ment of this native model in the governing telecommunications backbone network of Iran has led to an improvement in the quality of services in this industry.

Key Words: Telecommunications backbone network of iran, security and risk criteria, governance criteria, economic criteria, European foundation for quality management excellence model.

AND STORAGE SPACE CONSTRAINTS

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Abstract

Considering increasing global competition, increasing productivity is a serious issue for different industries. Determining optimal production quantity and preparing suitable conditions for desirable quality play an important role in achieving high productivity. The quality of products is not always perfect for different reasons, which leads to increased costs and reduced productivity. Therefore, controlling quantity and quality of produced items are equally important. In this research an integrated economic production quantity and quality control, using control charts problem has been investigated. A model has been developed including allowable shortage, limited storage space and service level. The proposed cost function is a nonlinear function and for validation purposes, the meta- heuristic Tabu search algorithm is used.

Key Words: Economic production quantity, control chart design, imperfect production, shortage.

A REVIEW ON THE CRITERIA FOR THE ENHANCEMENT OF THE QUALITY MANAGEMENT AND EXCELLENCE OF THE COMMUNICATIONS AND INFORMATION TECHNOLOGY INDUSTRY BY THE CASE STUDY OF THE BACKBONE NETWORK OF IRAN TELECOMMUNICATIONS

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Abstract

To fulfill the macro-policies of the country in the sector of information and communications technology, the presence of an effective governing company as the telecommunications and communications backbone network is necessary to provide the requirements for upgrading the quality management of the products and services and to fulfill the strategic policies of that industry. The purpose of this research is to examine and identify the specific requirements, criteria and standards of the communications and information technology area for improving the service quality of the telecommunications backbone network of Iran. By adding the security & risk, governance and economic criteria to the latest edition of the European Foundation for Quality Management Excellence Model, the newly developed model was designed and localized as a model for the quality management and excellence of the telecommunications backbone network of Iran after validating and verifying the model. In this research, to achieve the highest level of the reliability and the internal consistency of each criterion, the related sub-criteria, using the factor analysis approach, were sorted and analyzed according to the survey of the experts in several stages. The criteria of this model consist of two categories including the Enablers and the Results. The criteria for the Enablers include the leadership, economic, people, strategy, processes & products and services, partnership & resources, security and risk criteria in addition, to the Results' criteria, including the customer results criteria, business results criteria, society results criteria and the people results criteria. The studies show that the establish-

two sub-dimensions of data access and security. Data quality should be considered in the context of the data used. This dimension includes the following dimensions of value added, relevance, timeliness, completeness and adequacy of data. The ability to display data about the presentation framework (succinct and stable presentation) and the meaning of data (interpretability and comprehensiveness). The results of the research show that accessibility, security and ease of perception are considered to be the most influential factors affecting the quality of research data. In this regard, the design of security layers in the research data registration system, the design of database fields to enhance user perceptions and the need to review the requirements for future development of this system are among the practical proposals for this study.

Key Words: Research information systems, data quality, fuzzy ANP, fuzzy DEMATEL, FDANP.

DEVELOPMENT OF A SYSTEM DYNAMICS MODEL TO EVALUATE TOTAL FACTOR PRODUCTIVITY IN IRAN

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Abstract

Total factor productivity refers to the effectiveness of output generated by the combined effects of different inputs. Compared to the traditional methods of calculating single-factor productivity, total factor productivity has a full attention to inputs and better reflects the overall effectiveness of an economic system. Due to the importance of total factor productivity, it is essential to know about its future and changes. Increasing or decreasing the efficiency of a country is one of the important and effective factors in changing economic conditions. Therefore, measuring productivity can be used to monitor changes in living standards, effectiveness, or competitiveness of the economy.

The best indicator that indicates total productivity, is total factor productivity (TFP). Considering the factors affecting the total factor productivity based on Fernands(2014) and the experts' opinions and the multivariate linear regression of the indicators by SPSS software, the model is developed. Because of above reasons, in this research, a system dynamics model has been developed to forecast the results of the actions and policies applied to total factor productivity with an accuracy of 93.2% for Iran. Data of the factors affecting the productivity are extracted from the website of Iran's Statistics Center, the World Bank and Inter development Bank of America for the years 2005 to 2019.

