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COMPARISON OF LIQUIDITY LEVELS OF ENTERPRISES OPERATING IN THE BIST WOOD PRODUCTS INCLUDING FURNITURE SECTOR

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ABSTRACT

Wood products, including furniture, are one of Turkey's most established industries. While working conditions used to involve intensive labor and low technology, technological advances and changes toward a knowledge-intensive (capital-intensive) sector have occurred. This study aims to compare the liquidity levels of BIST companies operating in the wood products including furniture sector, which holds a strategic position in the Turkish economy. This sector plays a significant role in economic growth due to its high export potential, contribution to employment, and extensive supply chain. However, factors such as seasonality, fluctuations in demand, and volatility in raw material prices directly impact businesses' cash flow and ability to meet short-term obligations. Analyzing liquidity levels contributes to assessing businesses' financial stability, ensuring sustainability during crisis periods, and effectively evaluating investment opportunities. BIST data enables an objective and comparative assessment based on regular and transparent financial reporting, thus providing valuable information for both academic literature and decision-support processes for investors and industry managers. The study aims to compare the liquidity levels of six companies in this sector using their annual data from 2019 to 2023. Using data from 2019 to 2023, the GRA method was used to measure the liquidity levels of the companies and compare their liquidity levels. As a result of the analysis, it was determined that the company with the code SUMAS had the highest liquidity level.

Keywords: Wood Products, Furniture Sector, Liquidity Levels, Gray Relational Analysis

BİST ORMAN ÜRÜNLERİ VE MOBİLYA SEKTÖRÜNDE FAALİYET GÖSTEREN İŞLETMELERİN LİKİDİTE DÜZEYLERİNİN KARŞILAŞTIRILMASI

ÖZ

Orman ürünleri ve mobilya sektörü Türkiye'nin en köklü alanlarından biridir. Eskilerde yoğun emek ve düşük teknoloji ile çalışma şartları varken; teknolojinin gelişmesi ve bilgi (sermayenin) yoğun olduğu sektöre doğru değişiklikler olmuştur. Türkiye ekonomisinde stratejik bir konuma sahip olan orman ürünleri ve mobilya sektöründe faaliyet gösteren BİST şirketlerinin likidite düzeylerini karşılaştırmalı olarak incelemeyi amaçlamaktadır. Söz konusu sektör, yüksek ihracat potansiyeli, istihdama katkısı ve geniş tedarik zinciri ile ekonomik büyümede önemli bir rol oynamaktadır. Ancak, mevsimsellik, talep dalgalanmaları ve hammadde fiyatlarındaki oynaklık gibi unsurlar, işletmelerin nakit akışını ve kısa vadeli yükümlülüklerini karşılama kapasitelerini doğrudan etkilemektedir. Likidite düzeylerinin analiz edilmesi, işletmelerin finansal istikrarının değerlendirilmesine, kriz dönemlerinde sürdürülebilirliğin sağlanmasına ve yatırım fırsatlarının etkin biçimde değerlendirilebilmesine katkı sunmaktadır. BİST verilerinin kullanılması, düzenli ve şeffaf finansal raporlamaya dayalı olarak, nesnel ve karşılaştırmalı bir değerlendirme yapılmasına olanak tanımakta; böylece çalışma, hem akademik literatüre hem de yatırımcılar ve sektör yöneticilerine yönelik karar destek süreçlerine değerli bilgiler sağlamaktadır. Araştırmada, bu sektördeki altı işletmenin 2019-2023 yılları yıllık verilerini kullanarak likidite düzeylerinin karşılaştırılması amaçlanmıştır. 2019-2023 yılları arasındaki verileri kullanarak Gri İlişkisel Analiz yöntemi ile işletmelerin likidite düzeylerini ölçmeye ve likidite düzeylerinin karşılaştırmasına olanak sağlamıştır. Analiz sonucunda analiz yapılan yıllar arasında; SUMAS kodlu işletmenin likidite düzeyi en yüksek olan işletme olduğu belirlenmiştir. 2019-2022 yılları arasında Koleksiyon Mobilya A.Ş'nin likidite düzeyi en düşük olan işletme olduğu tespit edilmiştir.

Anahtar Kelimeler: Orman Ürünleri, Mobilya Sektörü, Likidite Düzeyleri, Gri İlişkisel Analiz

Introduction

The furniture sector holds immense strategic importance in Turkey due to the added value it creates. With increasing competition in this sector, facilities that operate on an economic scale while simultaneously conforming to global standards have been established. This has subsequently led to the development of a dealership system which allows to distribute the products of these facilities both within the domestic and international markets, thereby enabling logistics and infrastructure services to be delivered more efficiently. The furniture sector is one of the industries that makes use of domestic resources in exports the most while simultaneously having the least dependency on imported products, thereby contributing increasingly to the national economy. Moreover, the furniture sector mainly consists of small and medium-sized enterprises (SMEs), often facing various financing challenges. Therefore, the consolidation of small firms and their management by professional executives is critical.

At the outset, the wood products sector aims to manage natural ecosystems and transform the goods and services obtained from these ecosystems into high value-added products. This sector, which requires significant investment and research, is an important field encompassing a wide range of sub-industries and continues to evolve with cutting-edge technology and production processes that meet global standards. The dynamic and active structure of the sector is evident from the considerable investment and capacity expansion that facilities processing wood products have seen in recent years. The wood products sector in Turkey is often closely associated with the furniture industry. Due to the structural limitations in adopting new technologies, this sector faces many challenges in competing globally. Nevertheless, it continues to meet domestic demand and has the capacity to serve both the European Union and Middle Eastern markets adequately.

The wood and furniture sector, which holds a significant place in the Turkish economy, is considered a strategic sector due to its contribution to economic growth and the high level of employment it creates. Sustainable management of wood resources plays a critical role in preserving the ecological balance and biodiversity, and providing raw material for industry. One of the most intensive uses of these raw materials is the furniture industry. With its high-value-added product production, export potential, and contribution to employment, the furniture sector has become prominent in Turkey's manufacturing industry. Recent advances in design, quality standards, and production technologies have enabled the sector to increase its domestic and international competitiveness. Consequently, a strong value chain exists between wood products and furniture production, and the effectiveness of this chain directly impacts the sector's overall success and sustainability.

The wood and furniture sector is positioned as one of the most essential subsectors within Turkey's manufacturing industry in terms of employment, production, and export potential. The financial performance of companies operating in these sectors affects the overall outlook of the country's economy. As of 2023, the total number of wood products and furniture companies operating in Turkey exceeded 40,000, with the vast majority of these companies being SMEs. Liquidity ratios stand out as a key indicator in assessing the financial structures of companies in the sector. Analyses based on Turkish Trade Registry data and Public Disclosure Platform (KAP) data show that the average current ratio of companies in the wood and furniture sector ranged between 1.25 and 1.40 during 2019–2023, while the acid-test ratio remained at 0.90. This demonstrates that the ability to meet short-term obligations across the sector is limited, and liquidity management is critical for a sustainable financial structure. Fluctuations in exchange rates, rising raw material costs, and difficulties accessing financing, particularly after 2021, have negatively impacted cash flows for companies in the sector and increased liquidity pressure. In this context, identifying the sector's financial vulnerabilities and monitoring liquidity performance are crucial for micro-level company management and macro-level sector policy development.

