicated. The reason for the model is to decide the necessary base stock level to bolster the real administration level or the subsequent management execution given the base stock level. In both cases, we need to figure the reaction times for the request put on an SKU at the site. As we will see later, this response time is imperative as it affects material supply times of downstream locales [5].

The customers would not buy a thing on the remote possibility that they don't consider the thing as somewhat of value. Viewpoint of the beneficial position that a customer takes from a thing or organization need be similar or more unmistakable, than the esteem that the consumer paid to get the thing and the organization. As with most high-technology activities that use valuable commodities, the nuclear community places great emphasis on security and prevention of theft or loss of special nuclear materials management (SNM) that are an inherent part of all nuclear power and nuclear weapons work. The primary instrument for protecting SNM is safeguards, whose function is to monitor the use of SNM and to assess, in a quantifiable manner, the truth of the statement no SNM is missing. That particular sorts of SNM are utilized as a part of the fabricate of atomic weapons implies that protections thought on included significance. Quite a bit of shield is worried about bookkeeping strategies given estimations of mass amounts of SNM. On account of physical constraints, such estimations can never be correct (i.e., they contain blunders). Likewise, coming about assessments of material close by at given times or areas can be associated, for they may rely on upon the same hidden estimations. Subsequently, numerous shields issues are intrinsically factual in nature [6].

## II. OPPORTUNITIES OF MATERIAL MANAGEMENT

A first part of material management in the (Figure 1) it is going to be the user of the buyer as she or he is one to be an advantage with the idea. The material management intended to do for material manager. Initially, if materials management is to continue a suitable fact of convergence for holding the focused edge, experts around there must cooperate effectively with architects, generation organizers, merchants, quality certification faculty, controllers, administration data frameworks, and computers [7]. Material management has been the essential objective of the corporation and also the material department so understanding that is brought over the possibility of material management is basic. Second segment of the figure will be the limit that will be required to play out the thought. It is only the need of the consumer or the part required on the business's part to done. The multidisciplinary oversight and waiver audit council

was made and accused of giving gadget waiver oversight and direction for hierarchical issues encompassing BBP assurance and usage of center safe practices. The board was co-led by specialists in quality change and contamination avoidance, with representation from doctor's facility organization, word related wellbeing, perioperative administrations, surgical divisions, anesthesiology, procedural regions, radiology units, materials management, natural wellbeing and security, and the clinical research center [8].



Figure (1): The Opportunities of Material Management and its relation to four independent variables.

There is expanding worry with supply administration and the mix of obtaining, acquisition, and materials management inside the more extensive idea of logistics. In spite of the fact that the quantity of schools offering courses in materials administration or synonymous titles is moderately little [9]. The issue of deciding the financial requesting strategy for the purchaser of a thing or the supplier of a thing has been managed widely in the OR writing. Be that as it may, very little distributed material is accessible managing the connection between the purchaser and the supplier of an item [10]. Italian Society for Quality Assurance in Health Care was established. A multidisciplinary exploratory society, it expected the undertaking of considering, instructing, and advancing techniques in quality certification. The general public's central command are in Udine, where its leader, Professor Perraro, is additionally leader of the crisis branch of the general doctor's facility [11].

The differences of information required is obvious in the course books. In spite of the fact that a center of standard subjects has been created, the accentuation put on every point fluctuates extensively as indicated by the creator's predispositions; the same can be said in regards to the scope of fringe themes. Second, scholastic examination in buying and materials administration is in its early stages. The greater part of the examination referenced or strategies utilized have

been done as a part of fringe regions [7]. One zone with mind boggling potential for price speculation assets is the cementing of incoming and outcome shipments. Structure that can oblige pickups and transports in the meantime could convey critical business segment advantage for the association [12].

Recently, there is expanding worry with supply chain and the reconciliation of buying, acquisition, and materials management inside the more extensive idea of logistics. Despite the fact that the quantity of schools offering courses in materials administration or synonymous titles is moderately little, it appears that a noteworthy segment (1/3) are offered through a promoting office. This may encourage material administration's reconciliation into the logistics idea [9]. There were a few impalpable advantages from the new framework. Data turned out to be promptly accessible at a solitary area. There was more prominent objectivity in basic leadership. The measure of "firefighting" was significantly decreased similar to the reliance on a couple of people. The whole decision making process in materials management enhanced significantly in light of more exact, solid, and opportune data [13]. The board of trustees was co-chaired by specialists in quality change and contamination prevention, with representation from hospital facility organization, word related wellbeing, perioperative administrations, surgical divisions, materials management, and security, and the clinical research facility. Both grown-up and pediatric clinical zones were spoken to, and official authority gave backing to and effectively took an interest in the activity [8].

