panies need to recognize their customers' requirements to predict their behavior before their rivals do. However, customer retaining only is not enough, because the dynamic nature of customers' behavior makes marketing planning inefficient and ineffective. Therefore, companies must continually monitor changes in customers' behavior to adapt their own marketing planning to customers' behavior. Common analyses of customers' behavior are focused on customer churn and segmentation. Another form of customer analysis, less noticed by many marketers, is the management of small changes in customers' behavior, while if it is not paid attention to, they lose a great deal of value over time, because many changes in customer's spending behavior are not primarily subject to products defects.Therefore, an important form of customer segmentation is customer migration that focuses on smaller changes in customer spending and considers customer value at different points in time to help companies not only stem the downward course, but also influence upward migration earlier. There are several migration patterns. Some move from economy class to business class, and to first class. Some move from buying one product to buying several different products. Some migrate by changing their lifestyle. Beyond such broad changes, companies can create superior value propositions by tailoring benefits to specific sub-segments to reduce not only the chance of their defects, but also to encourage customers to consolidate their spending, so that they can continue receiving benefb01ts. In this research, in order to understand the migration pattern, after introducing aspects of changes in customers' behavior, we propose new approaches for studying the changes using customer database and applying those to analyzing the customers of a subset of fixed-line telecom.

icy development", standardization", "support", "education and culture" are success factors at industry level. In addition, "increasing VFM for taxpayers", "efficiency of economy", and "percentage of privately financing" are success criteria; "policy development", "proper national laws", "accountability and commitment", "economic stability and business-friendly environment", "financial and capital market availability", and "good governance" are success factors at national level.

SUBMITTING A PATTERN FOR THE EVALUATION OF PERFORMANCE OF THERAPEUTIC CENTERS WITH JOB BY BSC AND COMBINING IT WITH THE FANP METHOD (CASE STUDY: IMAM SAJJAD HOSPITAL RAMSAR).

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Abstract

Therapeutic centers are health systems in each country, and many of the health concerns of sovereignty find crystallization centers and health reform; it would not be possible to improve the performance of these centers without addressing these centers. Balanced Scorecard is one of the most modern frameworks of performance measurement that considers both financial and non-financial dimensions of the evaluation model. In this study, Balanced Scorecard and fuzzy analytic network process are used to evaluate therapeutic centers, e.g., Imam Sajjad hospital in Ramsar. literature was provided in the form of library research and the collection of data related to the paired comparison and the determination the index of the field and through the design and distribution of questionnaires the analyses network determine the among the three groups of the experts. Integrating comments and achieving final criteria were used in the geometric mean. After the collection of questionnaires and relevant matrix, the relevant calculations were done. The questionnaires were designed personally and discussed by testing their validity and reliability. In order to confirm the validity of this research, the initial questionnaire study, based on the factors identified in previous research, university professors' and experts' perspectives, was provided; the validity of the content is approved. Questionnaire was used to determine the rate of adaptation. The results show that among the balanced scorecard perspectives, customer's perspective is superior to other approaches. Also, among the sub-criteria patients and relative satisfaction, operating benefit and market share are important in the functioning of Therapeutic centers. In this stage, on the basis of references presented by the FANP model, the solutions for increasing the quality of the performance levels of inefficient hospitals in fourth dimensions were determined, and some suggestions were proposed. Although all performance indices of the hospital need to be addressed, priorities must be determined by the respective managers.

CUSTOMER MIGRATION MANAGEMENT USING CUSTOMER DATA IN TELECOM INDUSTRY

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Abstract

Companies have different sources of value. In competitive markets, customers and their relationships with a company comprise an important part of organizational value. Therefore, customer retaining is a valuable strategy that guarantees a long-term profit and success in the company. To win in today's competitive markets, com-

