



**TALAŞLI İMALAT YAPAN BİR ATÖLYEDE
ATÖLYE İÇİ DÜZENLEME VE TEZGAH YERLEŞİM PLANLAMASI**

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Küreselleşen dünyada teknolojinin ilerlemesine bağlı olarak sermayenin sınır ötesi hareketi işletmeleri ülkeler arası rekabete sokmuştur. Bu durum işletmelerin zamanında ve kaliteli hizmet/üretim yapmalarını zorunlu hale getirmiştir. Dolayısıyla işletmeler gelişen yeni teknolojileri kendileri uyarlamak ve değişimlere ayak uydurmak zorunda kalmışlardır.

Sürekli gelişen dünyada ürün maliyetlerini azaltmak, zamanında ve daha kaliteli ürünler üretmek çok önemli bir unsur haline gelmiştir. Bu durum işletmeleri, gelecekte var olabilmek için insan, makine, hammadde ve enerji kaynaklarını en iyi şekilde değerlendirmeye yönlendirmiştir.

İşletmelerin yerleşim düzeni ve üretim şekilleri ve buna bağlı olarak süreç içi yönetimleri son derece önem kazanmıştır. Atölye içi yerleşim çalışmalarının temel amacı zamanında ve kaliteli üretimi gerçekleştirerek verimliliği artırmaktır.

Bu çalışmanın amacı da yapılan süreç analizi ile yeni yerleşim planının oluşturulmasıdır. Bu nedenle talaşlı imalat yapan atölyelerde mevcut durum analiz edilerek yazılım aracılığıyla yeni yerleşim planları ortaya konulmuş ve atölye içi yerleşim eniyilemeye çalışılmıştır.



ALGORITHMS FOR EFFICIENT PORTFOLIO ANALYSIS

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Our project is about Markowitz standard portfolio optimization and combining it with sentiment analysis method.

The main reason we choose the sentiment analysis method is that we wanted to try something that was not done before in portfolio optimization. We are aware that we can see large percentage changes in short run because we deal with crypto money exchanges and we want to benefit from these changes. For this reason, our target is short-term investors

We decided to make the first part of the project, the sentiment analysis part, with twitter data. A snapshot of the data tells us about the future of the stocks in the short-term. After analyzing the tweets word by word and guessing the feelings contained in the tweet, we use this for portfolio selection. We can choose the number of tweets and hashtag to be examined in the program. We classify the tendency of people in seven different categories, from very positive to very negative, including neutral. We believe that the emotional analysis method will have a different approach to portfolio optimization by examining the impact of users comments on the stock.

After determining the direction of the shares, we go to the creation of the portfolio and the optimization part. What we have done so far can be thought of as a financial indicator to help us with the content of the portfolio. The sentiment analysis program we wrote just like other indicators makes predictions about the feelings of the feelings and gives the BUY / SELL signals.

We plan to incorporate the program by transferring the results to interface we obtained by emotion analysis to MS Excel. From the point of view we want to create ease of use for the end user. We are planning to assign coefficients to our 7 clasified data between 1 and 0. By this way we are going to implement this data to our model as percentages.



PORTFOLIO OPTIMIZATION AN RISK AND RETURN MANAGEMENT

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A general mathematical model for portfolio selection problem is proposed. We formulate an extended mean–variance model with. 3 objective functions. Mean maximization, variance minimization and balance sheet increasing proportion maximization are our objective functions. Our objective proportions are depended on decision makers preferences and risk attitude so as to maximizing of balance sheets, maximizing of return and minimizing of risk. The obtained multi-objective model is scalarized by using the weighted sum method which find solutions by considering investor preferences in non-convex multi-objective problems. The performance of the proposed approach is tested on a real case problem generated on the data derived from BIST Stock Exchange. The comparison is conducted with respect to different levels of investor preferences over return, variance, and balance sheet and obtained results are summarized.



**MODERN MARKETING APPROACHES IN VISITOR RELATIONS BY USING
MCDM METHODS IN MUSEUM MANAGEMENT**

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Our work is aimed at creating new marketing and management strategies for profit-oriented businesses (mainly museums, art galleries, etc.). To increase the number of visitors in nonprofit organizations like museums, to increase the popularity of the museum by making the nationality and universality of recognition, and to reduce the cost of expenses by increasing income items are our problems that we deal with in our work.

When establishing these management and marketing strategies, a deep literature review was conducted to determine the constraints of the museum management. Based on the questionnaires we have made to the experts in the museum management, it is calculated how much the strategies created by using the multiple decision-making method called Analytical Hierarchy Process are dependent on the constraints. After these methods, strategy that is a decision support system will be created with pilot museum data such as visitor numbers, percentage of expenditures (what expenditure items are used as much as what income is used), types of income sources, advertising works, etc.