Companies carry out specific operations aligned with their objectives, and through the successful execution of these operations, they aim to reflect this success in their financial strength. In this context, achieving financial success necessitates attaining certain financial advantages, which are largely dependent on the effectiveness of their policies and strategies. Well-crafted and sound strategies enable companies to minimize the risk of financial failure. Additionally, successful top management and financial executives also contribute critically to this endeavor. Furthermore, in today's world, removing economic barriers has enabled companies to access diverse global markets and financial resources. Consequently, as competition merges with accessibility, achieving financial success has become increasingly context-dependent. Companies that can adapt their strategies and policies in response to evolving conditions are more likely to succeed in this environment.

Liquidity is defined as the ability of an asset to be converted into cash. For companies, cash is the most liquid asset. Liquidity is important for various reasons: it addresses urgent cash needs, allows the evaluation of investment opportunities, facilitates risk management, and serves as an indicator of an enterprise's financial health. In other words, liquidity provides a strategic advantage to companies. A company's liquidity level indicates its ability to meet regular payments while continuing its operations, making it a critical factor in business performance. Liquidity is a critical financial indicator that reflects a company's ability to meet its short-term obligations promptly and thoroughly. As in all sectors, this concept is of great importance for the financial sustainability and operational continuity of companies in the wood products, including furniture sector. These sectors typically face high raw material costs, labor-intensive production processes, and competitive pricing pressures. In this context, maintaining adequate liquidity levels is vital for minimizing the risk of cash shortages that could disrupt production processes, while ensuring the supply chain's continuity, the payment of employee salaries, and the effectiveness of inventory management. In these sectors, particularly vulnerable to seasonality and fluctuations in external demand, liquidity is a key factor in providing financial flexibility to cope with sudden market changes, enhancing businesses' resilience to crises, and strengthening their competitive edge. Additionally, companies with sufficient liquidity are in an advantageous position to evaluate investment opportunities, increase production capacity, and pursue innovative activities. Therefore, for businesses operating in the wood products including furniture sectors, liquidity is not merely a short-term indicator of financial health but also a fundamental pillar of long-term growth and sustainability strategies.

This study aims to measure and compare the liquidity levels of companies operating in the Borsa Istanbul (BIST) Wood Products including Furniture sector. The study also aims to rank the liquidity levels of the companies under consideration. A total of six companies operating in this sector between 2019 and 2023 were included in the analysis, and the liquidity levels of these firms were analysed using the Gray Relational Analysis (GRA) method. Despite this wealth of research, there remains a noticeable gap in studies focusing specifically on measuring liquidity levels using the Gray Relational Analysis method. This study intends to fill this literature gap, thereby highlighting this research's originality and significance.

The wood products including furniture industry hold a significant position in the Turkish economy. A review of recognized and widely accepted indices reveals many studies on the subject. However, no prior research in the literature specifically measures liquidity levels using the GRA method. This underscores the originality and significance of the present research.

1.Review of literature

The literature is divided into two groups. The first group includes studies measuring the liquidity levels of companies operating in the BIST wood products, including furniture, or different sectors. The studies are arranged chronologically from the past to the present. This section succinctly reviews the relevant literature on the topic, identifying the key contributions of these previous studies, particularly highlighting the varied methodologies used to analyse financial performance.

Madushanka & Jathurika (2018) in study, they investigated the effect of liquidity ratios on profitability for 15 manufacturing companies listed on the Colombian Stock Exchange during the five years from 2012 to 2016. They found that liquidity ratios (quick ratios) were positively and significantly related to company profitability among manufacturing companies listed on the Sri Lankan stock exchange. The authors recommend that manufacturing companies in Sri Lanka pay more attention to liquidity ratios, as these ratios significantly impact company profitability. Additionally, they state that since the current ratio values indicate deficiencies in managing liquidity assets, developing new strategies for appropriate liquidity management is necessary.

Akyüz et al. (2019) compared the financial performance of forest products companies using an entropy-based TOPSIS method. The study analysed six companies and concluded that Company E had the best financial performance overall, while the worst-performing company varied across years.

Kırklıkçı & Gedik (2019) examined performance perceptions in Turkish furniture and panel manufacturing companies. The sample consisted of 2,622 firms registered with the Union of Chambers and Commodity Exchanges of Turkey (TOBB) and the Turkish Particleboard Industrialists Association. Here, performance perceptions were measured using survey questions. The analysis found that productivity, business income, and new product development capabilities were the main factors influencing performance. Additionally, the study posited that performance perception improved with an increase in the number of employees.

Öztel and Yavuz (2019) conducted a performance ranking of the Furniture and Woodworking sectors between 2008 and 2016 using an entropy-based TOPSIS method. They used the entropy method to weight criteria and found that the liquidity ratio had the highest significance in the furniture sector, while asset turnover had the highest significance in the woodworking sector. From the years that the study analysed, the best years for the furniture sector were determined to be 2008, 2014, and 2015, while for the woodworking sector, it was found to be 2012.

Apan and Öztel (2020) evaluated the financial performance of 15 companies listed in the relevant index between 2011 and 2018. They used the entropy method to determine the weight of the criteria. The study found that, except for the year 2015, the company KARTN exhibited the highest performance. SAMAT and HURGZ were identified as the lowest-performing companies.

Kılıç & Uçaktürk (2020) examined the interaction between alternative investment instruments and the securities exchange. In this context, weekly data for 25.12.2009 – 30.03.2018 were used for the BIST100 index, gold, interest rates, and exchange rates (dollar). The long-term relationship between the variables was analyzed using the Johansen cointegration test, while the causality relationship was analyzed using the Toda-Yamamoto causality test. The findings revealed that the variables are cointegrated in the long term. The causality analysis showed a one-way causality relationship from the BIST100 index to the exchange rate and interest rates, while there is no causality relationship between the BIST100 and gold prices.

Abu et al (2021) aimed to systematically analyze studies conducted in the wood and furniture industry. A total of 2879 studies conducted between 1991 and 2019 were examined.The identifed articles have been classifed accordingly into three sections in the wood and furniture context, which are (1) growth of research interest, (2) motives and application of lean practices, and (3) lean implementation status, organizational context, barriers, and challenges. Therefore, it cannot be assumed that any lean implementation issues or benefits in the wood and furniture industries would lead to similar results to those already shown in the literature. This, arguably, is the most important aspect of this paper, as only that in-depth comparison can lead to new theoretical insight. The main limitation comes from the initial search.

Akyüz (2021) evaluated the financial performance of five companies listed on Borsa Istanbul using the GRA method. The analysis revealed that Company D ranked first in terms of efficiency, followed by Companies B and A.