Because Vensim provides an integrated framework for conceptualizing, constructing, simulating, analyzing, optimizing, and expanding models for complex dynamic systems, it has been used for its great speed and effectiveness.

Independent variables affecting the model include: 1) Net rate of increase of population 2) Human capital Index and 3) Physical Capital Stock that affect other parameters. Based on developed model, it is clear that the improvement of the total factor productivity in the country needs change in the three above variables simultaneously or individually or subgroups of them. But we should be careful about their amoun.

Key Words: Total factor productivity, research and development, satisfaction of life, system dynamics, policy making.

MODELING AND SOLVING AN INTEGRATED EPQ AND CONTROL CHART DESIGN IN AN IMPERFECT PROCESS CONSIDERING SHORTAGE AND SERVICE LEVEL

MARKET: GAME THEORY APPROACH

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Abstract

To foster competition in the mobile phone industry and foster proposing variety services to the consumers, the Iran government decided to enter a fourth operator to the country's mobile phone market at 1392 alongside Hamrah Aval ,Irancell and Rightel,who held, respectively, Fifty-nine hundredths, thirty-seven hundredths and four-hundredths of the market. As it seems no economic studies have been published on the topic, this research has analyzed the effect of the entry of a fourth operator to the country's oligopoly market by examining two questions: 1) whether the entry of a fourth operator will create or extend competition (regulator's dream) and 2) whetear the entry of a fourth operator will create or extend competition (regulator's nightmare). To this purpose, by using a stylized model of France's mobile phone market, and also static and dynamic models in game theory as "Cournot oligopoly", "monopolistic cartel" and "partial cartels (oligopoly with a Cournot competitive fringe)". The result showed when Hamrah Aval, Irancell and Rightel are in cournot competition and extend it to the new operator:

1) Compared to three-way Cournot competition the maximum most realistic price fall is 1.36% when fourth operator is as efficient as Rightel and could be 0.37% when Hamrah Aval is averagely efficient.

2) All three operators experience losses, so the total surplus decreases, while consumer surplus increases, which means the entry of a new operator and more competition is good for the consumers.

3) If Hamrah Aval, Irancell and Rightel are in competition and extend it to the fourth operator, this situation will be sustainable and switching to the "monopolistic cartel" and "partial cartels" is equally unlikely.

Key Words: mobile phone, new operator, game theory, cournot competition, cartel.

PRIORITIZING QUALITY INDICATORS OF RESEARCH DATA BASED ON MULTIPLE CRITERIA DECISION MAKING TECHNIQUES

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Abstract

Research in today's world is one of the most important ways to get out of a resource-based economy into a knowledge-based economy. Hence, research data produced and disseminated during the research play an important role in the growth of knowledge economy. In this study, data quality indicators were screened and their significance was determined in order to assess the quality of research data. The main criteria affecting the quality of the data were identified and categorized, including essential, inherent, accessibility, textual and display dimensions. Then, using the paired comparison and the fuzzy demilitarization technique based on fuzzy ANP, we determined the internal and external relationships of the factors and sub-factors. Intrinsic quality of data not only includes precision and objectivity, but also credibility and reputation. Accessibility includes

waste incinerator, and landfill centers) was considered in the present paper. A bi-objective mixed-integer linear mathematical programming model was presented for location and allocation of municipal solid waste. Model goals were minimizing waste disposal cost and greenhouse gas emission. Other points taken into consideration were a variety of products derived from recycling waste, transferring them to sales areas, and the limitations of number and capacity for transfer stations and waste disposal facilities. Districts 1 to 8 and District 22 of Tehran were selected as a case study for measuring model performance. The results of the case study and sensitivity analysis demonstrated that the optimal solution requires the location of disposal facilities in different districts of Tehran, although these facilities incur considerable costs.

Key Words: Municipal solid waste management, facility location, allocation, two-objective optimization, transfer stations.

