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IDENTIFYING AND ANALYZING THE RISK FACTORS OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN TEXTILE SECTOR

TEKSTİL SEKTÖRÜNDE SÜRDÜRÜLEBİLİR TEDARİK ZİNCİR YÖNETİMİNİN RİSK FAKTÖRLERİNİN BELİRLENMESİ VE ANALİZİ

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Abstract

Sustainable supply chain management is a management process that combines economic, social, and environmental contribution and foresees making certain decisions and planning at every stage of the supply chain line. With the understanding of sustainable management style, companies keep environmental traceability in the foreground, provide necessary regulations, take important steps in social environment cooperation, and achieve economic efficiency while doing all these. In addition to the economic investments required to make their supply chains more effective with a developing sustainability understanding, companies should also consider the risks that environmental and social factors may bring, taking into account the level of uncertainty in the future and their decisions. While the risk factor is accepted as the uncertainty associated with the occurrence of any event; on the other hand, risk management is strategically important in the planning of contingencies. Risk management in the supply chain is effective in identifying and analyzing risk factors in the economic and production cycle and in producing proactive solutions against risks. With the effect of the rapidly increasing population of the world, there is a significant increase in textile consumption. The risks were evaluated under the main headings of supply, production, distribution, customer, reverse logistics. The main headings were examined with economic, social and environmental subtitles. Potential risks are determined by reviewing the literature and taking opinions from textile sector employees. As a result of the study, it is aimed to develop a comprehensive framework for Sustainable Supply Chain Risk Management (SSCRM). Important strategies such as the ability to transform textile wastes into the raw materials of value-added products with appropriate technologies, which are included in the sustainability of textiles, are presented.

Özet

Sürdürülebilir tedarik zinciri yönetimi ekonomik, sosyal ve çevresel katkıyı birleştiren, tedarik zinciri hattının her aşamasında belirli kararlar verilmesini ve planlamalar yapılmasını ön gören bir yönetim sürecidir. Sürdürülebilir yönetim tarzı anlayışıyla firmalar çevresel izlenebilirliği ön planda tutarak gerekli düzenlemeleri sağlar, sosyal çevre işbirliğinde önemli adımlar atar ve tüm bunları yaparken ekonomik anlamda verimlilik elde eder. Firmalar, gelişen sürdürülebilirlik anlayışı ile tedarik zincirlerini daha efektif kılmak için gereken ekonomik yatırımlara ek olarak, gelecekteki belirsizlik düzeyini ve kararlarını dikkate alarak çevresel ve sosyal etmenlerin getirebileceği riskleri de ele almalıdır. Risk faktörü, herhangi bir olayın meydana gelmesiyle ilişkili belirsizlik olarak kabul edilirken; risk yönetimi ise beklenmedik durumların planlamasında stratejik açıdan önem arz eder. Tedarik zincirinde risk yönetimi, ekonomik ve üretim döngüsündeki riskleri belirlemek, analiz etmek ve risklere karşı proaktif çözümler üretmede etkilidir. Dünyanın hızla artan nüfusunun etkisiyle tekstil tüketiminde önemli bir artış söz konusudur. Riskler tedarik, üretim, dağıtım, müşteri, tersine lojistik ana başlıkları altında değerlendirildi. Ana başlıklar ekonomik, sosyal ve çevresel alt başlıklarıla incelenmiştir. Çalışmada potansiyel riskler, literatür gözden geçirilerek ve tekstil sektörü çalışanlarından görüşler alınarak belirlenmiştir. Çalışma sonucunda sürdürülebilir tedarik zinciri risk yönetimi (SSCRM) için kapsamlı bir çerçeve geliştirilmesi amaçlanmıştır. Çalışmada, tekstilde sürdürülebilirliğin sağlanmasının içinde yer alan tekstil atıklarının uygun teknolojilerle katma değerli ürünlerin hammaddelerine dönüşebiliyor olması gibi önemli stratejiler sunulmuştur.