Akyüz (2021) aimed to determine the impact of intellectual capital on financial performance. The wood products sector listed on Borsa Istanbul served as the sample, covering 2017 to 2019. The study identified three companies in the paper and paper products sector and two in the forest products and furniture sector as being successful in terms of intellectual capital.

Kurt et al. (2021) analysed the financial performance of 15 companies operating in Turkey's forest products, paper products, and furniture sectors. They used the entropy method to determine the weights of the criteria and the PROMETHEE method to evaluate performance. The study found ALKA and SUMAS to have the best performance.

Epede & Wang (2022), aimed to examine the competitiveness of 25 countries in the wood and furniture industry. Data were obtained from the UN Comtrade database. The study found that many middle-income countries have risen to higher competitive positions, while high-income countries, which initially dominated the sector, find it increasingly difficult to maintain their competitive positions. They also noted that most African countries focus on low-value-added forest harvesting and raw wood exports, leaving the wood and furniture sectors insignificant globally.

Polat & Kılıç (2022) investigated whether there was an interaction between exchange rates and stock markets in BRICS countries regarding returns and volatility. Using weekly data from 2001 to 2019, they conducted an analysis using the VAR-EGARCH model. They found interactions between exchange rates and stock markets in each of the BRICS countries regarding returns and volatility. In Brazil, there is a two-way relationship between the exchange rate and the stock market regarding returns and volatility, while in India and China, only a one-way return interaction was identified. On the other hand, it was determined that there is a two-way volatility interaction between the exchange rate and the stock market in Russia, India, China, and South Africa.

Arslan (2022) analysed the financial performance of companies in the wood products including furniture sector listed on Borsa Istanbul. The study concluded that the company coded SUMAS generally had the best financial ratios.

Cobandag Guloglu & Ekinci (2022) aimed to identify a comprehensive review and classification of market liquidity measures used to measure liquidity in empirical studies. They also aimed to measure liquidity using high-frequency data. They found that market liquidity measures have various characteristics and can be classified accordingly. They determined that high-frequency measures are concentrated around bid-ask spread and LOB.

Kendirli & Çıtak (2022) used the Altman Z-score to determine the financial distress of companies listed in the BIST Forest, Paper, and Printing Index. Based on financial statements, they calculated various financial ratios and found that seven of the 15 companies were at high risk of bankruptcy.

De Souza et al. (2023) aimed to conduct a comparative LCA analyzing the environmental aspects and impacts of different WWTP management scenarios established in the furniture industry in the Brazilian state of Espirito Santo. Scenarios 1 and 2 were identified as potentially more suitable for WWTP disposal than Scenarios 3 and 4. Scenario 1 achieved greater environmental benefits across all impact categories assessed. Specifically, 1 m3 of MDF stores 1080 kg CO2 eq/m3, resulting in a net impact of -849 kg CO2 eq/m3 of MDF. Scenario 5 was found to be the least preferred application.

Ersen et al. (2023) aimed to forecast stock prices of companies operating in the BIST Wood Products Including Furniture sector using the Markov Chains method. The study concluded that this method was valid and successful in predicting future stock price movements.

Kavas & Medetoğlu (2023) evaluated the performance of companies operating in the BIST Wood Products Including Furniture sector. For the year 2021, SUMAS was found to be the most successful company financially, while ORMA had the lowest financial performance.

Türedi et al. (2023) evaluated the financial success of wood products including furniture companies listed on Borsa Istanbul and examined the relationship between financial success and performance. They used six different methods to analyze this relationship for the 2018–2022 period and employed Spearman's correlation analysis to identify relationships among variables 7.

Pasha (2024) evaluates the annual intermediation efficiency of public and private banks in Egypt. Advanced nonparametric econometric approaches were used on a sample of public and private banks in Egypt between 2014 and 2022. It was found that public banks consistently outperformed private banks in terms of financial intermediation efficiency levels. Additionally, while a negative relationship was observed between bank intermediation efficiency and liquidity risk, it was found that banks with high liquidity risk exhibit a higher and more significant positive effect of intermediation efficiency in reducing liquidity risk.

Ryu, Webb & Yu (2024) study examined the role of financing liquidity in the simultaneity of stock prices and market liquidity. They analyzed the Korean Composite Stock Price Index (KOSPI) market from January 2010 to June 2023. According to the research findings, they found empirical evidence against the relative simultaneity hypothesis. They determined that the asymmetric effect of funding liquidity contributes to a certain extent to the high market liquidity of unique stocks.

Yudaruddin et al (2024), This study examines the relationship between liquidity, FinTech development, and credit risk in the

Indonesian banking industry. Specifically, it investigates the impact of FinTech, particularly in peer-to-peer lending and payment systems, on credit risk in conjunction with liquidity. The analysis is conducted using panel data from 142 commercial banks in Indonesia over a 15-year period from 2004 to 2018. The results reveal that higher liquidity leads to a reduction in credit risk, whereas FinTech development is found to increase credit risk, particularly in small banks (BUKU 3 and BUKU 4) and private national banks.

Goropečnik, et al. (2025) aims to examine the self-perceived digital and sustainability competencies of 433 senior students studying wood science and technology at different levels in Slovenia. It also seeks to compare these with the expectations of 28 industry stakeholders. The analysis was conducted using a survey of senior students. They found that students' self-assessments increased only slightly with increasing levels of education, while industry stakeholders' expectations increased significantly, leading to significant discrepancies. At the secondary level, stakeholders noted a greater emphasis on developing students' general digital and sustainability competencies. In contrast, they said an increasing focus on career-specific competencies at the tertiary level. They also emphasized that some stakeholders do not consider specific competencies necessary for graduates at certain educational levels.

Ramli et al. (2025), using data from the Malaysian Timber Industry Board (MT1B), aim to analyze Malaysia's furniture export sector's trends, status, and challenges. The study plans to overcome significant economic and operational obstacles and thus provide practical recommendations to enhance the resilience and strength of Malaysia's furniture export sector. The study aims to comprehensively assess Malaysia's wood furniture export performance between 2020 and 2024. The study identifies systemic barriers that hinder the sector's long-term sustainability, particularly for small and medium-sized enterprises (SMEs). Among the significant obstacles identified are limited market access, insufficient investment in research and development, and a lack of understanding of international trade regulations.

The second group covers studies related to gray relational analysis. The studies are arranged chronologically from past to present.

Akyüz et al. (2017) analysed the financial performance of companies operating in the paper and paper products industry sector on Borsa Istanbul between 2011 and 2016 using the Gray Relational Analysis (GRA) method. The study employed 17 financial ratios. They found that Company C ranked first among seven firms in the overall ranking, while Companies B, E, and G had the weakest financial performance.

Şamiloğlu et al. (2018) compared the liquidity levels of companies listed in the BIST Sustainability Index between 2009 and 2016. They determined the liquidity levels of these enterprises using the GRA method. The analysis revealed that TURKCELL had the highest liquidity level, while SABANCI had the lowest.