their manufacturing levers and production systems. The factors of driving supply chain, relating to these manufacturing outputs, are too many to control, and managing them is essential for world-class manufacturing. That is why this study applied the Supply Chain Operations Reference (SCOR) metrics and Delphi method to categorize the effective factors on manufacturing outputs in procurement, production, and sale levels, known as internal supply chain. As these manufacturing outputs and their hierarchy were inter-connected, this study was conducted to distinguish critical factors, metrics, and levers influencing most prominently on them. To cope with this inter-relationship, group decision making techniques, Decision Making Trail and Evaluation Laboratory (DEMATEL), and hierarchical weighing approach, with MATLAB programming, were used by the view of 35 Iranian Industrial experts and mangers in the supply chain. The conclusion selects the driving variables which give and receive the most influences among manufacturing outputs of cost, quality, delivery, flexibility, and innovation in procurement, production, and sale units, which are adhered to internal supply chain. The results at the first level of hierarchy show that Iranian supply chain managers prefers cost and quality rather than flexibility and innovation, which prove that they are still in primary level of growth in life cycle. Then, the lowest-level priority clarifies the necessity of Iranian managers to receive training of information systems and communication technologies which can connect supplier and customer factories with manufacturing factories, such as on-line purchase and sale, to decrease bullwhip effect. Rather, this selection procedure can reduce the number of affective factors and be used as a pre-assumption for dynamic system modeling of supply chain for choosing their environment, which is usually confusing due to lots of interacting variables.

Key Words: Supply chain operations reference (SCOR); manufacturing outputs; decision making trail and evaluation laboratory (DEMATEL).

FRAMEWORK OF MULTI-LEVEL SUCCESS AT PUBLIC -PRIVATE PARTNERSHIP PROJECTS

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Abstract

Nowadays, using Public Private Partnership (PPP) has increased in many countries. Many infrastructure projects have been developed with PPP worldwide by utilizing BOT-type arrangements. Also, in Iran, many infrastructures have been developed in power electricity generation, water and wastewater, transportation, telecom, etc., by BOT-type contracts. Now, two questions about the success of these projects are raised: "Are these projects successful (what are the success criteria)?" and "How can we increase the probability of successful implementation of them (what are the success factors)?". The investigations of the recent studies have shown that they could not assess the success of PPP/BOT projects properly. In previous researches, the phenomenon of "investment context" to some extent has been ignored. Using an innovative approach, we believe that the success of phenomenon at PPP/BOT must be considered comprehensively by concentration on "investment context". Multi-level research paradigm has proper potentials to reach this concentration. Our objectives in this manuscript are to introduce the success framework of PPP/BOT at comprehensive format. Using qualitative content analysis as the research methodology in the previous PPP/BOT researches, we introduce the new framework of success criteria and factors for PPP/BOT projects at multi-level. This framework encompasses three levels of success criteria and factors at PPP/BOT project level, at industry level (i.e., power, water, transportation, telecom, hospital, education, etc.), and at national PPP/BOT program level. Therefore, "VFM/efficiency of project", "profitability", and "legal framework" are success criteria. In addition, "realignment of public mindset", "anti-collusion and corruption regulations", "proper risk management", "increasing of capabilities", "proper stakeholder management", "proper project selection", "proper financial engineering", "proper tendering system", "competition", and "proper partnership" are the success factors at project level. "VFM/efficiency of industry" and "increasing the quality of services" are success criteria; "pol-

erarchy Process (AHP), improved by rough sets theory and multi-objective mixed integer programming, is proposed to simultaneously determine the number of suppliers to employ and the order quantity allocated to these suppliers. A solution methodology is presented to solve the multi-objective model and the model is illustrated using a numerical example.

A MODEL AND CONSTRUCTIVE HEURISTIC APPROACH FOR MULTI-PRODUCT MULTI-PERIOD INVENTORY ROUTING PROBLEM WITH BACKLOGGING AND TIME WINDOW

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Abstract
Today, companies need to integrate all production processes from raw material to final consumers. Supply chain management suggests opportunities to achieve integration and management within the companies and between them. Since interests of the loops in the supply chain do not necessarily follow the same function, the Vendor-Managed Inventory (VMI) is an approach that seeks to make interaction and coordination between different loops in supply chain in the area of inventory and demand management. This paper considers a part of the supply chain that involves a transportation between supplier, customer, and inventory customer management simultaneously by VMI approach to deal with the solution of some kinds of inventory routing problems. The proposed mixed integer linear programming model, in terms of multiple product customer demands, aims to minimize the total costs of transportation, inventory

