

with addressing the issue of HWM in particular, such that the use of social and qualitative variables (such as culture, education, family size, and impact of advertising budget and source waste separation on recycling level) and also economic variables such as inflation, per capita income, buying power and per capita consumption, increase our innovation in terms of systematic approach. Casual loop and flow diagram were drawn by Vensim software. In the last sections, we performed the model validation and verification using the establishment of extreme conditions, reality check, logical boundaries for variables and matching with historical data. Considering socio-economic factors, simulation time period, and current delays dealing with our issue, we are trying to analyze the best policies for HWM in Tehran in order

to achieve the best possible results in recycling cost, recycling ratio, and disposal ratio regarding budget limitation. One of the main problems in (WHM) is the pollution caused by the landfill and the shortage of land for burial. Two solutions are proposed to deal with this problem: the first is increasing of budget to make culture and also advertising and planning to promote the consumption culture; the second is focusing on the planning and implementation of source waste separation. The model indicates the second solution is better than the first.

**Key Words:** Household waste, solid waste management, household waste management, system dynamics, socio-economic factors.

## IMPLEMENTATION- CASE STUDY: SAIPA COMPANY

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### Abstract

Repeated failure in devices and equipments, Low access plants and quality decrease, results Operating costs growth and lower productivity.

Today, the competitive market in any industry needs to operate and produce cost reduction with high quality, world-class products. In such conditions, Maintenance requires additional changes and learning new techniques. The common goal of all these techniques is continuous Development. TPM is one of the capable techniques.

TPM is one approach in order to maximize the effectiveness of facilities and equipment with the aim of considering all aspects of operations, such as installation, maintenance and facilities that promotes employees' motivation and promotion.

TPM Insists on the operators importance in maintenance devices, Thus, through education and participation sense, provides environmental that will encourage such commitment and follows for continuous improvement through group activities. In the past, the TPM role in the lean production had not seen while based on most existing studies, TPM roles as a prime driving factor. TPM methodology has beneficial result of unexpected turns to lean manufacturing.

What important in a world class continuous improvement is Evaluation of Performance and OEE is One of the methods of performance evaluation in manufacturing industry. Overall Equipment Effectiveness consists of three factors of the availability, yield and quality. Thus, the total participation units of the organization in determining the overall equipment effectiveness are provided. This research study focuses on evaluate the TPM and six major waste in industry and its key role in supporting initiatives such as lean manufacturing and continuous quality improvement strategies and practical solutions to eliminate losses. Also feasibility of implementing a comprehensive TPM in the press shop of SAIPA has been discussed.

To collect the required data in this study, questionnaire audit of maintenance in seven subjects And human resources audit questionnaire in five subjects such as social and psychological, cultural and administrative, economic and physical factors has been used after the acquisition of industrial and academic experts and validity and reliability. Data analysis shows that there are not structural and human factors for TPM implementation in Saipa Press Shop.

**Key Words:** Total production maintenance (TPM), OEE, lean production.

## MODELING EFFECT OF SOCIO-ECONOMIC FACTORS ON HOUSEHOLD WASTE MANAGEMENT USING SYSTEM DYNAMICS APPROACH: THE CASE OF TEHRAN

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### Abstract

Urbanization, growing population, and economic development cause a growing trend in waste generation of the world including our country. On the other hand, other concerns like landfill limitation and pollutions of waste disposal, bring this matter to fore. In this paper, we are trying to represent a different approach in terms of systematic and managerial aspects of Solid Waste Management (SWM) using dynamic modeling for Household Waste Management (HWM), which contains an important part of current waste generation in Tehran. In terms of management, our new approach is concerned