Ding et al. (2019) studied the relationship between port logistics and regional economic development using gray correlation analysis and decision tree algorithm methods. According to the analysis results, the correlation coefficients between port logistics and gross industrial production value, total investment in fixed assets, and gross import–export value were calculated as 0.690, 0.682, and 0.643, respectively. In contrast, the construction sector was found to have the lowest level of relationship with port logistics. Decision tree analyses revealed that gross industrial production value and import–export value have a decisive impact on port logistics.

Chen et al. (2020) used AP index data from 31 provinces and cities in China between 2014 and 2018 to apply cross-sectional data, time-based systematic clustering, and panel data gray correlation clustering methods. These analyses examined AP status and regional differences (RD). The findings indicate that air quality has generally improved in the provinces and cities in question, and that pollutant concentrations have decreased to varying degrees. However, it was determined that air pollution remains more serious in Beijing, Tianjin, and some other regions. Additionally, it was found that the effects of improvements in air quality were limited in some areas, while the regional PM trend continued at serious levels.

Nurcan & Deniz Köksal (2021) in their study, financial failure prediction models were developed and applied using Logistic Regression (LR) analysis, a traditional statistical method, and Data Envelopment Analysis (DEA), a non-parametric method based on mathematics. The study utilized financial report data from companies listed on the Istanbul Stock Exchange National 100 Index (BIST 100) between 2014 and 2016. The results revealed that the LR model has a higher predictive power than DEA in predicting financial failure. However, it was also noted that DEA is a fast and practical method for predicting financial failure and can guide companies on the indicators that need improvement to achieve success.

Li (2022) studied the stepwise regression method with China's grain production forecast data to test the gray relational model. The analysis findings reveal that the newly developed model can comprehensively process many input variables using the gray correlation degree approach without needing a subjective pre-screening process. This approach increases the adaptability of the BP neural network and demonstrates superior prediction accuracy and stability performance.

Abdullahu et al. (2024), aims to optimize the input parameters used in dry CNC drilling of forged steel to achieve sustainable machining conditions. Within this scope, three Taguchi-based multi-criteria decision-making (MCDM) approaches—traditional Grey Relational Analysis (GRA), Weighted Grey Relational Analysis (WGRA), and Data Envelopment Analysis Ranking (DEAR)- are considered. As a result of the multi-objective optimization experiments, it was determined that compared to the initial parameter settings, the GRA method achieved a 29.86% improvement, the WGRA method achieved a 34.48% improvement, and the DEAR method achieved a 96% improvement in overall quality response characteristics. The findings revealed that the DEAR method demonstrated higher optimization success than the GRA and WGRA approaches. As a result, it was determined that the proposed methods are practical and applicable tools in the multi-objective optimization of cutting parameters.

Prabhakaran (2025) stated that the importance of the research in asset management lies in its capacity to optimize financial strategies and improve customer decision-making processes. The study aimed to enable asset managers to analyze market trends, assess risk factors, and develop personalized solutions in line with individual financial goals. The findings reveal that this approach contributes to the creation of informed investment strategies, efficient tax planning, and effective risk mitigation processes. Additionally, it has been determined that this approach will strengthen asset management practices' ability to adapt to economic and regulatory changes by assisting in identifying innovative financial products and emerging investment opportunities.

Despite this wealth of research, there remains a noticeable gap in studies focusing specifically on measuring liquidity levels using the GRA method. This study intends to fill this literature gap, thereby highlighting this research's originality and significance.

2.Data and methods

This study aims to compare the liquidity levels of six companies operating in the Wood Products Including Furniture sector listed on Borsa Istanbul (BIST), using annual data from 2019 to 2023. The dataset was obtained from the Finnet database and the Finnet 2000 Plus website. The financial ratios used in the study include: the current ratio, cash ratio, asset turnover ratio, current asset turnover ratio, receivables turnover ratio, and inventory turnover ratio. These ratios enable the measurement and comparison of the liquidity levels of the companies. The Gray Relational Analysis (GRA) method was applied to measure liquidity levels.

Table 1 presents the list of companies operating in the BIST Wood Products Including Furniture sector during the 2019–2023 period.

TABLE 1 | List of companies in the wood products including furniture sector

Firm code	Enterprise Name
DGNMO	Doğanlar Furniture Group Manufacturing Industry and Trade Inc.
GENTS	Gentaş Decorative Surfaces Industry and Trade Inc.
KLSYN	Koleksiyon Furniture Industry Inc.
ORMA	Orma Forest Products Integrated Industry and Trade Inc.
SUMAS	Sumaş Artificial Wood and Furniture Industry Inc.
YONGA	Yonga Furniture Industry and Trade Inc.

At the outset, since the GRA method was employed to measure and compare the liquidity levels of the companies, it remains essential to provide a detailed explanation of the steps involved in applying the Gray Relational Analysis method.

2.1.Gray Relational Analysis Method

This section presents the implementation steps of the Gray Relational Analysis (GRA) method. This method, developed based on gray system theory, is a degree-based technique used for ranking, classification, and decision-making. It consists of six main stages (Deng, 1982; Ayçin, 2019, pp. 141–158).

2.1.1. Preparation of Data and Construction of the Decision Matrix

In this stage, a series of m factors relevant to the decision problem and subject to comparison are identified as shown in Equation (1).

$$x_i = (x_i(j)_{,\ldots,i}\ x_i(n))\ \ i = 1,2,\ldots,m\ ;\ j = 1,2,\ldots n \tag{1}$$

In Equation (1):

- x_i represents the decision alternatives
- $x_i(j)$ denotes the value of the ith decision alternative for the jth criterion.

The matrix formed from these *m* series is denoted as "*X*", as shown in Equation (2).

$$X = \begin{bmatrix} x_1(1) & x_1(2) & \cdots & x_1(n) \\ x_2(1) & x_2(2) & \cdots & x_1(n) \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ x_m(1) & x_m(2) & \cdots & x_m(n) \end{bmatrix} \tag{2}$$

2.1.2. Determination of the Reference Series and Comparison Matrix

At this stage, a reference series must be determined to compare the factors involved in the decision problem. This reference series is established as defined in Equation (3).

$$x_0 = (x_0(j))\ \ j = 1,2,\ldots,n \tag{3}$$

2.1.3. Determination of the Normalized Matrix

When considering benefit-type criteria, higher values are preferable. Normalization for benefit criteria is performed using Equation (4).

$$x_i{}^* = \frac{x_i(j) - \min\limits_j x_i(j)}{\max\limits_j x_i(j) - \min\limits_j x_i(j)} \tag{4}$$

For cost-type criteria, lower values are preferable. Normalization for cost criteria is conducted using Equation (5).

$$x_i{}^* = \frac{\max\limits_j x_i(j) - x_i(j)}{\max\limits_j x_i(j) - \min\limits_j x_i(j)} \tag{5}$$

If an optimal value exists for a given criterion, then the normalization process should target this optimal value, as shown in Equation (6).

$$x_i{}^* = \frac{x_i(j) - x_{0b}(j)}{\max\limits_j x_i(j) - x_{0b}(j)} \tag{6}$$

The normalization process is completed using these approaches, and the decision matrix defined in Equation (6) is transformed into a normalized decision matrix, represented in Equation (7).