#### A. Supplier

Explore request part with one supplier to such an extent that the initial segment of the request is conveyed quickly yet the second part of the request is discharged later (booked discharge). Through broad computational results, demonstrate that as a rule where double sourcing or the utilization of a less expensive supplier would be [14]. The expense of one of the accomplices in the supplier-purchaser relationship may surpass the base aggregate expense of the accomplice when his stock approach is resolved in seclusion. It was proposed that the supplier and the purchaser could go to a commonly tasteful understanding for sharing the advantages of the incorporated arrangement [10]. At the point when the maker need not share the expense in precisely one of the remuneration plans, he may at present offer the other pay plan to a supplier sort contingent upon the relative costs included, the most extreme pay cost satisfactory by all supplier sorts, and his ex-stake convictions about the quality level of the supplier [15]. As for the consolidated impacts of correspondence and control, the outcomes demonstrate that capacity control upgrades the beneficial outcomes of both supplier information and supplier full of feeling duty on ceaseless supplier execution change, while process control undermines the impact of supplier learning on the result [16].

#### B. Production Planners

Considering the unpredictable way of human basic leadership, it appears to be impossible that preparatory examination of this write will uncover all the applicable para-meters which impact the organizer's choice procedure [17]. Real production systems, some crude materials are normal to numerous items. For instance, in an electrical machines organization, numerous segments are regular to a few items, or in a pharmaceutical organization, numerous fixings might be normal to different tablets [18]. A further decrease in arrangement time is vital for such calculations to be of down to earth esteem. This is on account of such issues require that an answer be given inside hours as production planners ought to have the capacity to assess and re-improve iteratively [19]. The differences in proficiency parameters and capital-work proportions influence relative benefit in inverse headings. This circumstance of the Brazilian firm stands in solid complexity. Its area of capability was created in a low-wage, little market, however in all likelihood in other product offering [20].

#### C. Quality Assurance

Economic and social prices of the failure of software systems can be substantial. It is these costs that provide the justification for expenditure on software quality assurance activities. It should be noted that the total costs of software failure are not always borne by the developer of the software [21]. The paper describes the advancement of the task over the 2 or more years of the agreement and the ensuing arrangement for its proceeded with improvement. Specific reference is made to the learning material for measurements and its application in modern quality assurance [22]. Alternate areas additionally started pilot concentrates on for the execution of shared acknowledgment, especially in Latin America and Asia. Bolstered by the choice of the 2007 meeting of the Ministers of Education, ARCU-SUR's accreditation plans under RIACES, have turned into an establishment for creating common acknowledgment in Latin American nations [23]. Beginning methodologies are regularly unstructured and wasteful, intended to satisfy the necessities of different administrative organizations as opposed to enhancing the conveyance of consideration. What's more, quality affirmation is exorbitant, and monetary confinements on prescription are expanding [24].

#### D. Management Information System

Innovative recent years have achieved propels m late years have realized numerous progressions that managers will be required to comprehend and use in their position of administration obligation [25]. In the meantime, the environment of data delivery will be controlled by agreeable registering, with the end clients picking up in a huge measure direct access to data. The part of MIS as a critical segment in the advancing learning society is stressed [26]. While MIS theory and research has developed quickly, little

research and for all intents and purposes no hypothesis has been distributed on open administration data frameworks (PMIS). The reasons for this paper are to give an incorporating hypothetical structure to PMIS which concentrates on the contrasts amongst open and private part situations and to utilize the system to create prescriptive recommendations for PMIS [27]. In many zones of horticulture there are no finished MIS's operational as of now. Top directors much of the time have gotten to be frustrated with MIS's produced to date. They are coming back to their unique strategy more persuaded than any time in recent memory that it is still the best method [28]. In some cases, helpful and prudent results can be acknowledged from this sort of concentrate, yet they are by and large in the zone of expanded effectiveness of information streams or decrease in administrative staff not in the enhanced nature of choices made. By the method for the difference, the choice arranged methodology starts with the ID of the association's directors and the choices they should make. Utilizing this approach, the fashioner begins by looking at the activity options accessible to the director and the criteria for browsing among them [29].