## Abstract

In recent years, many economic and social institutions allocate their budget in a traditional manner or in some cases with the use of indicators. Although traditional methods may seem easier when the data are limited and the bargaining method is a solution however, in today's complex and changing environment, they are not efficient. Universities are among public institutions that need planning and budgeting at the university level to allocate their funds in different departments to achieve their objectives. In this study, we tried to provide a model at the university level to solve this problem. The model consists of three parts. In the first part, the coefficients of efficiency were calculated using Data Envelopment Analysis (DEA). The number of graduates and research outcomes based on the amount of faculty grants as the outputs, and the number of faculty members and staff as the inputs were taken into account. In the second part, the coefficients of effectiveness were calculated using a multi-objective mixed integer linear programming model to achieve multiple and conflicting goals of the university. The goals were ratios of faculty to students, postgraduate students, faculty members with the ranking of associate professor or higher, and research grants. Then, in the third section, the coefficient of each department's budget was calculated based on the current budget demand of department and efficiency and effectiveness coefficients. Finally, the performance of the proposed model was checked using data from Yazd University. The data for the 12 departments at the university were gathered on which basis the analysis was carried out. The results of the model and its sensitivity analysis showed that the proposed model was consistent with what is happening in the reality. The model can be applied for those organizations whose management aims at distributing the budget based on the efficiency and effectiveness of the departments.

**Key Words:** Performance based budgeting, mathematical programming, university, efficiency, effectiveness.

## COMBINATION OF CLASSIC LINEAR ASSIGNMENT METHOD AND MOLP FOR EVALUATION OF ALTERNATIVES RANKING

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## Abstract

Classic Linear Assignment method is a multi-criteria decision making method, which takes the weight of criteria into account, and each ranking is assigned to one, and only one alternative. In order to omit the need of calculating the weight of criteria, to use the priority of decision-making criteria, and to be able to assign each ranking to more than one alternative, a multi-objective linear programming method is suggested in this paper in which an objective function is defined for each criterion, to optimize alternatives based on that particular criterion. The objective function of each criterion consists of the total related performance point variables in the linear assignment model so that the best alternative, which is optimum in terms of all criteria, is chosen in the end. There are as many objective functions as criteria which all contribute to a Multi-Objective Linear Programming. Then, regarding the priority of the criteria, the multi-objective linear programming model is solved using Absolute Priorities Method. In the suggested method, measuring the weight of criteria is not required; however, the degree of the importance of each criterion is taken into account. Decision-makers exert their opinion on the final ranking by prioritizing the criteria. Constraints posed by the need to assign each ranking to only one alternative are removed in this model. Global Criterion method can be used to solve the resulting MOLP problem, too. In addition, when adding new criteria to the problem, as many new objective functions are added to, hence, there will be no need to recalculate the weight of criteria and do the calculations required in the linear assignment method. Calculating Spearman's Correlation Coefficient shows that the proposed model in comparison with Classic Linear Assignment method is more consistent with the most commonly used multi-criteria decision-making methods: TOPSIS, VIKOR, and MOORA.

**Key Words:** Linear assignment method, multiple objective linear programming, multiple attribute decision making, absolute priorities method.

## THE IMPORTANCE AND EFFECTIVENESS OF TOTAL PRODUCTIVE MAINTENANCE

choice 11 were used as tools for project evaluation, followed by the economic analysis required for justification.

**Key Words:** Computer integrated manufacturing (CIM), advanced manufacturing technology (AMT), justification, axiomatic design (AD).

## A NEW APPROACH TO DEVELOPMENT OF NSGAI AND NRGAI FOR SOLVING COMMUNITY DETECTION PROBLEM

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### Abstract

Detecting community structures is applicable in a wide range of scientific fields such as biological and social sciences. Community detection is one of the most renowned problems in the field of social networks mining. Thus, many methods have been introduced and developed in order to meet diverse needs of community detection. The aim of community detection is to partition the network in such a way that relations between components of network are dense. Since the relations between the members of partitions are strong, it is possible to consider them as a community or a cluster. In this paper, we have considered community detection as a multi-objective problem. The objective functions are modularity and community scores, which are two of the most well-known objectives in the literature. In order to optimize these objective functions, two algorithms, which are the enhanced versions of NSGAI and NRGAI, have been proposed. These methods use a greedy algorithm to obtain initial population. Moreover, new crossover

and mutation operators have been designed. The crossover operator is based on closeness of nodes. The mutation operator is based on TOPSIS method. The proposed crossover and mutation operators always generate feasible solutions. Furthermore, the closeness index helps to form distinct and high quality communities. We have compared the performance of the proposed methods with those of classical NSGAI, NRGAI, and a well-known method called MOGA-Net by conducting several numerical experiments in six real-world networks. The experiments split into two parts. In the first part, we have compared the solutions of these five algorithms regarding the values of objective functions. The second part is dedicated to the comparisons made based on various multi-objective metrics. We have considered spacing, generational distance, inverted generational distance, set coverage, normalized mutual information, computation time, and the number of non-dominated solutions obtained by each method. In order to ensure that the solutions obtained by the proposed algorithms are significantly better than the ones provided by the other three methods, we have conducted several two-sample t-tests. The results showed significant improvement, and the proposed algorithms outperformed the other three methods regarding various criteria.