AN INTEGRATED APPROACH TO SUSTAINABLE SUPPLIER SELECTION BASED ON EVIDENTIAL REASONING APPROACH AND BEST-WORST METHOD

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Abstract

In recent years, supplier selection is one of the vital issues in supply chain. In the past, supplier selection was only based on costs. Years after that, further than costs, factors such as quality, minimum delivery time, etc. have become important. So, it has been shown that sustainable supplier selection concerns environmental and social factors besides the economic factors that have to be considered simultaneously. Hence, supplier selection is a multiple criteria problem in which qualitative and quantitative factors must be considered. One of the causes of environmental criteria importance is the pollution which is increasing by the activities of companies. Also decreasing the available resources is another cause of such. Finally, to create a sustainable supply chain, sustainable supplier selection is very important. In this paper, a sustainable supplier selection is considered. A method is presented for the first time to evaluate suppliers with an Evidential Reasoning (ER) approach which considers the uncertainties of personal judgments. Also, in conditions that there is an absence of information in some of the sub-criteria during the comparison of suppliers, they can be compared based on the minimum and maximum utility function of the suppliers' value. At first, criteria and sub-criteria are chosen in order to evaluate and select the suppliers in sustainable supply chain based on company strategies, expertise and literature review in this field. Then, using the BMW, an effective multiple criteria decision-making method, weights of criteria and sub-criteria determined and in the end to evaluate and rank the suppliers an ER method is employed. ER approach is an algorithm based on a multicriteria evaluation matrix and combination of forecasts Dempster—Shafer and by using that, factors of multilevel structures can be combined. Imperfect evaluation resulted from the lack of information or the inability of the assessor in performing precise judgments or the assessor's error in group decision making, is considered via the error degree of the combined information and utility intervals to determine the imperfect degree of the primary information in decision analysis are provided. In the end, a case study is provided to investigate the procedure in details.

Key Words: Sustainable supplier selection, best worst method, evidential reasoning.

THE ENTRANCE EFFECT OF A FOURTH OPERATOR ON IRAN'S MOBILE PHONE COMPETITIVE

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Abstract

In today's business world, companies try to collaborate with each other without losing their own competitive powers. In this case, the concept of coopetition can describe these situations excellently. In this paper, collaboration between a supplier and a retailer in a decentralized supply chain has been examined through the use of quantitative discounts in a game theory model. In this model, the agents are faced with inventory, pricing, and discount-offering decisions. At first, this paper examines the problem in the case where the supplier does not offer any discounts to the retailer and obtains the results. Then the paper studies a situation that the supplier applies a discount on the retailer's wholesale price and retailer sells the product to the customers with the same amounts of discounts. In these situations, the paper models a sequential game that the supplier is the leader of the negotiations in order to obtain the Stackelberg Equilibrium. Also the retailer is allowed to set different prices for the customer according to the supplier's discount decisions. Finally, the model is analyzed by studying the fixed and variable transportation costs, using two scenarios in which the costs are paid by the supplier or the retailer. In the investigated problems, if the final customer is dissatisfied, the product is returned to the retailer at a different price, and the retailer sells the returned product at a new price in a secondary market. The results indicate that an increase in the retail price reduces the utilities of the customers from purchasing the product. Nevertheless, such increase also enhances the return price, leading to a greater incentive for the customers to return the purchased products. So an increase in the retail price can even increase the demands of customers. Also a numerical analysis shows that collaboration between the members of a supply chain through a discount contract can significantly improve the profits of the retailer and the supplier.

Key Words: Pricing, inventory, discount, rate of return, game theory.

A BI-OBJECTIVE MATHEMATICAL MODEL FOR MUNICIPAL SOLID WASTE LOCATION-ALLOCATION PROBLEM: A CASE STUDY IN TEHRAN

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Abstract

There are different factors, including economic development and population explosion, causing the rapid increase in municipal solid waste generation rates. In today's municipal solid waste management, a considerable amount of financial and human resources is spent on collection and transportation, and little attention has been paid to production, storage in place, recycling, and disposal. As proper collection and transportation are important issues in municipal solid waste system, creation of energy from waste as well as recycling and disposal are also significant, attention must be paid to the optimal usage of dirty gold (i.e. municipal solid wastes) for pollution reduction. Moreover, determining suitable locations for transfer stations and waste disposal facilities is a very complex problem, needing a comprehensive review and evaluation process accounting for the requirements of municipal, environmental, and governmental regulations. In this context, it is vital to develop an effective and efficient approach for designing and planning a waste management system. In order to realize this goal, a three-level network consisting of customers, transfer stations, and disposal facilities (recycling, composting,