Keywords: FMEA, Risk Factors, Risk Management, Sustainable Supply Chain, Sustainable Supply Chain Management

Anahtar Kelimeler: FMEA, , Risk Faktörleri, Risk Yönetimi, Sürdürülebilir Tedarik Zinciri, Sürdürülebilir Tedarik Zinciri Yönetimi

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1. INTRODUCTION

Risk management in the supply chain has emerged as one of the main research topics in recent years (Narasimhan & Talluri, 2009; Gurnani et al., 2011). The world economy, increasing outsourcing, developments in information technologies, and increasing market share have caused the complexity of the global supply chain to continue. This has created a risk environment arising from the uncertainties in the supply chain in a rapidly changing world.

Since businesses must be able to respond to increasing risks and uncertainties (Nagurney et al., 2005), they should identify and resolve risks in their supply chain lines in their own industries. Risks in the supply chain have been classified by different groups in the literature, and a wide variety of risks have been identified. Esfahbodi (2016), divided sustainable supply chain management into four groups: sustainable procurement, sustainable distribution, and reverse logistics. Beske et al. (2014) evaluated sustainable supply chain management practices in five groups: strategic orientation, continuity, cooperation, risk management, and proactivity for sustainability. Das (2018) discussed sustainable supply chain management practices by dividing them into five classes: environmental management practices, socially inclusive practices for employees, socially inclusive practices for society, operational practices, and supply chain integration. Hamdy et al. (2018) divided sustainable supply chain management practices into seven groups: internal environmental management, green purchasing, customer collaboration, eco-design, return on investment, social supply chain practices, and flexible supply chain. In the current study, sustainable supply chain management risk groups for the textile industry are determined as supply, production, distribution, customer, and reverse logistics. All risk groups are classified within themselves as economic, social, and environmental.

The main purpose of this study is to identify, analyze, and solve the risks for the textile industry, which is oneof the most important sectors within the scope of sustainable supply chain management. Failure Mode Effect Analysis (FMEA) method is applied by choosing a company from the textile industry. All stages of the supply chain have been taken into account, from the purchase of the raw material to the delivery to the customer as a result of the production process.

2. LITERATURE REVIEW

When the literature is examined, there are many studies on sustainability in the supply chain. FMEA analysis is one of the techniques frequently used in studies where risks related to errors are analyzed. Risk analysis is an important approach to improve quality and take action before failures occur, especially in labor-intensive industries. The textile industry is one of the industries where FMEA is preferred as a labor-intensive industry. Among the studies in the literature, the studies including FMEA approach are given in Table 1.

3. MATERIAL AND METHOD

3.1. Material

In the textile industry, product quality is very important. Many methods are used for quality assurance estimation, but there is not yet a preferred method for the most part. In this study, FMEA (Failure Modes and Effects Analysis) analysis, which is an important technical method, is applied to identify potential risks and prevent potential problems and quality problems. The area with the highest risk is determined, and priority is given to making the necessary improvements in this area. Before proceeding to the FMEA study, the existing literature studies are extensively researched, and the risk factors to be used in this study are determined in Table 2.

Table 2: The main dimensions and sub-risk factors that are the subject of the study.

| Main Dimensions | Sustainability Dimensions | Sub Risk Factors |
|--------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supply | Economic | Demand fluctuations/demand uncertainty risk (Guan et al., 2011) |
| Supply | Social | Price and cost volatility (Abdel-Basset & Mohamed, 2020) Lack of healthy partnership among supply chain partners (Mithun et al., 2019) Supplier failure (Song et al., 2017) Wrong supplier selection (Song et al., 2017) |
| Supply | Environmental | Lack of commitment to green in the supply chain (Rostamzadeh et al., 2018) |
| | | Lack of green suppliers (Rostamzadeh et al., 2018) |
| | | Raw material scarcity (Breen, 2008) |
| | | FMEA |
| Production | Economic | Frequent machine failures (Mutlu & Altuntas, 2019) |
| | | Inefficient use of resources (Abdel-Basset & Mohamed, 2020) |
| | | Currency and exchange rate fluctuations (Abdel-Basset & Mohamed, 2020) |
| | | Planning and scheduling errors in production (Rostamzadeh et al., 2018) |
| | | Wrong blend selection * |
| | | Abrage and risk related to quality (Mutlu & Altuntas, 2019; Rostamzadeh et al., 2018) Wrong yarn count (Mutlu & Altuntas, 2019) |
| Production | Social | Management policy errors (Rostamzadeh et al., 2018) |
| | | Operator errors/accident damage (Abdel-Basset & Mohamed, 2020) |
| | | Lack of sustainable information technology (Abdel-Basset & Mohamed, 2020) Information flow errors * |