### III. DISCUSS RESEARCH

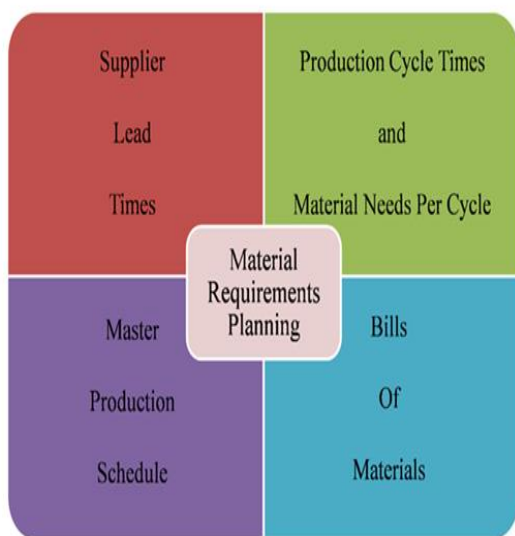


Figure (2): MRP in Context with Production Management Processes

Subordinate order items are sections of completed goods, for instance, component part, subassemblies, and raw materials for which the quantity of inventory mandatory relies on upon the stage of the making of the previous product. For example, in a plant that produced bikes, secondary request stock things may incorporate aluminum, seats, bicycle chains and tires. (MRP) Material Requirements Planning is a PC-based inventory management system proposed to help group supervisors in arranging and pushing orders for things of ward request. The MRP software of inventory management developed in the 1940s and 1950s. They utilized mainframe server PCs to extract data from a bill of materials for a specific completed item into

purchasing plan for components and a production. After a short time, MRP was extended to incorporate data criticism circles so that generation faculty could change and redesign the commitments to the framework as required. The following and coming period of MRP, known as gathering resources arranging or MRP II, moreover joined bookkeeping, back, promoting, building, and HR points of view into the organizing system. A related thought that creates MRP is (ERP) Enterprise Resources Planning, which uses PC advancement to associate the diverse utilitarian territories over an ERP programming. Material Requirements Planning breaks down inventory requirements into planning phases with the aim that production can be finished promptly during stock levels and associated conveying costs are kept to a most minimal. Produced and used correctly, it can help creation administrators get prepared for farthest point needs and allow production time.

Regardless, MRP frameworks can be exorbitant to execute and tedious to actualize, which may put them out of range for some autonomous endeavors. Likewise, the data that leaves an MRP software is just in the same class as the data that fits into it. Companies must keep up current and real bills of materials, part numbers, and stock reports if they are to realize the potential benefits of MRP. As the author Hurst and McNamara [17] said the early phases of the study included broad discourses with the creation organizer on the planning procedure; definite examination of his card plans while they were being readied and thusly; and consistent testing by the study gathering to find the thinking behind particular choices [17]. According to Manns and Coleman [21] the motivators for a product engineer to embrace quality assurance exercises are expanding. The predetermined number of reasonably prepared staff might be an element confining the utilization of programming quality confirmation systems [21]. Bozeman and Bretschneider [27] mentioned that one impression of the tremendous increment in (MIS) management information systems is the quick development of exploration, hypothesis, and medicine [27]. As figure 2 demonstrates how utilizing data collected from inventory records file, bill of materials and master schedule. An MRP software defends the net necessities for module parts, subassemblies for each session on the planning range and raw materials. MRP taking care of first chooses net material management, then subtracts out the stock accessible and incorporates back in the wellbeing stock remembering the ultimate objective to prepare the net prerequisites.

The material prerequisites arranging handling incorporates three optional reports and three essential reports. The primary reports contain: arrange discharges, which approve requests to be made; managed to ask for arrangements, which plot the sum and timing of future material demands and changes to orchestrated solicitations, which may consolidate overhauls of the amount, time portion, and cancellations. The discretionary reports made by MRP

include: orchestrating reports, which can be used as a piece of foreseeing future stock necessities, uncommon case reports which call attention to executives' main problems like late demands or over the top scrap rates and execution control reports which are used to track issues like missed movement dates and stock outs with a particular real objective to survey structure performance.