**Key Words:** Community detection, complex networks, multi-objective optimization, TOPSIS.

## BUDGETING FOR THE DEPARTMENTS OF A UNIVERSITY USING DEA AND GOAL PROGRAMMING (CASE STUDY: YAZD UNIVERSITY)

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#### Abstract

Developing countries devote huge shares of their annual budget to Public Procurement contracts, which are awarded through standard processes to avoid discrimination and obtain the best price/quality. Thus, national contracts are meticulously scrutinized to make sure that the public budget is properly allotted to the best spending. Public sector management, as the main actor of Public Procurement contracts, is held accountable, for the decisions made in the contracts and to various groups of stakeholders. Actual or perceived corruption is increasing in the third-world countries. Iran is unfortunately low in the published transparency records.

Many stakeholders are involved in public procurement processes with different expectations and demands. Paying attention to their demands and creating accountability in contracts help curb the perceived or actual corruption. Literature is reviewed in public procurement and stakeholder accountability. Corporate social responsibility draws attention of public firms to their stakeholders and becomes increasingly more responsible and accountable, particularly in their contracts. Stakeholders are categorized into salient, urgent and import. The public, internal workers and managers, suppliers, and even competitors are stakeholders.

“Thematic analysis” and “in-depth interview”, as qualitative research methods, are used to extract the main topics and elements of corruption in public procurement. A case study is used to develop a base model and use coding for the main themes. Three main themes of corruption in Iran’s Public Procurement system are: weakness in organization communication which impedes the normal flow of organizational “Culture” and “Knowledge”; dysfunctional imbalance between leadership and managerial features of the public procurement contracts; deterioration of public procurement value chain in rentier economy. Solutions are offered to curb corruption.

**Key Words:** Corruption, procurement, stakeholders, accountability.

**ADVANCED MANUFACTURING  
TECHNOLOGY JUSTIFICATION FOR**

## AN OEM COMPANY WITHIN AXIOMATIC DESIGN FRAMEWORK

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#### Abstract

Today, in many industrial sectors, technology has made significant progress. Investing in advanced manufacturing technologies, especially in computer-integrated manufacturing systems, is essential in order to survive in a competitive environment, improve performance, respond to demand fluctuations, and increase customer satisfaction. With available technologies and systems in computer integrated manufacturing (CIM) and its related technologies, the application of CIM in manufacturing enterprises is a reality and can meet the need of complicated manufacturing environment. Implementation of these systems brings many tangible and intangible benefits. However, according to several factors that must be considered in the evaluation process, justification of these systems is complex and difficult. The traditional justification methods, such as net present value (NPV) and return on investment (ROI) for the evaluation of these systems, are not sufficient; the substantial benefits of advanced manufacturing technologies, such as quality and flexibility, go undetected with these methods. Yet, the justification of investment in these systems is one of the many challenges facing managers in the manufacturing industries today. In this paper, the existing approaches to assessment and justification of advanced manufacturing technologies are reviewed. Using axiomatic design theory as a tool for the systematic design, a comprehensive framework to justify the investment is provided. Taking into account the economic and strategic considerations, this framework encompasses the important aspects required for a complex decision-making and analysis. Also, it is shown that using a four- step procedure, intangible benefits can be made tangible. Finally, based on the proposed framework, a case study considered and the decision to implement advanced manufacturing technology has been evaluated. The paper lists intangible benefits that are important in ERP projects and demonstrates economic and strategic justification of this system. At the strategic level, analytic hierarchy process and The Expert

reliability and safety assessment, and updating safety systems failure probabilities. In addition, Bayesian networks due to their modeling and analytical abilities, are capable of accommodating the mentioned aspects easily and straightforwardly. In this paper, we extend the traditional definitions of importance measures to Bayesian networks resulting in more capable importance measures in terms of modeling and analysis. The importance measures that are extended to Bayesian networks in this research are the most important and widely used ones that some of them are used in famous methods named probabilistic safety assessment. The extended importance measures are: Risk achievement worth, Risk reduction worth, Fussell-Vesely importance measure, Birnbaum importance measure, and Differential importance measure. The results of implementing the new achievements on a real-world case study prove the desired effectiveness.