**OUTBOUND LOGISTICS NETWORK DESIGN WITH VEHICLE ROUTING
PROBLEM**

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In these days, vehicle routing problems are considered on the purpose of using logistic networks more efficiently. In general, vehicle routing problems involve network designs that are consist of many customers and one or more depot. Constructing routes to minimize distance between customers or to minimize transportation costs according to distance. This provides the optimal or the nearest optimal solution. The aim of this study to review split delivery vehicle routing problem and open vehicle problem which has a lot of vehicles that are not turn back to depot. A mathematical model based on the HİSARLAR A.Ş data has been developed and solved in GAMS software.

Keywords: *Modelling, Vehicle routing problem, Split delivery, GAMS*



**DECISION SUPPORT SYSTEM FOR DETERMINING MONTHLY
PRODUCTION AMOUNT IN FINITE CAPACITY PRODUCTION PROGRAM**

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Businesses are organizations that try to reach profit by producing all kinds of goods or services. Due to the rising prices of technology and enterprises, quality competition, production quantity and diversity increase, productivity of produced goods and services, rational use of production tools and production of most suitable goods and services have gained importance. Production planning is therefore of great importance for companies operating in the manufacturing sector. Nowadays, production planning departments spend a lot of time creating a production plan according to monthly products demand from customers. In this process, profit is not considered too much. In this study, it was aimed to assign monthly products demand from customers in suitable furnaces in such a way that maximum profits are provided. Firstly, mathematical modeling, which is the exact solution method, was approached and 0-1 integer programming was used in this model. Model was solved with GAMS package program and output was obtained. There are also some assumptions in the model. A decision support system has been established to handle these assumptions. In this system, it is aimed to create a production plan in a short time to ensure maximum profit.



**EXAMINATION OF FLEXIBLE JOBSHOP SCHEDULING PROBLEM WITH
SIMULATION MODEL**

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Scheduling is one of the most important issues in manufacturing planning. Job shop scheduling problem is a NP- hard problem. Difficulty of scheduling problem is due to combinational complexity. Operations can be processed on different machines, each job requires sequential operations, and one operation requires only one machine. Moreover, process time is constant and known. The point is to decide the sequence of operations on the machines. Flexible job shop scheduling problem (FJSP) is an extension of the job shop-scheduling problem (JSP).

Keywords: Flexible jobshop scheduling, jobshop scheduling, simulation, NP-problems



FLEXIBLE JOB-SHOP SCHEDULING WITH USING DISPATCHING RULES AND

SIMULATION AT A METAL COMPANY

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In this study, a solution to the problem of order delivery for a metal company is sought and then appropriate solutions were sought for the problem. The development of technology, competition among businesses has increased in the globalizing world. The survival of businesses in this environment is possible by using their resources in the most effective way. This necessitated good planning and scheduling. It is especially important for young and growing businesses like the one where the work is done. The most basic problem of this business is delayed in submission of orders due to incomplete planning, scheduling and completion time. It was decided to design a simulation environment as a result of the observations made in the workshop production metal company and the information obtained. In this simulated environment, assigning jobs to machines will be done by dispatching rules. Since the objective function is to minimize order delays resulting from the completion period, appropriate dispatching rules are preferred. In this way, bottlenecks can be seen and the optimum schedule for the company will be determined by determining which dispatching rule is optimal. This study evaluates total of 10 dispatching rules with the classification of single rules. The performance of each rule compared and summarized to determine the final ranking for all the different dispatching rules. The result shown that SPT (Shortest Processing Time) rule performs well in almost all measurements.



ACADEMIK SCHEDULING SYSTEM

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Scheduling is one of the problems which so many researches have been conducted on it over the years. The university course timetabling problem which is an NP-hard problem is a type of scheduling problem. Timetabling process must be done for each semester frequently, which is an exhausting and time consuming task. In this project we are dealing with the timetabling of the faculty of architecture in Anadolu University to simplify the work of building a timetable of each semester using an automated software that solves a mathematical model specifically built for this problem and optimized to give fast and optimal solutions.



BUZDOLABI MONTAJ HATTININ SON KALİTE KONTROL NOKTASINDA, GÖZ İZLEME CİHAZI İLE OPERATÖRÜN GÖZ HAREKETLERİNİ İZLEME, İNCELEME VE ANALİZ ETME

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Bu çalışma, Eskişehir’de faaliyet gösteren bir buzdolabı fabrikasında son görünüş kontrol noktasında operatörlerin ve buzdolabı tiplerinin etkisini incelemek amacıyla göz izleme cihazı ile veri toplanmış ve istatistiksel olarak analiz edilmiştir.