#### IV. RESULT AND DISCUSSION

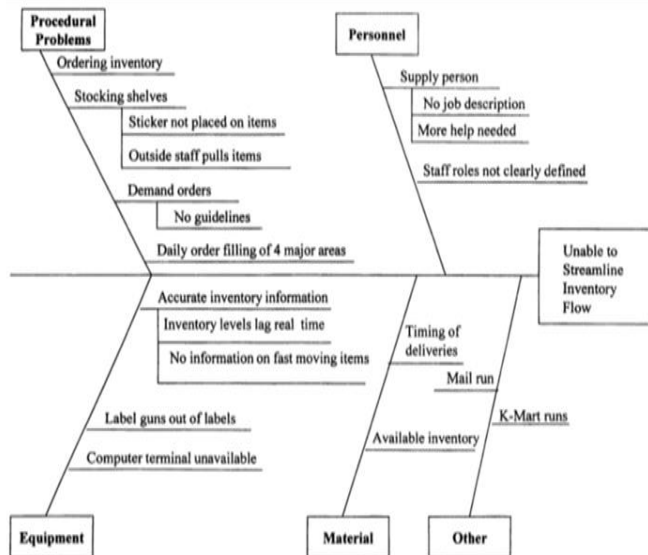


Figure 3: Several problems in the materials management [30].

At this stage, the figure 3 shows some several problems in material management department. We utilized a Pareto graph to track thing stream. The four offices required a couple of stuff in massive amounts routinely. The MMD supervisor and the professional following prerequisites for things in MMD more than 4 weeks to let us know when things were provided as often as possible in massive amounts. Over a similar period, we monitored the recurrence and level of interest for similar things on a check sheet, additionally called a count sheet. Next, we recommended that the expert utilizes a division thing sort (DPT) grid to track the stream of these as often as possible utilized things (that is, to lead a materials content stream investigation). In this lattice, every line spoke to an office, and every segment talked about a thing sort [30].

The operating cost including the annual demand rate, inventory holding costs, and the purchase ordering depend on upon the joint choice strategy contracted. This paper contributes by incorporating work tending to amount discounts on work focusing and inventory and ordering policies on the control device gave by quantity reductions in the channel coordination [31]. The section was laden with issues transports were not made to the plan, department staffs were not able to keep specific data on stock, and the role of worker was not clearly described. We made a few suggestions that helped the department in streamlining their service. This paper thinks about a

conveyance framework with one focal distribution center and N indistinguishable retailers. The stock is occasionally audited and transport times are deterministic. Companies execute re-order point strategies and request amounts measure up to whole number products of an altered clump estimate. Customer need is stochastic with a known discrete appropriation work that is permanent and autonomous crosswise over time and areas [32].

#### V. CONTRIBUTION AND NEW INSIGHT

The material management can be developed the supply chain and be an advantage in all around the world. Understanding the material management with some technology system will increase and change the way of customers cooperate with supply chain outcome. Supply Chain administration has drawn extraordinary consideration from practitioners and researchers in some years ago. The resultant complexity and globalization economy of the supply chain arrange in addition to the instability of the situation makes some opportunity and helplessness a noteworthy test to related sounds. This paper proposes to build up a theoretical ideal for moderating supply chain opportunity by presenting two factors named organizational risk propensity and supply chain integration [33]. Today world situation, organizations realize the strategic significance of all around oversaw supply chains. Apparently, organizations, for example, Wal-Mart, Li and Fung, Zara, and Dell have constructed their general business system round accomplishing supply chain prevalence over their rivals Anderson and Copacino.

These organizations have increased unmistakable points of interest by productively dealing with the unpredictable web of connections that reach out crosswise over mainland and crosswise over ventures during the time spent getting, collecting, and conveying merchandise in a worldwide setting [34]. The objective of this study is to build up a total comprehension of the dispersion of essential material management techniques. All advances investigated are concerned fundamentally with data trade inside and amongst associations as well as overseeing production related information and exercises. Notwithstanding reporting the degree of store network innovation dispersion and its joining at a useful level, the pilot review examined the effect of the innovation on inventory system execution. This exploratory study is the main broad examination of some these as of late created material management advancements. Its outcomes ought to give a structure to future studies of these significant innovation dispersion issues. This paper manages key making arrangements for management information systems. In particular, those variables of the key arrangement which sway on the achievement or disappointment of MIS are recognized, and recommendations are planned relating conditions of the variables to framework conditions [35].