**Key Words:** Risk analysis, importance measures, fault tree, bayesian networks.

## INTRODUCING A COMPREHENSIVE IMPLEMENTATION MODEL OF TRAINING MANAGEMENT IN ORGANIZATIONS

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### Abstract

Along with the ever-growing trend of competition in business domain, the manufacturing industries and service provider organizations tend to focus mainly on their core activity. Education and its management is not the main expertise of manufacturing and service organizations; hence, outsourcing the training management to the training management expert companies could be a smart move, considerably attracting the world-class companies' attention. Accordingly, meanwhile, reducing the relevant costs, they have increased the quality and efficiency of training programs through outsourcing

their training management. In fact, the organizations' inability in provisioning specialized training services has added to the importance of outsourcing the companies' training management to the fourth party training organizations (4PT). The 4PT managers, therefore, to implement the training management concept needed to focus on the preparation of the components related to the values' dimensions proposed to the customers, which constitute the infrastructure model for the implementation of training management system. Due to the lack of pertinent theoretical framework, the present paper proposes a model for implementing the training management of the organizations by the 4PTs. The statistical society of the study includes the education field professors, training managers of the industries and the educational institutes' managers. An integrated approach-based methodology has been adopted for the research. In quantitative analysis section, the interview content analysis approach has been used through theme analysis method to identify the main approaches applicable in conceptual model dimensions compilation; in the quantitative analysis section, the final model has been analyzed using factor analysis and structural equations of modeling techniques. According to the obtained results of the study, presenting an effective training management by the 4PTs is mainly dependent on the needs assessment besides demand creation, and other variables, such as guiding individuals, towards passing a set of courses, creating the value added for the third party training organizations (3PTs), standardization of training services, complete assessment of the needs that directly or indirectly relates to the continuous training, perfect performing of the educational processes from the needs assessment to effectiveness evaluation and effective management of intensive and more applicable training fall to the lower degrees of importance.

**Key Words:** The proposed value, outsourcing training management, fourth party training organizations, structural equations modeling, theme analysis, analytic hierarchical process.

## CONCEPTS AND CHALLENGES OF CURBING CORRUPTION IN PUBLIC PROCUREMENT CONTRACTS FOCUSING ON STAKEHOLDER ACCOUNTABILITY

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## LOT SIZING IN A SUPPLY CHAIN SCHEDULING IN A TWO-ITEMS PRODUCTION SYSTEM WITH REWORK

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### Abstract

In classical models of inventory and production control, it is assumed that all kinds of production machineries in various stages produce items with no defect and the quality of output of production stages are equal. However in practice, due to several reasons like the error of machinery and operators of productions, the performance quality of the production processes fluctuates after a time and producing the low-quality and defective items is inevitable. On the other hand, producing defective items, which may be reworked or deposed, has a direct and significant effect on optimal lot sizing and related costs. Hence, in problems raised in practical supply chain systems including different levels like supplier, manufacturer and customer, the defective production of items has been considered increasingly in recent years. In these systems, generally it is assumed that the low-quality products are returned to the prior level in production process and they come back in manufacturing system again after passing a rework cycle. In this situation, modeling the problem and determining the optimal policies in inventory and production planning, such as optimal lot sizing, are of the great concern for production managers. In this paper, an extended version of economic production quantity problem (EPQ) in which a final product consisting of two parts is considered. In this problem, there is a dual echelon supply chain which includes the parts suppliers in first level and the final product producer in the second one. In both echelons, it is assumed that the production process is accomplished with a positive defective rate, which may be different for parts and final product. In this study, production rate and rework rate are limited, demand is continuous, and shortage is not allowed. We model the problem with average cost approach and determine the optimal lot. The model is validated while illustrating a numerical example. Finally, we analyze sensitivity of cost depending

on inventory and economic lot sizing according to the change in defective production, rework rate, and production rate.