Table 1: FMEA applications in the textile industry.

| Author(s) | Theme of the Study | Methods |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Bilici & Kosanoğlu, 2021 | Improvement of bottlenecks identified using value stream mapping method in a textile factory with lean manufacturing practices | Value Stream Mapping and FMEA |
| Karasan & Erdogan, 2021 | Risk assessment and proactive approach in a textile manufacturing business | FMEA, fuzzy AHP, and modified fuzzy TOPSIS |
| Fithri et al., 2020 | A proposal for a hybrid approach to reduce defects in a textile company | FMEA, Pareto analysis, and fishbone |
| Mutlu & Altuntas, 2019 | Hazard and risk analysis for the ring yarn production process with the integrated FTA-FMEA approach | FTA-FMEA |
| Beyene et al., 2018 | Reducing Downtime in a Textile Sharing Company | FMEA |
| Erdil & Taçgın, 2018 | Potential risks and analysis of the apparel and textile industry in Turkey | FMEA |
| Thawkar et al., 2018 | Analysis to reduce malfunctions of carding machines in the textile industry | FMEA |
| Küçük et al., 2016 | An application of FMEA method to the cutting department of a clothing company | FMEA |
| Nguyen et al., 2016 | An empirical study in the non-woven fabrics industry | FMEA |
| Sabır & Bebekli, 2015 | The use of error types and effects analysis in FMEA, textile dyeing- finishing businesses | FMEA |
| Özyazgan, 2014 | FMEA analysis and application in a textile factory producing woven fabric | FMEA |

The differences of this study from previous studies are the lack of studies on sustainability in textiles, the inclusion of possible sustainability risks in textiles within the scope of sustainable supply chain management, the fact that it is a comprehensive application since many faults are examined, a multidisciplinary approach which is presented by establishing an FMEA team, and providing proactive solutions with brainstorming and experience of the textile team in order to prevent mistakes.

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| Inadequate recycling policies * Reverse Logistics Hazardous air emission (Song et al., 2017) | | Social | Difficulties in recycling waste* |
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| Logistics Hazardous air emission (Song et al., 2017) | Daviers | | inadequate recycling policies * |
| • | | Environmental | Hazardous air emission (Song et al., 2017) |
| | -0 | | Risks of dumping waste (Rostamzadeh et al., 2018) |

^{*} Created by authors.

3.2. Methods

3.2.1. Failure Mode and Effect Analysis (FMEA)

Failure Mode and Effect Analysis is a systematic method used to identify and prevent product and process problems before they occur. FMEA focuses on preventing defects, improving safety, and increasing customer satisfaction. FMEA also standardizes the process approach and creates a common language that canbe used both within and between companies. FMEA is always used by engineers to analyze processes and products for potential failures. It can also be used by non-technical and technical workers at all levels (McDermott et al., 2009).

FMEA method gives more effective results when applied by a team. Detection of errors, determination of risk priority, implementation of corrective and preventive actions and

prevention of errors were carried out by the FMEA team. Elements of FMEA method are functions and error types, consequences (effects), severity, causes, occurrence, control, detectability, risk priority number. The risk priority number (RPN) is determined according to Equ (1). This coefficient shows the degree of risk, and the values are ordered from largest to smallest. The greater the value, the greater the danger of the risk.