$$X^* = \begin{bmatrix} x_1{}^*(1) & x_1{}^*(2) & \cdots & x_1{}^*(n) \\ x_2{}^*(1) & x_2{}^*(2) & \cdots & x_2{}^*(n) \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ x_m{}^*(1) & x_m{}^*(2) & \cdots & x_m{}^*(n) \end{bmatrix} \tag{7}$$

2.1.4. Determination of the Absolute Difference Matrix

The absolute difference matrix is calculated using the formula given in Equation (8).

$$\Delta_{0i} = x_0{}^*(j) - x_i{}^*(j) \tag{8}$$

With the values obtained from Equation (8), the absolute difference matrix is constructed, as shown in Equation (9).

$$\Delta_{0i} = \begin{bmatrix} \Delta_{01}(1) & \Delta_{01}(2) & \cdots & \Delta_{01}(n) \\ \Delta_{02}(1) & \Delta_{02}(2) & \cdots & \Delta_{02}(n) \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ \Delta_{0m}(1) & \Delta_{0m}(2) & \cdots & \Delta_{0m}(n) \end{bmatrix} \tag{9}$$

2.1.5. Determination of the GRA Matrix

The elements of the GRA matrix are determined using Equations (10), (11), and (12).

$$\gamma_{0i}(j) = \frac{\Delta_{\min} + \zeta \cdot \Delta_{\max}}{\Delta_{0i}(j) + \zeta \cdot \Delta_{\max}} \tag{10}$$

$$\Delta_{\max} = \max_i \max_j \Delta_{0i}(j) \tag{11}$$

$$\Delta_{\min} = \min_i \min_j \Delta_{0i}(j) \tag{12}$$

2.1.6. Determination of GRA Degrees

GRA involves comparing the series x_i* within a gray system to the reference series x_0*, as a measure of their geometric similarity. A higher gray relational degree indicates a stronger relationship between the alternative and reference series.

GRA degrees can be calculated using different methods depending on the relative importance of the criteria in the decision problem. When all criteria are considered equally important, the gray relational degree is calculated using Equation (13).

$$\Gamma_{0i} = \frac{1}{n}\sum_{j=1}^{n} \gamma_{0i}(j) \tag{13}$$

Here, Γ_{0i} denotes the GRA degree

If the criteria have varying levels of importance, the criterion weights are incorporated into the formula, and the GRA degree is calculated using Equation (14).

$$\Gamma_{0i} = \sum_{j=1}^{n} \left[w_i(j) \cdot \gamma_{0i}(j) \right] \tag{14}$$

The weights of the criteria (w_j) should be determined in such a way that their sum equals $\sum_{j=1}^{n} w_j = 1$. Various methods such as AHP, CRITIC, DEMATEL, and SWARA can be used to determine these weights.

The calculation of GRA degrees completes the final step of the method. Subsequently, a ranking is established by ordering the alternatives from the highest to the lowest based on their geometric similarity to the reference series.

3.Findings

Due to the broad scope of this study, the findings related to the analyses conducted will be discussed in this section. The results pertaining to these findings are provided according to the Gray Relational Analysis Method.

Gray Relational Analysis was employed in this study to analyse and compare the liquidity levels of enterprises operating in the BIST Wood Products Including Furniture sector. The analysis was carried out using Microsoft Excel. Various criteria were utilized to measure liquidity levels, based on data from a five-year period. According to the analysis results, the values were ranked from the highest to the lowest. The liquidity levels of enterprises in the Wood Products Including Furniture sector for 2019 are presented in Table 2.

TABLE 2 | 2019 Values and rankings of the liquidity levels of enterprises in the wood products including furniture sector

Firm/Code	Γ0i	Ranking
DGNMO	0.38517	5
GENTS	0.44863	4
KLSYN	0.34983	6
ORMA	0.46303	3
SUMAS	0.95244	1
YONGA	0.52469	2

According to the 2019 Gray relational values in Table 2, the firm with the highest liquidity level was identified as SUMAS, with a value of 0.95244. The enterprise with the lowest liquidity level in the same year was KLSYN, with a value of 0.34983. The firms with higher liquidity levels were identified as YONGA, ORMA, GENTS, and DGNMO, in that order. According to the results of the GRA for 2019, significant differences were observed between the liquidity levels of companies. In this context, SUMAS achieved the highest liquidity level with a value of 0.95244, demonstrating its strong capacity to meet its short-term obligations. This shows that SUMAS can manage its cash flow effectively and sustainably finance its activities. In contrast, KLSYN, with the lowest value of 0.34983, is in the weakest position in meeting its short-term financial obligations, suggesting that the company is financially fragile and may be at risk of cash shortages.

The liquidity levels of enterprises in the Wood Products including Furniture Sector for the year 2020 are presented in Table 3.

TABLE 3 | 2020 Values and rankings of the liquidity levels of enterprises in the wood products including furniture sector

Firm/Code	Γ*0i*	Ranking
DGNMO	0.53336	3
GENTS	0.49156	4
KLSYN	0.34072	6
ORMA	0.46516	5
SUMAS	0.87671	1
YONGA	0.56122	2

According to the 2020 Gray relational values in Table 3, the firm with the highest liquidity level was identified as SUMAS, with a value of 0.87671. The firm with the lowest liquidity level in the same year was KLSYN, with a value of 0.34072. The firms with higher liquidity levels were identified as YONGA, DGNMO, GENTS, and ORMA, in that order. The results of the GRA for 2020 revealed significant differences in liquidity levels among the companies examined. In this context, SUMAS, with the highest relational value of 0.87671, stood out as the strongest company in terms of liquidity throughout the year. In contrast, KLSYN, with the lowest value of 0.34072, demonstrated the weakest performance in terms of liquidity levels. The results of the analysis indicate that there are significant differences in the companies' ability to meet their short-term obligations. Following SUMAS, YONGA, DGNMO, GENTS, and ORMA are among the companies with relatively higher liquidity levels, and these companies are considered to manage their cash flows more effectively and be more resilient to short-term financial risks. This indicates that these companies are in a more advantageous position in terms of economic stability and operational sustainability.

The liquidity levels of enterprises in the Wood Products Including Furniture sector for 2021 are presented in Table 4.

TABLE 4 | 2021 Values and rankings of the liquidity levels of enterprises in the wood products including furniture sector

Firm/Code	Γ*0i*	Ranking
DGNMO	0.51759	3
GENTS	0.42459	5
KLSYN	0.37312	6
ORMA	0.56870	2
SUMAS	0.88472	1
YONGA	0.42799	4

According to the 2021 Gray relational values in Table 4, the firm with the highest liquidity level was identified as SUMAS, with a value of 0.88472. The firm with the lowest liquidity level in the same year was KLSYN, with a value of 0.37312. The firms with higher liquidity levels were identified as ORMA, DGNMO, YONGA, and GENTS, in that order. The results of the GRA for 2021 reveal significant differences in the liquidity performance of companies. According to the study's findings, SUMAS stands out as the company with the highest liquidity level throughout the year, with a value of 0.88472. This indicates that SUMAS has a very high capacity to meet its short-term debts and has a strong financial liquidity structure. On the other hand, KLSYN, which was determined to have the lowest liquidity level with a value of 0.37312, can be said to have a more fragile structure in terms of meeting its short-term obligations. ORMA, DGNMO, YONGA, and GENTS, which have relatively high liquidity levels, demonstrate that they have implemented more effective liquidity planning in financial management. These results indicate that the companies above have a relative advantage in cash management, working capital control, and short-term economic stability.