Bu çalışma üç aşamadan oluşmaktadır. İlk aşamasında göz izleme cihazı ile veri toplanan ve analiz edilen konuları incelemek amacıyla literatür taraması yapılmıştır. İkinci aşamada, buzdolabı son görünüş kontrol noktasında veri toplama için deney planlaması yapılarak operatörlerin, çalışma sürelerinin ve buzdolabı tiplerinin buzdolabı görünüş kalite kontrolde hata bulma üzerinde etkisinin olup olmadığı analiz edilmiştir. Son aşamada ise etkin faktörler belirlenerek hata tespit etmede başarının artırılması konusunda iyileştirme önerileri sunulmuştur.

Çalışma imalat sektöründe göz hareketleri incelenerek görünüş kalite kontrol sürecinin iyileştirilmesi konusunda yapılan ilk çalışma olması açısından literatüre katkı sağlamakta ve alışlagelmiş çalışmalardan bu çalışmayı farklı kılmaktadır. Bu tür çalışmaların artması ile özellikle operatöre bağlı olan tüm görünüş kalite kontrollerinde belli bir standardın sağlanması ile müşteriye hatasız ürün gönderme ve müşteri memnuniyetinin artması mümkün olabilir.



DANIŞMANLIK ŞİRKETİNDE UYGULANAN MÜŞTERİ SEGMENTASYONU

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Müşteriler bir organizasyonun en önemli varlıklarıdır. Sadık ve organizasyonla ilişkilerini geliştiren memnun müşteriler olmadan bir şirket başarısından söz edilemez. Amacımız müşterileri segmentlere ayırıp davranışlarını tahmin etmektir. Segmentasyon, pazarlama stratejileri geliştirmek için müşteri tabanını homojen gruplara bölme işlemidir. Segmentasyon için kullanılan birçok yöntem vardır. Bu çalışmada tanınan bir ayakkabı firması müşterilerinin satın alma alışkanlıkları incelenerek SAP'nin bir modülü olan Hybris ile bir kümeleme algoritması olan K-means'te uygulanacak ve sonuçları karşılaştırılacaktır. Projede kullanılacak veri seti, ayakkabı firmasının 7500 online müşterisinden oluşmaktadır. Veri özellikleri genel olarak şunlardır: ülke, şehir, cinsiyet, yaş gibi müşteri özellikleri, üye olup olmadığı, sepete ekleme ve sepette geçen süre, alınan ürün ve fiyatı, alışveriş tipi gibi nitelikler.

Hybris, SAP firmasının kendi bünyesine kattığı ve geliştirdiği bir e-ticaret sistemidir. Hybris ile müşterileri gruplara ayırarak müşteri kitleleri oluşturup onlara özel kampanyalar oluşturulur. K-means algoritması n adet nesneden oluşan bir veri kümesini, giriş parametresi olarak verilen k adet kümeye bölmektir. Amaç, gerçekleştirilen bölme işlemi sonunda elde edilen kümelerin, küme içi benzerliklerinin maksimum ve kümeler arası benzerliklerinin minimum olmasını sağlamaktır.



**REDUCING WAITING TIMES OF MRI APPOINTMENTS BY USING
APPOINTMENT PLANNING STRATEGY**

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Every day lots of patients visit hospitals and due to insufficient resources, spend hours at the hospital. One of the busiest sections is radiology department because, just one or two MRI machines are used by all departments. This is the fact for a great majority of hospitals in our country. This situation causes a great deal of congestion of schedules in these sections. This project, aims to reduce waiting times of the patients at the MRI unit of Osmangazi University Hospital by preparing an appointment scheduling program. In this study, information about the business and analysis of the current system is given. To achieve the goal of the project, literature has been reviewed, and the mathematical and simulation models have been studied in the literature. Also, contributions and effects of the project have been examined.



**REPLACING SHELVES IN A WAREHOUSE WITH USING DATA MINING
METHODS**

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Problems were observed due to inaccurate and missing shelf placement in Eczacıbaşı Artema warehouse and It was decided to use data mining methods by searching the literature. The main reason for choosing of data mining topic is that it is deal with big data. For existing products, Basket Analysis which is an area of Association Analysis and for products which will enter to the market in the future, Polyhedral Conic Separator which is an area of Piecewise Linear Classifier were used in data mining methods. In addition to this, the order of importance of the products was identified thanks to ABC-XYZ Analysis. At the end of the Project, placing on shelves of products which will be shipped according to their order of the importance will be provided, path of the forklifts will be decreased during shipment in the aggregation phase, productivity of labor force will be provided, it will be minimized the number of extra operators, time and cost will be decreased and by being decreased number of forklifts job security will be increased. Therefore, the warehouse usage will be more efficient.