storage, lack of demand, and tardy demands. Due to the complexity of the problem which puts it among NP-Hard problems, a constructive heuristic algorithm was proposed to solve the model. Two scenarios, each of which consists of 20 samples, were designed to evaluate the performance of the proposed algorithm. Different scenarios were created to evaluate the flexibility of the objective function in dealing with different conditions. Two sets of problems (of small-medium and large-sizes) were presented to evaluate the proposed algorithm. In small- and medium-sized problems, the results of the proposed algorithm compared with those of linear programming model are solved by Cplex solver in GAMS software. To evaluate the performance of the proposed algorithm in producing high quality solutions at small and medium sizes, two methods were proposed. At first, results of the proposed algorithm are compared with the upper and lower bounds produced by Cplex solver. Second, three performance parameters were defined and the solutions were evaluated by them. To evaluate the proposed algorithm in large-sized scales, a benchmark Genetic Algorithm was used. Numerical results show the performance of the proposed algorithm.

SELECTING THE EFFECTIVE FACTORS ON THE HIERARCHY OF MANUFACTURING OUTPUTS FROM MODIFIED SCOR METRICS

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Abstract
Manufacturing strategies will let the factories be a market winner in some of the manufacturing outputs of cost, quality, delivery, flexibility, and innovation by adjusting

Abstract

Although batch scheduling has attracted many researchers, they mainly focus on flow shop scheduling problems. Yet, in real world industries, we rarely have a production system with only one processor at each working station. Machines are usually duplicated in parallel at each station to balance the production capacity of shop floor and to decrease the impact of bottleneck stations. This paper deals with a hybrid flow shop scheduling problem with batch processing machines (BPMs). The objective is to minimize makespan (i.e., maximum completion time of jobs). Batch processing machines can simultaneously process several jobs in a batch. The processing time of a batch is the longest processing time among all the jobs in that batch. Once a batch is formed by a set of jobs, it cannot be changed over stages. As the first study, in this paper, a mathematical model in form of a mixed integer linear programming model is proposed for the mentioned problem. Using CPLEX, the small-sized instances of the problem can be solved to optimality by the model. Yet, due to the NP-hardness of the problem under study, large instances cannot be optimally solved in a reasonable amount of time. Consequently, a novel population-based algorithm based on imperialist competitive metaheuristic algorithm is also proposed. This algorithm includes some advanced features of imperialist behavior mechanisms, imperialist competition operators, and revolutionary phases. The proposed algorithm is first finely tuned using Taguchi method. Then, to evaluate the proposed algorithm, its effectiveness is compared with a commercial solver (CPLEX) and two available metaheuristics algorithms in the literature, a simulated annealing algorithm, and a particle swarm optimization algorithm. In this regard, a set of large instances is generated and the tested algorithms are compared. The computational results indicate efficient performance of the proposed algorithm over the existing metaheuristics.

Key Words: Hybrid flow-shop scheduling; batch processing machines; mixed integer linear programming; imperialist competitive algorithm.

SUPPLIER SELECTION BY COMBINATION OF AHP METHOD

AND ROUGH SETS THEORY AND PRESENTING A MODEL FOR ORDER ALLOCATION TO SELECTED SUPPLIERS

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Abstract

Supplier selection is one of the most critical activities of purchasing management in a supply chain, because of the key role of supplier's performance on cost, quality, delivery, and service in achieving the objectives of a supply chain. Selecting the right suppliers significantly reduces the purchasing cost and improves corporate competitiveness, which is why many experts believe that the supplier selection is the most important activity of a purchasing department. Supplier selection is a multiple-criteria decision-making (MCDM) problem that is affected by several conflicting factors. Consequently, a purchasing manager must analyze the trade-off among several criteria. MCDM techniques support the decision makers (DMS) in evaluating a set of alternatives. In a real situation, for supplier selection problems, the weights of criteria are different and depend on purchasing strategies in a supply chain. Many multi-criteria decision making approaches have been proposed for supplier selection, such as Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Case-based Reasoning (CBR), Data Envelopment Analysis (DEA), fuzzy set theory, Genetic Algorithm (GA), mathematical programming, Simple Multi-Attribute Rating Technique (SMART), and their hybrids. Supplier selection is a multi-criteria decision making problem, which includes both qualitative and quantitative factors. In order to select the best suppliers, it is necessary to make a trade-off between these tangible and intangible factors, some of which may conflict. When business volume discounts exist, this problem becomes more complicated as, in these circumstances, buyer should decide about two problems: which suppliers are the best and how much should be purchased from each selected supplier. In this article, an integrated approach of Analytical Hi-