The liquidity levels of enterprises in the Wood Products Including Furniture sector for 2022 are presented in Table 5.

TABLE 5 | 2022 Values and rankings of the liquidity levels of enterprises in the wood products including furniture sector

Firm/Code	Γ0i	Ranking
DGNMO	0.59861	2
GENTS	0.55322	4
KLSYN	0.37919	6
ORMA	0.57126	3
SUMAS	0.80182	1
YONGA	0.50577	5

According to the 2022 Gray relational values in Table 5, the firm with the highest liquidity level was identified as SUMAS, with a value of 0.80182. The firm with the lowest liquidity level in the same year was KLSYN, with a value of 0.37919. The firms with higher liquidity levels were identified as DGNMO, ORMA, GENTS, and YONGA, in that order. The results of the GRA for 2022 reveal significant differences in the liquidity performance of companies. In this context, SUMAS stands out as the company with the highest liquidity level among the companies analyzed, with a value of 0.80182. This indicates that SUMAS has a strong capacity to meet its short-term obligations and implements effective liquidity management. On the other hand, KLSYN, with the lowest correlation value of 0.37919, has shown the weakest liquidity performance throughout the year. This result indicates that KLSYN has limited capacity to meet its short-term debts and is vulnerable to financial fragility. On the other hand, the relatively high correlation values of DGNMO, ORMA, GENTS, and YONGA indicate that these companies also have a strong liquidity structure and demonstrate stable performance in cash management. The findings generally reveal that liquidity levels among companies are an essential distinguishing factor in terms of financial stability and operational sustainability.

The liquidity levels of enterprises in the Wood Products Including Furniture sector for 2023 are presented in Table 6.

TABLE 6 | 2023 Values and rankings of the liquidity levels of enterprises in the wood products including furniture sector

Firm/Code	Γ0i	Ranking
DGNMO	0.58838	2
GENTS	0.49000	4
KLSYN	0.42151	5
ORMA	0.52980	3
SUMAS	0.90850	1
YONGA	0.38085	6

According to the 2023 Gray relational values in Table 6, the firm with the highest liquidity level was identified as SUMAS, with a value of 0.90850. The firm with the lowest liquidity level in the same year was YONGA, with a value of 0.38085. The firms with higher liquidity levels were identified as DGNMO, ORMA, GENTS, and KLSYN, in that order. The findings of the GRA for 2023 reveal significant differences in terms of companies' liquidity performance. According to the study, SUMAS, with the highest relational value of 0.90850, stands out as the strongest company of the year regarding liquidity. This result indicates that SUMAS has a high capacity to pay its short-term debts and has adopted a strong cash management strategy. On the other hand, YONGA, identified as the company with the lowest liquidity level with a value of 0.38085, appears to have a relatively weak structure in terms of meeting its short-term financial obligations. This situation indicates that the company is at a higher risk of experiencing imbalances in its

cash flows. DGNMO, ORMA, GENTS, and KLSYN are considered more advantageous in terms of liquidity with relatively high relational values. These companies demonstrate a favorable profile regarding operational continuity and financial resilience thanks to effective liquidity management. Overall, the 2023 data reveals that liquidity levels vary by company and that this is a decisive factor in terms of financial stability.

4.Conclusion

The wood products, including the furniture sector, are critically important in both economic and environmental terms. The raw materials and the products used in these sectors are often interchangeable, as they are primarily derived from forest-based resources. The wood products sector places significant emphasis on the sustainability of natural resources by holding a crucial role in preserving ecosystems and ensuring the continuity of resources. Meanwhile, The furniture sector is engaged in producing furniture for residential, office, and commercial spaces. Similar to the wood products sector, it is also committed to sustainability, employing recyclable materials and low-carbon production techniques. Taken together, both sectors contribute substantially to employment, economic growth, and exports. Their rapid development in Turkey suggests they are well-positioned to help close the country's export gap through continued growth and stability.

This study offers valuable insights for investors interested in the wood products including furniture sectors, as well as for entrepreneurs considering the purchase of shares in companies listed on the stock exchange. The research allows for observing fluctuations in performance among different firms in the sector. In today's market, investors tend to act more rationally, basing their strategies on the companies' financial statements. Meanwhile, with increasing competition, businesses now offer green products that pollute the environment less. This growing environmental awareness also leads investors to act sensitively and prefer the products of companies that demonstrate such responsibility.

Cash is a vital resource for businesses. Companies must maintain sufficient cash reserves to meet daily operational needs and to ensure business continuity. Financial managers in this sector must approach cash management with caution, taking into account seasonal uncertainties, economic volatility, and potential investment opportunities. This necessity also influences companies' overall financial management strategies. Due to the high inventory costs, long production cycles, and volatile demand characteristic of the wood products, including furniture sectors, financial decisions, particularly those related to cash management, must be made with great care.

The findings of the Gray relational analysis for the 2019–2023 period reveal significant differences in the liquidity levels of the companies included in the study over the years. Every five years, SUMAS has maintained its position as the strongest company in terms of its ability to meet its short-term liabilities by achieving the highest relational values. In 2019, it was 0.95244, 0.87671 in 2020, 0.88472 in 2021, 0.80182 in 2022, and 0.90850 in 2023. SUMAS ranks among the top companies, demonstrating its strong liquidity structure and stable cash management strategy. In contrast, KLSYN emerged as the company with the lowest liquidity levels in 2019 (0.34983), 2020 (0.34072), 2021 (0.37312), and 2022 (0.37919), while in 2023, this position was taken over by YONGA (0.38085). The low relational values of these companies indicate that they have a relatively weak financial structure in terms of meeting their short-term financial obligations and are exposed to potential cash flow risks. On the other hand, companies such as DGNMO, ORMA, GENTS, and YONGA have demonstrated stable and effective liquidity management with relatively high liquidity ratios in most years, presenting a favorable profile regarding their ability to repay short-term debt. In particular, the consistently high rankings of DGNMO and ORMA in the years following 2020 support these companies' financial resilience and operational sustainability. The results obtained throughout the period reveal that intercompany liquidity levels are essential to current economic strength and resilience to crises and investability. In this context, the findings provide critical indicators that should be considered by investors, financial analysts, and credit providers when evaluating companies' short-term payment capacity.