**A GENETIC ALGORITHM FOR FLEXIBLE JOB SHOP SCHEDULING PROBLEM
BY USING PYTHON**

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Enterprises exist in a competitive manufacturing environment. To reduce production costs and effectively use production capacity to improve competitiveness, a hybrid production system is necessary. The flexible job shop (FJS) is a hybrid production system, and the FJS problem (FJSP) has drawn considerable attention in the past few decades. This study examined the FJSP and, aimed to minimize the total order completion time (makespan). We develop a Genetic Algorithm (GA) by assigned randomly machines and operation sequence and increase the randomness by cross-over and mutation processes. We code the algorithm by using Python which is an open source and free programming language. A numerical experiment was conducted for evaluating the performance of the proposed algorithm relative to that of the Brandimarte MK1–MK10 benchmarks. In addition to this we also solve a real-world problem which is a flexible job shop problem in a pipe factory.



BİR MONTAJ HATTINDA 5S YARDIMIYLA YALIN HAT YERLEŞİMİ ÇALIŞMASI

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Günümüzde büyük, orta ve küçük ölçekli fabrikalar üretim sahalarını daha etkili kullanabilmek, yapılan iş ve çalışanın verimliliğini arttırmak için yerleşim ve üretim şekillerini, yalın üretime uygun hale getirmektedirler. Çalışma beyaz eşya ve otomotiv sektöründe yan sanayi olarak üretim yapan Esalba Metal Sanayi ve Ticaret Anonim Şirketi bünyesinde bulunan Davlumbaz Montaj Hattı üzerinde yapılmıştır. İş akışı içerisinde yer alan proseslerin süreç analizleri ve devamında gelen işlemler hat üzerinde üretilen Teka 600 ve Kuppersberg 960 White Inox olmak üzere iki farklı ürün üzerinden yapılmaktadır. Davlumbaz hattının mevcut durumdaki sorunları incelendiğinde en önemli ve iyileştirme gerektiren sorunun planlanan üretim miktarının çok altında üretim yapılması olarak belirlenmiştir. Belirlenen sorunların çözümünü bulmak adına öncelikli olarak literatür araştırması ve mevcut durum analizleri yapılmıştır. Yapılan araştırmalar sonucunda yalın malzeme akışı ve gerekli ergonomik iyileştirmeleri sağlamak amacıyla çözüm yönteminin, 5S Tekniği Yardımıyla Yalın Hat Yerleşimi olmasına karar verilmiştir. Davlumbaz hattında 5S tekniği uygulanmış ve uygulama sırasında hat yerleşimi değişikliği ve ergonomik iyileştirmeler yapılmıştır. Uygulama sonrasında süreç analizleri yapılmış, yeni durumun ARENA ile benzetimi yapılmıştır. Çıkan sonuçlar karşılaştırılmış, iyileştirmeler değerlendirilmiştir. Yapılan değerlendirmeler sonucunda günlük üretim miktarlarında artış sağlandığı gözlemlenmiştir.



IMPROVEMENTS ON PRODUCTION FAULTS

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This work was carried out in a company named Konveyör which produces refrigerator parts. In the factory, faults occur after the coating process. These errors increased the rework rate and production costs caused to rise. The aim of this study is to reduce the number of error and thus the rework rate. In the study, the source of the fault was identified by using DMAIC procedures. It has been determined that the fault has been occurred because of the lack of zinc chloride material that added to the electrolysis solution. As a result of the interventions, it was determined that the rework ratio decreased when the amount of zinc chloride material that added to the solution was increased.



MINIMIZATION OF TRANSPORT ROUTES IN AN INDUSTRIAL ENTERPRISE

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In today's business world, where knowledge-intensive production is effective, there is a competitive and ruthless competition environment. Rapid change in production technologies and progress has resulted in globalization of the competitive environment and it has become crucial for businesses to maintain their current position and their assets as well as to reduce the costs that are continuously increasing tendencies to desired levels. The vast majority of these costs are due to material handling costs. In this work we have rearranged the facility layout in order to minimize the transport routes in an industrial operation. The problem is considered as a Quadratic Assignment Problem where the flow between departments and the distance between locations are taken into consideration. A mathematical model has been developed for the problem and solved using a standard software.

As a result, the workstations are assigned to the most appropriate locations in terms of the parameters discussed. When these assignment results are compared to the current situation, the handling system in operation has become more efficient.