In addition, the bullwhip effect can be reduced using VMI. Although many researchers were committed to solve P-D problems in the supply chain environment, they did not pay attention to integrate P-D planning with VMI.

In this paper, a multi-objective non-linear mathematical model for production-distribution planning based on vendor-managed inventory (P-D-VMI) is presented for a three-level supply chain, including multiple external suppliers, a single manufacturer, and multiple retailers. The aim of this paper is to minimize the total cost of the manufacture, total cost of the retailers, and total flow times. The inventory of the retailers is managed by the manufacturer, and the common replenishment cycle policy is established between the manufacturer and all the retailers. Then, min-max method and an improved genetic algorithm are utilized to solve the proposed model, and several problems are designed to demonstrate their validation and efficiency. Results show that decreasing the retail price elasticity leads to an increase in demand and distribution time along with a reduction in the total cost of the manufacture and retailers, which is more tangible for the retailers. Finally, results confirm the applicability of the proposed model and solution methods.

PRICING AND ADVERTISING DECISIONS COORDINATION USING GAME THEORY

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Abstract
In the recent years, several researches have dealt with vertical cooperative advertising in a manufacturer-retailer supply chain which is named cooperative advertising. This type of collaboration can be defined as a financial agreement between the members of the chain, under which the producer suggests to the retailer to bear either a certain part or all of advertising costs of the retailer. The researches in cooperative advertising topic are divided into two main topics. The researches belonging to the first section are focused solely on advertising. But, the second group is those who not only have focused on advertising, but also have included other decision variables, such as pricing.

Producers can decrease the advertising cost of their retailers by paying off a fraction of those costs within the framework of a vertical cooperative advertising plan. Cooperative advertising is a coordinated effort by all members in a distribution channel to increase the overall profits under increasing customer demand. In each distribution channel, the upstream member can be a producer promoting its product via the national level advertising to enhance its brand equity. On the other hand, down-stream members, who can be retailers, can increase the demands under local advertising.

So, cooperation in advertisement is an economic way to achieve marketing goals through which manufacturers can reduce the retailers' advertising costs by paying a fraction of that. In this research, pricing and advertising decisions in a supply chain, including single manufacturer and single retailer, are simultaneously studied. Using game theory, four different strategies between members are considered. Firstly, three non-cooperative games with symmetric power in Nash and with asymmetric power in Stackelberg games, in which each member can be a leader and the other one is a follower, are investigated. Then, a cooperative game where each member intends to maximize his profit is studied. The concavity of each profit function is proved, and for each case, numerical example and sensitivity analysis are performed.

MODELING AND SCHEDULING HYBRID FLOWSHOP WITH BATCH PROCESSING MACHINES

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NETWORK TO IMPROVE PERSONNEL SELECTION PROCESS

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Abstract

Failure or success of an organization is directly related to the way in which human resource is recruited. Personnel selection is a complex system whose objective is to assess the differences among the candidates and to select the most appropriate person. Achieving this goal can be facilitated by predicting the future performance; however, cognitive limitations of the human mind make the behavior of unknown and/or very complex systems difficult to predict. Using current employee performance data to predict the future behavior of the applicants is an interesting area. Since personnel selection system is coupled with the ambiguity and uncertainty values, firstly, it is necessary to model the imprecise modes of reasoning to make rational decisions in an environment of uncertainty and imprecision. Secondly, optimal design of model parameters based on the existing data should be considered in order to minimize errors and to maximize adaptability of the model.