## VI. CONCLUSION

Supply chain and efficient material management are significant for the accomplishment of any small scale fabricating and can be the integral component between an active design and a design loaded with deferrals and cases. Material management procedures and decision model are relied upon to progress any industry current practices, along these lines growing capability and minimizing costs. A feasible production network programming is key for directing capable material management to keep up a key separation from material insufficiencies, scatterings, setback, and thievery which may achieve increases in gathering sit out of rigging times, loss of productivity and deferral of activities. The little size of any industry should execute a profitable material management programming in light of the fact that in a vast segment of the cases they are requesting that pound their offers to keep the expenses of a meander under spending course of action. In such a case, disappointments to sensibly regulate materials could accomplish diminishment in preferred standpoint or even a fiasco. The major objective is to have the material required, in the whole required, with the quality required, and the time that they are needed. The greater part of the affiliations has a real organization programming that serves their necessities, paying little mind to the way that it could be gaining ground.

The consistency of the material organization programming could be a stage forward in updating the structure and taking out a touch of the bottlenecks. The study presented in this file went for sketching out an organized course of action of decision reinforce devices for material procurement for the little scale industry. An incorporated approach for a material obtainment gives better choices on what to request, the amount to arrange and where to convey. Future research will be expected to build up an entire structure coordinating different choices required in ranges, for example, provider determination and preparatory material planning amid the construction stage. A completely incorporated approach will better enhance correspondence and minimize crevices in data stream among every one of the gatherings and offices included. For business field and numerous corporations, material management offers numerous focal points. The idea of material management has enhanced with time. At, in any case, progressing was about material management. The companies spent no comments to necessities and demand of purchasers and continuing passing on what it can be well. Next step, efforts of the patrons focused more on contracts. The third step, accentuation was on true blue progressing. The design is entering for assembling in that it will help the support in knowing each one of the parts that influence a without question variable. The thing publicizing is an amazing gadget get together that partners not only in the change of a job or association in a matter, notwithstanding, the relationship of the thing all through the thing life-cycle. This has primary outcomes for the connection and

moreover the common populace in that it can be employed not practically as a part of the field of showcasing yet in different territories. The purpose of material management is if all else fails feasible cleaned by the striking affiliation like Amazon. It has actuated different things classified with the material creation and has gotten an incredible response for the idea. The companies later in the world will need being more consider about the materials.

## REFERENCES

- [1] Timir, B., Waste of Electricity Board Engineers. Economic and Political Weekly, 1979. 14(29): p. 1185-1186.
- [2] Jaiswal, N.K., Materials Management. Economic and Political Weekly, 1971. 6(48): p. M137-M137.
- [3] Wilson, J.W., Transportation Journal, 1962. 1(4): p. 39-40.
- [4] Jaikumar, R. and U.R. Rau, An On-Line Integrated Materials Management System. Interfaces, 1976. 7(1): p. 19-30.
- [5] Lee, H.L. and C. Billington, Material Management in Decentralized Supply Chains. Operations Research, 1993. 41(5): p. 835-847.
- [6] Goldman, A.S., R.R. Picard, and J.P. Shipley, Statistical Methods for Nuclear Materials Safeguards: An Overview. Technometrics, 1982. 24(4): p. 267-275.
- [7] Reid, D., Purchasing and Materials Management Textbooks. The Academy of Management Review, 1986. 11(4): p. 878-883.
- [8] Talbot, T.R., et al., Implementation of an Enhanced Safety-Engineered Sharp Device Oversight and Bloodborne Pathogen Protection Program at a Large Academic Medical Center. Infection Control and Hospital Epidemiology, 2014. 35(11): p. 1383-1390.
- [9] Ballou, R.H. and J.E. Piercy, A Survey of Current Status and Trends in Transportation and Logistics Education. Transportation Journal, 1974. 14(2): p. 27-36.
- [10] Goyal, S.K., Determination of a Supplier's Economic Ordering Policy. The Journal of the Operational Research Society, 1987. 38(9): p. 853-857.
- [11] Gardini, A., Development Of Quality Assurance In Italy. BMJ: British Medical Journal, 1992. 304(6828): p. 703-705.
- [12] Bookbinder, J.H. and C.I. Barkhouse, An Information System for Simultaneous Consolidation of Inbound and Outbound Shipments. Transportation Journal, 1993. 32(4): p. 5-20.
- [13] Lingaraj, B.P., R. Balasubramanian, and T.V. Krishnamurthy, An Inventory Management and Materials Information System for Aircraft Production. Interfaces, 1983. 13(5): p. 65-70.
- [14] Mishra, A.K. and P.R. Tadikamalla, Order Splitting in Single Sourcing with Scheduled-Release Orders. The Journal of the