The study contributes a vital time series perspective to the literature by comparing companies' liquidity levels over five years using Gray's relational analysis method. This adds a new dimension to existing studies by revealing the dynamics of continuity and change in short-term financial resilience. The long-term identification of liquidity differences between companies provides concrete indicators to support the concepts of economic fragility and stability. Thus, not only a single period but also the risks and opportunities that persist over time are detailed in the literature. The analysis emphasizes that liquidity levels are a financial performance indicator and a critical criterion for the resilience and sustainability of businesses in crises. In this regard, it significantly contributes to the financial management literature. Based on the periodic analysis of companies' short-term payment capacities, it offers a practical tool that can contribute more effectively to the risk assessment processes of investors and financial institutions.

As policy recommendations in the research, Companies should be encouraged to adopt effective cash flow management and financial planning practices to reduce liquidity risks. Training programs and consultancy services can eliminate the lack of information on this subject in small and medium-sized enterprises. Financial reporting standards should be strengthened so that investors and creditors can correctly evaluate companies' liquidity situations. This increases market discipline and is essential for the early detection of liquidity risks. Financial institutions should consider the liquidity performance of companies as a priority criterion in lending processes; they should develop risk management strategies, especially for companies with low liquidity. Macroeconomic policies should pave the way for forming financial market structures that will minimize the liquidity risks of companies. Facilitating access to short-term financing is critical, especially in crisis periods. State-supported guarantee mechanisms, interest rate supports, or liquidity funds can be established for companies with a high risk of experiencing liquidity problems. Thus, financial resilience can be increased on a sectoral basis. The results obtained in the study differ from those in the literature. The results obtained by Akyüz (2021) differ from the results in this study. This difference stems from the years covered and the variables used. Furthermore, the difference between the findings obtained in the study and those in Akyüz's (2021) study reveals the study's originality. Kurt et al. (2021) revealed similarities with this study in their study. Kurt et al. (2021) found that the SUMAS-coded enterprise exhibited the best performance in the years covered in their study. This study also yielded similar results. This similarity reveals its similarity with studies in the literature. It can also be said that the results are identical to those in the literature. We can say that Kavas & Medetoğlu (2023) produced similar results to this study. Kavas & Medetoğlu (2023) determined that the company coded SUMAS had the best performance in 2021. This study also determined that the company coded SUMAS had the best liquidity in 2021. Accordingly, the results obtained from the studies indicate similarities and differences between the results obtained in this study and the literature.

The study conducts a comparative analysis of the liquidity levels of companies operating in the forest products and furniture sector listed on Borsa Istanbul (BIST), providing meaningful contributions to both the academic literature and practical applications. The findings reveal significant differences in liquidity across companies in the sector, and indicate that these variations stem from factors such as differences in financial management strategies, capital structures, approaches adopted in supply chain management, and responses to market conditions.

A literature review shows that comprehensive studies focusing on the joint liquidity analysis of the forest products and furniture sectors within the scope of BIST in Türkiye are minimal. In this context, the present research fills an essential gap in the literature through a sector-specific comparative liquidity analysis and, by employing periodic data, clearly demonstrates the impact of economic fluctuations on the short-term solvency of the sector. Consequently, the study provides data that can serve as a reference for investors, business managers, and policymakers in their decision-making processes.

Based on the results of the research, the following policy and practical recommendations are proposed:

1. Strengthening Sectoral Liquidity Monitoring Mechanisms: Borsa Istanbul and relevant regulatory authorities should encourage the regular monitoring and reporting of sector-based liquidity indicators. This would enable the early detection of potential financial risks.
2. Financial Management and Cash Flow Training: Sector-specific training and consultancy programs should be implemented for companies in the sector, focusing on liquidity management, short-term borrowing strategies, and cash flow optimization.
3. Credit and Incentive Arrangements: Companies with low liquidity but high production capacity and employment potential should be supported through short-term, low-cost credit opportunities and tax deferral measures.

4. Supply Chain and Inventory Management Improvements: Policies to shorten raw material procurement times and increase inventory turnover rates should be introduced through sectoral logistics support.
5. Facilitating Access to Capital Markets: Legal and technical arrangements should be made to improve companies' access to short-term financing instruments such as bonds and bills.
6. Corporate Transparency and Investor Confidence: Regular public disclosure of liquidity indicators in companies' financial reports will strengthen investor confidence.

In conclusion, this study highlights that liquidity management is a strategic factor for financial sustainability and competitive strength in the forest products and furniture sectors, contributing significantly to the theoretical body of knowledge and developing practical, policy-oriented strategies for the industry.

This study aimed to measure and compare the liquidity levels of companies in the wood products including furniture sector. The liquidity levels of these firms were effectively assessed and compared by utilizing data from 2019 to 2023 and applying the Gray Relational Analysis (GRA) method.

GRA was applied to six companies in the Borsa Istanbul wood products including furniture sector over a five-year period. The analysis found that SUMAS consistently had the highest liquidity level, while Koleksiyon Mobilya A.Ş. exhibited the lowest liquidity levels between 2019 and 2022.

The scope of this study was limited to a five-year period, utilizing six criteria and six companies to determine and rank liquidity levels. Future research could benefit from extending the time frame, increasing the number of evaluation methods, and employing a broader set of criteria to enhance the depth of analysis. Furthermore, applying alternative weighting methods for criteria could provide further insights.

References

Abdullahu, F., Zhujani, F., Todorov, G., & Kamberov, K. (2024). An experimental analysis of Taguchi-based gray relational analysis, weighted gray relational analysis, and data envelopment analysis ranking method multi-criteria decision-making approaches to multiple-quality characteristic optimization in the CNC drilling process. Processes, 12(6), 1212.

Abu, F., Gholami, H., Saman, M. Z. M., Zakuan, N., Sharif, S., & Streimikiene, D. (2021). Pathways of lean manufacturing in wood and furniture industries: A bibliometric and systematic review. *European Journal of Wood and Wood Products*, 79(4), 753-772.

Akyüz, K. C., Ersen, N., & Akyüz, İ. (2017). Borsa İstanbul'da faaliyet gösteren kâğıt ve kâğıt ürünleri sanayi sektörü firmalarının performanslarının Gri ilişkisel analiz yöntemiyle Değerlendirilmesi. *Akademik Sosyal Araştırmalar Dergisi, 51*, 139-151.

Akyüz, İ., Aydemir, B., Bayram, B. Ç., & Akyüz, K. C. (2019). Orman ürünleri işletmelerinin finansal performanslarının Entropi temelli Topsis yöntemi ile karşılaştırılması: Artvin Örneği. *Bartın Orman Fakültesi Dergisi, 21*(1), 136-146.

Akyüz, K. C. (2021). Orman ürünleri sanayi sektöründe Gri ilişkisel analiz yöntemiyle performans değerlendirme. *Artvin Çoruh Üniversitesi Orman Fakültesi Dergisi*, 22(2), 300-305. https://doi.org/10.17474/artvinofd.992174

Akyüz, K. C. (2021). Orman ürünleri sanayi sektöründe hesaplanmış maddi olmayan değer yöntemi ile entelektüel sermayenin hesaplanması. *Bartın Orman Fakültesi Dergisi, 23*(2), 555-564.