In this regard, the present study identifies effective input variables in predicting the output after designing the personnel selection system, whose output is job performance and its dimensions. The "Emotional Quotient (EQ)" and "individual variables" are also selected as input variables. Then, input and output data are collected from operational personnel work in Guilan Gas Company. Next, an approach that utilizes Genetic Algorithms (GAs) is applied for multi-objective design of group method data handling (GMDH)-type neural networks in order to model the job performance. In this algorithm, training error (TE) and prediction error (PE) are simultaneously minimized. However, the nature of human resource is filled up with uncertainty and inherent ambiguity, the correlation coefficient is 0.9956 and RMSEA is just 0.06 which indicate high accuracy of extracted model and the maximum adaptability to predict job performance with actual performance. It is worth mentioning that the extracted models of performance dimensions are effective for 84% to 96% of the data, and the performance variable is exactly the same as the real value. Therefore, the presented model is able to receive some information as inputs and to predict the future performance which has the minimum error. Accordingly, the most effective input variables in predicting performance are also optimally determined.

MULTI-OBJECTIVE PRODUCTION-DISTRIBUTION PLANNING BASED ON VENDOR MANAGED INVENTORY

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Abstract

Production-distribution (P-D) planning in supply chain leads to a coordination between production and distribution systems, and provides an integrated production and distribution plan in order to create a balance between the costs of production-distribution in supply chain and the level of customer satisfaction. P-D planning and optimization in the context of supply chain management have raised significant interest for both researchers and practitioners over the past few years. However, demand variances of the retailers may generate the potential challenges for P-D problems, such as increasing supply chain inventory levels and increasing the bullwhip effect. The vendor managed inventory (VMI) can improve supply chain performance by decreasing supply chain inventory levels. It is an important business mode in supply chains where the vendor is responsible to manage the inventory held at the retailer site.

and quantitative criteria in passenger port location as well as exorbitant establishment costs necessitate a reliable decision-making framework for the design of passenger port networks.

This paper presents a new approach for the design of passenger port networks based on Fuzzy TOPSIS method, set covering model, and utility covering model. Identification of major criteria in passenger port location, calculation of candidate points' utility, calculation of the number of ports needed to satisfy total demands, and selection of superior points are the main steps of the proposed approach. The proposed approach has been used for the design of passenger port network in Mazandaran province -an important coastal province in Iran- and the results are presented in this paper. In the first step of the proposed approach, 14 candidate points in the coastal cities of Mazandaran Province were rated by the use of TOPSIS model according to 18 criteria. Since the ports should cover the total demand, the set covering model was mixed with fuzzy TOPSIS model to find suitable locations that maximize utility function. Finally, each demand point was assigned to a selected port. Based on the results, Ramsar, Fereydunkenar, and Babolsar are selected as "Domestic Ports". In addition, Noushahr and Behshar sites are selected as "International Ports". The results of this research have been evaluated through conducting a sensitive analysis on coverage radius and the maximum available budget.

The proposed decision-making framework could be used in other Iranian coastal provinces to design maritime passenger networks.

A GENETIC ALGORITHM FOR RESOURCE RENTING PROBLEM WITH DISCOUNTED CASH FLOW

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Abstract
Project scheduling is an important task in project management. The resource-constrained project scheduling problem (RCPSP) consists of activities that must be scheduled and be subject to precedence and resource constraints such that the makespan is minimized. It has become a well-known standard problem in the context of project scheduling, which has attracted numerous researchers who developed both exact and heuristic scheduling procedures. Resource-constrained project scheduling is concerned with the allocation of time intervals to the processing of activities. The execution of activities requires the use of scarce resources. Resource investment problem (RIP) is known as the problem of minimizing renewable resource costs subject to a project due date.

A resource Renting problem (RRP) is a project-scheduling problem in which the availability levels of the rented resources are considered as decision variables, and the goal is to find a schedule and resource renting such that some objective functions are optimized. In this paper, we considered a resource renting problem with a discounted cash flow, in which the goal is to maximize the net present value of the project cash flows. We considered Interest Rate in this model, and this caused the model to be more real. In recent works, RRP was a NP-hard problem, and solving this problem with exact method took a long time. In addition, it was clear that the exact methods were not able to solve medium or large instances; thus, we developed a heuristic method to solve the problem. Most of the work in project scheduling used genetic algorithm for obtaining qualified solution in a reasonable time. Also, we developed a genetic algorithm for this problem such that it produced optimum and near optimum solution for this problem.