4. RESULTS AND DISCUSSION

The application of the study is carried out in a textile company, and it is aimed to determine the risk factors of sustainable supply chain management in the company and to reduce the risk values by taking the necessary precautions. By examining the literature and taking the opinions of the experts working in this company, 43 risky errors are identified in the company. These errors were evaluated in terms of supply, production, distribution, customer and reverse logistics. In the FMEA method, it is one of the most common methods for experts from different departments to come together and brainstorm. In this study, a FMEA team was formed and the ROS values in Table 3 were determined with their opinions. The determined RPN values are ordered from largest to smallest. Considering the highest RPN values, possible errors in the main groups of production, supply, and reverse logistics are seen. Distribution and customer main dimensions are atthe bottom of the risk list and should be given less priority. The risk with a high RPN value is more likely to encounter a potential error and the damage it will cause is higher. Necessary corrective actions are determined for errors with a risk priority score of 100 or higher than 100, and preventive actions are developed to prevent their recurrence (Table 3). For Table 3, according to the graphic in Figure 1, the stages of supply, production, distribution, customer, andreverse logistics in the supply chain management line contain risks at different levels of importance. When the risk factors considered in the current study are compared with the relevant main dimension, the reverse logistics stage shows the risks that should be reduced in the first place with a value of 26%. It is followed by the main dimension of supply (23%) and the main dimension of production (22%). This shows that we should pay importance to sustainable risks in our sustainability-based study.

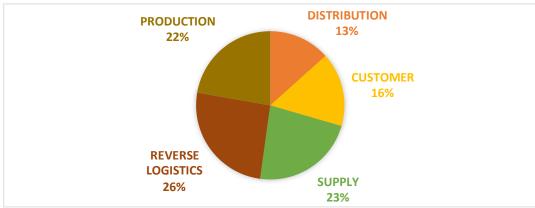


Figure 1: Risk distribution by main dimensions.