**Key Words:** Economic production quantity, lot sizing, supply chain management, defective production, rework.

## SYSTEM-RISK SENSITIVITY ANALYSIS IN BAYESIAN NETWORKS

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### Abstract

Importance measures are well-known and important tools which are widely used in risk-informed decision making. Their outstanding traditional definitions have made them useful in many applications related to risk and reliability aspects of different systems. These perfect traditional definitions help researchers to find the most important components in a system, and consequently, to detect and obviate weaknesses in system structure and operations. Generally, these measures are based on fault tree technique. Although fault tree is a powerful tool to study risk, reliability, and structural characteristics of systems, Bayesian networks have indicated explicit advantages over it in modeling and analysis abilities. Classical fault tree is not suitable in analysis of large systems that include aspects such as: common cause failure, redundant failure, uncertainty, and some kind of complex dependencies such as sequentially dependent failures, while these aspects are not negligible in large modern systems anymore. So, the perfect definitions of importance measures are restricted to limitations of fault tree. Bayesian networks, on the other hand, have become a widely used method in different kinds of statistical problems, including fault diagnosis,

## Abstract

This paper studies the case of multiple retailers sourcing a product from a vendor. To reduce transportation and handling and shortage and ordering costs, the retailers have the option to assign to the vendor and other retailer. The vendor and retailers, chosen to distribute goods, deliver their batches jointly to the retailers. The paper shows that consolidating shipments may lead to a significant reduction in total cost. Based on continuous review (r,Q) policy, this paper deals with contracts for vendor-managed inventory (VMI) program in a system comprising a single vendor and multiple retailers. Vendor-managed inventory is a well-known industry practice for supply chain collaboration. Vendor-managed inventory is a continuous approach to determining the quantity and timing of order dispatch to the retailers by the -suppliers, which is performed performed with the exchange of information between retailers and suppliers. The purpose of this paper is to obtain the optimal order of quantity and determine the retailers that can be selected as intermediaries for transferring goods to other retailers in such a way that minimizes transportation and handling and shortage and ordering costs. This work develops a new coordinated one supplier and multi-retailer model for a single item in a vendor-managed inventory context. In particular, the contractual agreement between the vendor and buyer is explicitly included. The proposed model developed a VMI by adding a provision allowing for the movement of goods between retailers. This mechanism makes logistical coordination between supplier and retailer much easier. Considering 30 retailers the proposed model was solved using LINGO and showing that the inventory and transportation costs, considering the movement of goods between the retailers will be reduced significantly. Results show that it is possible for both vendors and retailers to obtain profits in VMI implementation by selecting satisfactory parameter combinations using our proposed coordination scheme in a win-win relationship. We also show that the proposed model reduced the inventory and transportation costs are great.

**Key Words:** Supply chain management, vendor managed inventory, goods transshipment, multiple retailers, logistics systems.

## A NEW OPTIMIZATION MODEL FOR TEAM FORMATION PROBLEM CONSIDERING EXPERTS' COLLABORATION NETWORK

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## Abstract

Humans have always sought to provide their needs and aspirations through group activities. Creating groups and teams in the past has been limited to geography and local constraints. The people whose place of residence was close together, formed the team. Gradually, along with the tendency of societies to specialization, the emergence of high-speed vehicles and communication via the Internet, overcoming the locational limitations for the team formation problem was proposed.

Choosing the best combination of experts for forming a team, has always been one of the most important issues in decision-making problems for performing research projects. In addition to being members of a team specialized in the required field, they must have a good cooperation with each other.

Researchers have developed several optimization models to minimize the number of people in the team to satisfy the required skills. However, these kinds of models do not cover the interaction problems between people. In recent years, some researchers have emphasized the importance of interactions between experts and taken into account the cost of the interaction in team formation problem, and they have solved the problem by using heuristic and meta-heuristic approaches without developing a mathematical model while the assessment quality of heuristic and meta-heuristic methods is determined based on comparison with results of the corresponding optimization model.