comes close together and reaches to a certain proportional level.
• The amount of government subsidies to producers and consumers of green products has an effect on GSCM diffusion. The results show that in the case of same changes in these two parameters, the impact of the consumer subsidy (SC) is far greater than the effect of the producer subsidy (SM), and if the government's target is more green production, the consumption subsidy has a better effect.
• GSCM releases will be significantly enhanced, if green manufacturers can reduce the cost of their products in a variety of ways.
• Sensitivity of consumers to green product preferences is also effective in GSCM diffusion, but its effect is less than other factors.

Key Words: Green supply chain management, system dynamics, diffusion modeling, supply chain simulation.

DESIGNING CONTROL CHARTS BASED ON RESIDUALS FOR MONITORING SIMPLE LINEAR PROFILES IN SHORT RUN PROCESSES

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Abstract
In some applications, performance of a process or quality of a product is characterized by a relationship between a response variable and one or more explanatory variables, referred to as profile in the literature. Certain methods have been developed to monitor various profiles. On the other side, nowadays due to diversity of customer demand and short time for presenting products in market, manufacturing strategy is focused on short run processes characterized by high diversity and low volume. Therefore, statistical process control for such processes, due to inspection restrictions in a short period is a special practice. In such circumstances, control charts in Phase I cannot be performed and correct estimations are not available for estimating process mean and standard deviation. To overcome the situation, self-starting methods are developed to update the parameter estimations along with new observations and simultaneous checks of the out-of-control conditions. Hence, implementing traditional control charts for monitoring short run processes is not practical, and new methods and control charts should be developed to monitor such processes. In this paper with aggregating two above-mentioned subjects, quality characteristics which are pertained to short run processes and which are modeled by simple linear profiles, have been monitored. Suitable methods and new control charts are developed to monitor process effectively. In this paper, we focus on monitoring residuals and propose new control charts to monitor mean and dispersion of residuals simultaneously. In order to monitor residuals in short run processes whose quality characteristics are modeled by simple linear profiles, we propose two control charts for monitoring mean and one control chart for monitoring standard deviation. Then, with combination of these control charts, we develop two distinct control charts named QMCC and TMCC to monitor mean and variance of residuals concurrently. Performance of the proposed control charts have been compared with competitor control chart using simulation studies and average run length (ARL) criterion. The results of simulation studies show that our proposed control charts in some parameters have better performance compared to competitive control chart under moderate and large shifts in terms of out-of-control ARLs.

Key Words: Control chart, short run processes, process monitoring, simple linear profile, exponentially weighted moving average.

A GAME THEORETIC APPROACH FOR PRODUCT PRICING IN A TWO-ECHELON SUPPLY CHAIN CONSIDERING QUANTITATIVE DISCOUNTS AND RETURN POLICIES

Abstracts of Papers in English

MODELING THE DIFFUSION OF GREEN SUPPLY CHAIN MANAGEMENT IN PRODUCTION INDUSTRIES USING SYSTEM DYNAMICS

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Abstract

The implementation of the Green Supply Chain (GSC) has become one of the fundamental strategies of governments today, and is recognized as a competitive advantage for companies. Nevertheless, the diffusion and expansion of Green Supply Chain Management (GSCM) in manufacturing industries is a complex subject and faces many barriers and difficulties. The existence of different stakeholders with different and sometimes contradictory goals, along with a wide range of influential factors that have mutually interactive and indirect effects, are two main features of this issue. Using system dynamics tools, this research models the interactions between the key stakeholders including government, manufacturers, and consumers quantitatively and dynamically, and describes the pattern of GSCM diffusion in manufacturing companies. The proposed model analyzes feedback and causal relationships among key stakeholders, evaluates the path of GSCM diffusion over time. It also evaluates the sensitivity of the results to the model parameters. Moreover, as a case study, the model is simulated in Iran's automotive industry and the results of various scenarios have been analyzed. The most important results are:

• Diffusion of GSCM in automotive companies has a decreasing oscillation pattern, and over time, the revenue of the two green producer groups and normal producers