- Operational Research Society, 2006. 57(2): p. 177-189.
- [15] Lim, W.S., Producer-Supplier Contracts with Incomplete Information. *Management Science*, 2001. 47(5): p. 709-715.
- [16] Joshi, A.W., Continuous Supplier Performance Improvement: Effects of Collaborative Communication and Control. *Journal of Marketing*, 2009. 73(1): p. 133-150.
- [17] Hurst, E.G. and A.B. McNamara, Heuristic Scheduling in a Woolen Mill. *Management Science*, 1967. 14(4): p. B182-B203.
- [18] Goyal, S.K., S.G. Deshmukh, and A.S. Babu, A Model for Integrated Procurement-Production Systems. *The Journal of the Operational Research Society*, 1990. 41(11): p. 1029-1035.
- [19] Torgnes, E., et al., Parallel Dantzig-Wolfe decomposition of petroleum production allocation problems. *The Journal of the Operational Research Society*, 2012. 63(7): p. 950-968.
- [20] Morley, S.A. and G.W. Smith, Limited Search and the Technology Choices of Multinational Firms in Brazil\*. *The Quarterly Journal of Economics*, 1977. 91(2): p. 263-287.
- [21] Manns, T.S. and M.J. Coleman, An Approach to Software Quality Assurance Training. *Journal of the Royal Statistical Society. Series D (The Statistician)*, 1987. 36(5): p. 493-498.
- [22] Searstone, K., The Open Tech Project in Quality Assurance. *Journal of the Royal Statistical Society. Series D (The Statistician)*, 1987. 36(5): p. 583-587.
- [23] Hou, A.Y.-C., Mutual recognition of quality assurance decisions on higher education institutions in three regions: a lesson for Asia. *Higher Education*, 2012. 64(6): p. 911-926.
- [24] Nettleman, M.D., Using Decision Analysis to Assess the Quality of Quality Assurance. *Infection Control and Hospital Epidemiology*, 1990. 11(5): p. 260-262.
- [25] Tolle, W.A., MANAGEMENT-INFORMATION SYSTEMS. *Journal (American Water Works Association)*, 1971. 63(11): p. 688-691.
- [26] Zwass, V., Management Information Systems; Beyond the Current Paradigm. *Journal of Management Information Systems*, 1984. 1(1): p. 3-10.
- [27] Bozeman, B. and S. Bretschneider, Public Management Information Systems: Theory and Prescription. *Public Administration Review*, 1986. 46: p. 475-487.
- [28] Hall, J.T., Management Information Systems: Discussion. *American Journal of Agricultural Economics*, 1971. 53(5): p. 880-880.
- [29] Mason, R.O. and A.E. Hofflander, Management Information Systems in Insurance. *The Journal of Risk and Insurance*, 1972. 39(1): p. 65-77.
- [30] Jayaraman, V., C. Burnett, and D. Frank, Separating Inventory Flows in the Materials Management Department of Hancock Medical Center. *Interfaces*, 2000. 30(4): p. 56-64.
- [31] Weng, Z.K., Channel Coordination and Quantity Discounts. *Management Science*, 1995. 41(9): p. 1509-1522.
- [32] Cachon, G., xe, and P. rard, Exact Evaluation of Batch-Ordering Inventory Policies in Two-Echelon Supply Chains with Periodic Review. *Operations Research*, 2001. 49(1): p. 79-98.
- [33] Yu, Y., W. Xiong, and Y. Cao, A Conceptual Model of Supply Chain Risk Mitigation: The Role of Supply Chain Integration and Organizational Risk Propensity. *Journal of Coastal Research*, 2015: p. 95-98.
- [34] Corsi, T.M., et al., The Real- Time Global Supply Chain Game: New Educational Tool for Developing Supply Chain Management Professionals. *Transportation Journal*, 2006. 45(3): p. 61-73.
- [35] Ein-Dor, P. and E. Segev, Strategic Planning for Management Information Systems. *Management Science*, 1978. 24(15): p. 1631-1641.