Results show that as interest rate increases, since the cost of resource usage should reduce, scheduling of work and start times shift later. It shows that adding interest rate to the model makes the problem more real and useful for real projects.

PREDICTING THE JOB PERFORMANCE BY USING MULTI-OBJECTIVE OPTIMIZATION AND GMDH-TYPE NEURAL

was solved by the developed PSO algorithm, and to receive a better answer from PSO, we ran the algorithm 50 times.

IMPROVING THE QUALITY OF BANKING SERVICES: PROVIDE AN INTEGRATED METHODOLOGY FOR THE KANO MODEL AND PERFORMANCE CONTROL MATRIX (PCM) (THE STUDY OF: SADERAT BANK)

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Abstract

Nowadays, increasing the proportion of markets is the most fundamental purpose of organizations in today's complex and dynamic global economy. This purpose is not possible without attracting and increasing customers' satisfaction; in other word, if organizations demand to earn more profit, they should pay attention to customer's satisfaction. Since the quality of banking services to clients in attracting and retaining customers is undeniable, the present study sought to examine the level of service quality offered in one of the subsidiaries of Iranian Saderat Bank and the solutions for improving the quality of service at this branch. The application of this study is based on survey method and questionnaire. In order to collect the data, we used questionnaires to measure quality of service by 29 criteria in 7 dimension. In this study, the clients of Iranian Saderat Bank branch were under experiment. Due to the limited number of the clients, we used Co-hron formula, shared questionnaires with 170 persons, and calculated the result based on 0.11 variance. Techniques used in analyzing the data of this research consist of analysis model to identify gaps between expectations and perceptions of the elements of service quality of the bank's customer. Also, we used Kano model in this study aimed to identify customers' needs, and then offered attractive solutions to improve them. Finally, we used Performance Control Matrix (PCM) Model to provide strategies for improving and providing the performance, and set priorities for action identified by the Kano model to improve them. The result of analyzing data shows that each of 29 components has gaps in the branch of study. Also, the result of Kano model analysis indicates that 9 components have taken attractive criteria into account. Finally, Performance Control Matrix model leads to the classification of 9 attributes and selection strategies for improving the quality of branch under study.

LOCATION AND ALLOCATION OF PASSENGER PORTS IN MAZANDARAN PROVINCE WITH COMBINATION OF SET COVERING METHOD AND THE FUZZY TOPSIS METHOD

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Abstract

Iran has a huge potential in maritime passenger transport while possessing 5780 km water coast, including islands, rivers, and water basins. Development of maritime passenger transport will certainly trigger tourism industry. Ports, as the most important infrastructures in maritime passenger transportation, play a pivotal role in development of this industry. A variety of qualitative

Abstracts of Papers in English

A TWO-ECHELON SINGLE-PERIOD INVENTORY CONTROL PROBLEM UNDER A BUDGET CONSTRAINT AND DISCOUNT CONDITIONS WITH PARTICLE SWARM ALGORITHM

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Abstract

In this research, we investigate the two-echelon single-period inventory problem, in which the raw materials and the final product should be provided at the beginning of the selling period. Raw materials that remain unused and the final products that remain unsold until the end of the period, can be sold at a discount at the end of the period. the use of coefficient in final products is different from each raw material, so the raw materials and the final product may not have a one-to-one relationship; we have a certain limited budget for buying the raw materials and producing the final products. Supplier will offer the discount for each raw material to reduce his inventory level, if we buy more than a certain quantity of that raw materials. Since the price of the final product at the end of the period is so Low, we set a cumulative discount policy to encourage customers for our final product. Consequently, one of the costumers buys more than a certain quantity, and the price of each final product for that costumer will be less than the normal price. If the final product is sold out during the period, depending on the demand, some of our customers will wait for transforming raw materials into the final product during the period. The objective of this problem is to find the order of quantities of both the raw materials and the final product, such that the expected profit can be maximized. A mathematical model was first developed for this problem, then a particle swarm optimization algorithm (PSO) was proposed to solve it. Finally, a numerical example was given to illustrate the application of the proposed methodology. This example