Key Words: facility layout, mathematical model, quadratic assignment problem, material handling cost



BEYAZ EŞYA FİRMASI İÇİN YARI MAMUL STOK ALANI YERLEŞİMİ

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Günümüz dünyasında keskinleşen rekabet ortamında verimlilik iş yaşamının vazgeçilmez bir parçası haline gelmiştir. Bu sebeple üniversiteler de verimlilik kavramına gereken önemi vermektedir. Derslerde etkin olarak optimizasyon yöntemlerinin, yalın üretim felsefesinin ve kalite araçlarının etkin olarak uygulanması gösterilmektedir. Bu süreçlerde birçok kalite performans göstergesi oluşturulmalı ve takip edilmelidir. Üretim sahasında yarı mamul miktarları işletmenin verimliliğini belirleyen en önemli kısıtlardan biridir. İşletmeler yarı mamul miktarlarını minimize etmek amacı ile çeşitli programlar ve yöntemler kullanmaktadır. Winqsb ve ARENA programları, stok yönetimi ve sürecin simüle edilmesi için kullanılan araçlardır. İşletmenin değer katmayan işlerini tespit etmek adına çeşitli istatistiksel yöntemler kullanmakla beraber mevcut durum analizi ve emniyet stoku çıkartılmıştır. Tezimizde bir montaj alanı için çalışma alanı yerleşimi ve bir çalışma alan için sistem optimizasyonu yapılmıştır.



**DEFECTIVE PRODUCTS CONTROL AND RECORD SYSTEM DESIGN WITH 8D
METHOD FOR A DEFENSE AND AVIATION FACTORY**

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In the developing and changing world, technology is becoming a part of our life and systematic software supports provide many advantages in production/ manufacturing and service sector. With this study, in a Defense and Aviation factory in Eskişehir, a system is provided that detailed, recorded, and reported parts that are shipped but are reported to be as defective. The sector in which the work has been done requires production with zero component error. The new system, whose algorithm is developed, basically consists of two different designs. Both designs work by recording customer number, customer name, part ID, shipping number, defect code and defect description headings. The recorded data are evaluated in a certain period and the process is progressed to the improvement process. In this respect, it has been seen that with the financial profit provided to the factory by the production process, which has been optimized, it is possible to follow the desired period with the reporting system which prevents loss of time. Workflow schedules, root-cause analysis, product-based and customer-based acquisition graphs, and results that match the 8D system were observed.



**IMPROVEMENT STUDY OF WORK -IN- PROCESS WAREHOUSE
ACTIVITIES IN A DEFENSE AND AEROSPACE FACTORY**

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Optimization of distances and layouts in storage activities allows for improvements in the existing supply chain systems of the companies. As the number of turnover in this area increases, the importance of storage activities is better understood. The improvements that will be realized in storage activities provide benefits such as reducing storage costs, timely shipment and most importantly customer satisfaction.

In this study, the Work-In-Process warehouse's current situation of a defense industry company was examined and a mathematical model was developed to improve it. In the developed mathematical model, the objective is to allow the shelf addressing of the products to be freed from intuitiveness and to be assigned the most suitable shelf by a scientific methodology. While the model was being developed, ABC analysis of the products, the dimensional characteristics of each product and the shelf capacities, the physical properties of the warehouse were taken into consideration. With the new shelf addressing plan resulting from the study, it is aimed to provide minimum distance travelled so that time savings for storage operations.



**BAKSAN SANAYİ SİTESİNDE ATIK MERMER TOPLAMA NOKTALARININ
BELİRLENMESİ**

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Günümüzde birçok endüstriden kaynaklanan atık maddelerin direkt olarak çevreye atılması önemli bir kirliliğe neden olmaktadır. Bu atık türlerini katı atıklar, sıvı atıklar, tehlikeli atıklar, tıbbi atıklar vb. oluşturmaktadır. Bu çalışmada, Baksan Sanayi Sitesi'nde atık mermer toplama noktalarının belirlenmesi amaçlanmıştır. Baksan Sanayi Sitesi'nin en büyük problemlerinden biri atık toplama noktalarının olmaması, bu nedenle işletmelerin kendi belirledikleri yerlere atıklarını atmalarıdır. Bu durum büyük bir çevre kirliliğine neden olmaktadır. Probleme üç farklı çözüm yaklaşımı ile çözüm aranmıştır. Yaptığımız atık mermer noktaları belirleme çalışmasında temel amaç, en az sayıda atık noktası açmaktır. Çözüm aşamasında, üç farklı yöntemden elde edilen sonuçlar karşılaştırılmış ve en uygun çözüm uygulanmak üzere sunulmuştur.