Apan, M., & Öztel, A. (2020). Bütünleşik Entropi-Edas yöntemi ile nakit akım odaklı finansal performans analizi: bist orman, kâğıt, basım endeksi'nde işlem gören firmaların 2011-2018 dönem verisinden kanıtlar. *Bartın Orman Fakültesi Dergisi, 22*(1), 170-184.

Arslan, Ö. G. E. (2022). BIST'te orman ürünleri ve mobilya sektöründe işlem gören işletmelerin finansal performanslarının gri ilişkisel analiz yöntemiyle değerlendirilmesi (ss.386-396). *4. Uluslararası Ankara Multidisipliner Çalışmalar Kongresi*,

Ayçin, E. (2019). Çok kriterli karar verme: bilgisayar uygulamalı çözümler. Nobel Akademik Yayıncılık.

Cobandag Guloglu, Z., & Ekinci, C. (2022). Liquidity measurement: A comparative review of the literature with a focus on high frequency. *Journal of Economic Surveys*, 36(1), 41-74.

Chen, H., Zhang, L., Zou, W., Gao, Q., & Zhao, H. (2020). Regional differences of air pollution in China: comparison of clustering analysis and systematic clustering methods of panel data based on gray relational analysis. Air quality, atmosphere & health, 13(10), 1257-1269.

De Souza Pinho, G. C., Calmon, J. L., Medeiros, D. L., Vieira, D., & Bravo, A. (2023). Wood waste management from the furniture industry: The environmental performances of recycling, energy recovery, and landfill treatments. *Sustainability*, 15(20), 14944.

Deng, J. L. (1982). Grey system fundamental method. Huazhong University Of Science And Technology, Wuhan, China.

Ding, H. C., Lian, M. R., Chen, X. Y., Liu, J. M., Zhong, Z. C., Zhang, Y. F., & Zhou, M. Y. (2019). Research on the correlation of port logistics and regional economic growth base on gray relational analysis method. Concurrency and Computation: Practice and Experience, 31(10), e4744.

Ersen, N., Akyüz, K. C., & Akyüz, İ. (2023). Orman ürünleri ve mobilya sanayinde hisse senedi fiyat hareketlerinin Markov Zincirleri yöntemi ile tahmin edilmesi. *Düzce Üniversitesi Orman Fakültesi Ormancılık Dergisi, 19*(1), 43-58.

Epede, M. B., & Wang, D. (2022). Competitiveness and upgrading in global value chains: A multiple-country analysis of the wooden furniture industry. *Forest Policy and Economics, 140*, 102737.

Goropečnik, L., Radovan, D. M., Grošelj, P., & Kropivšek, J. (2025). Gaps Between Students' Self-Perceived Digital and Sustainability Competencies and the Expectations of the Wood & Furniture Industry. *Forests*, 16(7), 1194.

Kavas, Y. B., & Medetoğlu, B. (2023). BIST orman ürünleri ve mobilya sektöründe faaliyet gösteren işletmelerin Topsis ve finansal analiz yöntemleri ile performanslarının değerlendirilmesi. *Abant Sosyal Bilimler Dergisi, 23*(1), 80-97.

Kendirli, S., & Çıtak, F. (2022). Altman modeli ile finansal başarısızlık tahmini: bist orman, kağıt ve basım endeksinde faaliyet gösteren şirketlerde bir uygulama. *Econder International Academic Journal, 6*(1), 86-97.

Kılıç, E., & Uçaktürk, M. (2020). Alternatif yatirim araçlarinin menkul kiymetler borsasi ile etkileşimi. *Bingöl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (21), 499-518.

Kırklıkçı, A. B., & Gedik, T. (2019). Türkiye mobilya ve levha işletmelerinin performans algısı. *Düzce Üniversitesi Bilim ve Teknoloji Dergisi, 7*(3), 1073-1086.

Kurt, R., İmren, E., & Karayılmazlar, S. (2021). Türkiye orman endüstri sektörü altında faaliyet gösteren kağıt, orman ve mobilya firmalarının finansal performanslarının Entropi temelli PROMETHEE Yöntemiyle Analizi. *Bartın Orman Fakültesi Dergisi, 23*(2), 545-554.

Li, Z. (2022). Application of the BP neural network model of gray relational analysis in economic management. *Journal of Mathematics, 2022*(1), 4359383.

Madushanka, K. H., & Jathurika, M. (2018). The impact of liquidity ratios on profitability. International Research Journal of Advanced Engineering and Science, 3(4), 157-161.

Nurcan, E., & Deniz Köksal, C. (2021). Determination of financial failure indicators by gray relational analysis and application of data envelopment analysis and logistic regression analysis in BIST 100 Index. Interdisciplinary Journal of Management Studies, 14(1), 163-187.

Öztel, A., & Yavuz, H. (2019). Entropi tabanlı TOPSIS yöntemi ile finansal performans analizi: mobilya ve ağaç işleri sektörlerinde bir uygulama (ss. 175-182). *5. Uluslararası Ekonomi Yönetimi ve Pazar Araştırmaları Kongresi.*

Pasha, R. (2024). Bank intermediation efficiency and liquidity risk in Egypt: a two-stage non-parametric analyses. *Future Business Journal*, 10(1), 97.

Ramli, N., Sarmin, S. N., Kusin, M., Rosman, N., Jalil, A. M. A., Mahmud, S. Z., & Ahmad, N. (2025). An Empirical Analysis of Malaysian Wooden Furniture Export Performance from 2020 to 2024. *Bioresources and Environment*, 3(2), 10-18.

Polat, M., & Kılıç, E. (2022). Brics ülkelerinde döviz kuru ve borsa arasindaki getiri ve volatilite etkileşimi: Var-Egarch modeli ile bir uygulama. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (49), 539-551.

Prabhakaran, S. P. (2025). Evaluating Wealth Management Firms Using Grey Relational Analysis: A Comparative Study. International Journal of Computer Science and Data Engineering,doi:https://www.semanticscholar.org/paper/38e6032e8c73160f2674e15f50ca1ab134d81f56.

Ryu, D., Webb, R. I., & Yu, J. (2024). Stock price synchronicity and market liquidity: The role of funding liquidity. *Finance Research Letters*, 61, 105051.

Şamiloğlu, F., Bağcı, H., & Kahraman, Y. E. (2018). İşletmelerin likidite düzeylerinin karşılaştırılması: bist sürdürülebilirlik endeksi uygulaması. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (33), 115-129.

Türedi, H., Celayir, D., Çakalı, K.R., Baloğlu, G. (2023). Finansal oranlarla mali başarı ölçümü: borsa istanbul'da işlem gören orman ürünleri ve mobilya işletmeleri üzerine bir araştırma. *Başkent Üniversitesi Ticari Bilimler Fakültesi Dergisi*, (7)2, 83-107.

Yudaruddin, R., Nugroho, B. A., Mardiany, Fitrian, Z., Hapsari, P., Fitrianto, Y., & Santi, E. N. (2024). Liquidity and credit risk in Indonesia: The role of fintech development. *SAGE Open, 14*(2), 21582440241245248.