In this study, a mathematical optimization model is developed for the first time to find a subset of the available expertise that fulfills the required skills with the best interactions. Because of the availability of historical data of experts' cooperation, the model tries to find members as a team that have the best cooperation with each other. In order to assess the performance of the model, a real problem and an artificial problem are presented. Results indicate the abilities of the model for problem-solving.

**Key Words:** Team formation, experts' collaboration network, optimization model, operations research.



node's neighbor nodes, and the distance between the sink node's neighbor nodes and a node within the network called agent node. Then, it offers an appropriate objective function to design an intelligent agent-based energy-efficient routing protocol, called IARR protocol based on the radio range. The simulation results show that the proposed protocol is efficient from the energy consumption point of view, and it reduces the average delay and also does not reduce the packet's delivery ratio in the network.

**Key Words:** Wireless sensor networks, mobile sink node, energy efficient, agent-based routing, average delay.

## PRICING FREE AND BUNDLED PRODUCTS OF SMARTPHONE MANUFACTURERS AND TELECOM SERVICE OPERATORS IN COOPERATION AND NON-COOPERATION MODES: A GAME THEORETIC APPROACH

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### Abstract

Nowadays, with the increasing importance of communication, competition in the smart phone supply chain is greatly increased with the arrival of various companies. Companies at all levels of the smart phone supply chain compete and coordinate with each other for market share and profit. These companies should be able to make right decisions in the competitive marketplace and even collaborate with some other members of the chain to preserve their survival in the market. Telecom service operator and smart phone manufacturer are two key members of smart phone supply chain. The importance

of channel selection and pricing to the competitiveness of a supply chain has been recognized in practice and literature for some time. In this paper, we examine the impact of power structures on the decision of pricing and channel selection between a free channel and a bundled channel. This paper investigates the smart phone supply chain that consists of two smart phone manufacturers and two telecom service operators. Based on game theory models, the manufacturers' optimal retail pricing policies in free and bundled channels and the telecom service operators' optimal subsidy policies in a bundled channel are derived under different power structures. The results show that there exist unique optimal retail prices for free and bundled products of the smart phone manufacturer in the free channel and bundled channel with different power structures. There are also unique optimal subsidies for the telecom service operator in bundled channels with different power structures. Our findings also show that different power structures have significant impact on the profit of individual firms and the entire smart phone supply chain's profitability. Finally, a numerical example will be provided to illustrate the effectiveness of the proposed method, sensitivity analysis and the effect of price changes in telecom operator services. The results show that cooperation between a smart phone manufacturer and a telecom service operator has high impact on profit of each player.

**Key Words:** Pricing, telecom service operators, game theory, nash, stackelberg.

## VENDOR-MANAGED INVENTORY MODEL FOR SINGLE VENDOR AND MULTIPLE-RETAILERS WITH CONSIDERING THE MOVEMENT OF GOODS BETWEEN RETAILER'S WAREHOUSES

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# Abstracts of Papers in English

## AN ENERGY-EFFICIENT ROUTING PROTOCOL FOR MOBILE SINKS IN WIRELESS SENSOR NETWORKS BY USING THE RADIO RANGE

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### Abstract

Wireless sensor networks (WSN) consist of small-sized sensor nodes; due to ease of deployment, reliability, scalability, flexibility, and self-organization, the existing and

potential applications of the wireless sensor networks span a wide spectrum in various domains of the environmental and technical requirements such as vehicle tracking, danger alert and battlefield surveillance. In addition, owing to the growing demand for low cost and 'networkable' sensors in conjunction with recent developments of micro-electro mechanical system (MEMS) and radio frequency (RF) technology, new sensors come with advanced functionalities for processing and communication. One of the known features in the wireless sensor nodes is the limited battery supply. On the other hand, replacing the battery in wireless sensor networks is difficult and often is impossible. Therefore, it is essential to employ an energy-efficient routing protocol for minimizing energy consumption in these networks. In addition, one of the most challenging factors in the energy consumption of wireless sensor networks, is the mobility of the sink node. When the sink moves, its location is changed frequently. Obviously, frequent location updates can lead to excessive power consumption of sensors that exhausts existing energy in the network. In considerable quantity of research has addressed the possible mobility of the sink node. This paper considers the energy limitation, mobility of the sink node, geographical distance between the sink node and the sink