| | | New RPN | 84 | 96 | 70 | | 84 | 06 | 64 | 84 | 96 | 84 | 72 | 80 | 40 | 09 | | 75 | 20 | | |
|--------------------|--------------------------------------------------|--------------------|----------------------------------------------|-------------------------|---------------------------------------------------------|-------------------------------------------------------|------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------|----------------------------------------------------|-------------------------|--------------------------------------------------------|-----------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------|---|------------|
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| opliers | Provid | in g su | stanhal | ហា | y tr ล ใกi | ng to | າງSu | pp¶ers | , cờnv | eyMg | ৳ | purpose | m | ₹7 | 48 | 57 | 280 | 3 | 87 | 4 | 96 |
| lures (blow frame, | Plannin | g r e gu | | | enakce nings g | | | | | :a n dr | <u>@</u> | rdine the | 168 | 09 ₁ 7 | 160 | √160 | 245 | ô60 | ¥50 | 5 | 70 |
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| to green in ain | | S | pďatir ග | ng (| ontrac | | d tr | aining ഹ | of sup | pliers o | 5 | 80 | 3 7 | ∞ ₆ | 4 ∞7 | 4 80 | 210 | 4 83 | } 5 | 4 | 84 |
| energy | Switch | ing to | the us | e c | | vable vest | e en | ergy so | | , planr | ning | related ഉ | | _ | 8 | | 2 <u>0</u> 0 | 3 | 6 | 5 | 90 |
| ccident | Ensuring th | م ع د ء | | LOL | tive eq | uipm | ent | , chec | . <u>.</u> | .: # | | 3 | | cessa 9 | 8 | 45 | reginal | lighting | malmg | 4 | 64 |
| nission | Choosi | lean a | hig hig | high | ua∰y e | nerg | y sc | uzces, | Site Birth | techno | olog | jes t enat v | og <mark>ra</mark> m | nitiating necessary | 8 | :he cost | 1\$\bar{2}{2} | and | and ma | 4 | 84 |
| ing waste | Keeping Pre | | Hrop (A) | ng Ats | lassific | ation | ι _o f | .⊑ w⊊aste | guage page | e Lee | | ordir cordir ace | RP pi | S, initiatin esources | 9 - - | ta k e t | at s ns | lation lation | periods | 4 | 96 |
| lated to | Reeping a re quality *g or ± | itroi u | n <u>≖</u> , in | νgs | ilenes ai tigeting ta≹in⊊ | g une | ₽ae | Tective | ∍∺aa£t | agcor | þЩ | freeden Sarbadge intenbadge | m Electron | imposing limitations, ini testing alternative resor | customer | gधीatioff, the relधvant'instftuti8ns undertake the costsे | ngedige stat | approach the wareing Adequate ventilation | certain peri | 7 | 84 |
| errors | S <u>e</u> bb | orting | emp | liøì | cegwit | n info | <u>j</u> m | a g on f | r g ma | he E | μį | pegraem E | fro | limi ega | | <u>8</u> | 1628 | da da da | ært | 4 | 72 |
| esources | Putting a gud | ta on | the res | g | rce္အ ပန္မွ် | ed, ir | <u>₽</u> po | s @ g_Ji | ĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ | oigs,.¥n | t (a | | ड्रिwith informatign | osing ngralt | ogder by the | stAut | 1 € 0 5 | ade a | Ցuppffers հո | 4 | 80 |
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| | unloadiജg; | waste | w⇔reh | œ i | sesash₿ | uld h | <u>≅</u> ve | a deq₁ | ı₩eŞv | e fi til a t | iφη | a⊞ad≹igFot | n Bei | _ = i3 | Confirmation | atioff | 160 | - 30 le | performance | 5 | 75 |
| election | Table 3: New ⊞Nev | g the | Active and effic | Providing sust | Planning reg | | | Switching to the | Ensuring the use o配p record ofocc單p | Choosing clean and o | | Keeping a record of the quality control untercepts | Supporting 88m | Putting a quota on the studies im | Сорт | Under the regtila | Evaluating the separation | | Examining the p&R | 5 | 50 |
| | | Sub Risk Factors | Planning and scheduling errors in production | Lack of green suppliers | Frequent machine failures (blow room, card, draw frame, | comber, ring, bobbin) Lack of commitment to green in | the supply chain | Inefficient use of energy | Operator errors/accident damage | Hazardous air emission | Difficulties in recycling waste | Abrage and risk related to quality | Information flow errors | Inefficient use of resources | Risk of wrong order request | High cost for disposal of hazardous waste | مئر درین مونوستان مو عراعات | Misks of duffipling waste | Wrong supplier selection | | |

| Fire danger | | | | | | י |) | RPN |
|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---|-----|-----|-----|-----|---|-----|
| | adjustments according to the results | | | | | | | |
| | Providing the fire alarm system in the company with full equipment, training the employees | m | 9 5 | 135 | 5 2 | 6 | 4 | 72 |
| Soil, water, air, noise pollution | Ensuring the use of necessary protective equipment | 4 | 8 4 | 128 | 8 4 | 4 | 4 | 64 |
| Currency and exchange rate fluctuations | Annual planning of necessary investments, not making instant decisions | _ | 6 3 | 126 | 9 | 4 | n | 09 |
| Lack of sustainable information technology | Updating the ERP program | 5 | 5 5 | 125 | 5 3 | | 5 | 75 |
| Demand risk ass <mark>oci<mark>發码</mark> with demand fluctuat<mark>豫n쬨ആ</mark>mand uncertaint<mark>家</mark> 第</mark> | Somer-oriented forecasts are sales and customer-oriented | 9 | 4 5 | 120 | 0 3 | 4 | 7 | 09 |
| Supplier failure | Providiশ্বি periodic supplier performance, increasing the frequency of communication with the supplier | 4 | 6 5 | 120 | 0 4 | . 5 | 3 | 9 |
| M Deployment planning errors | Making use of Industry 4.0 technologies, keeping track of stock management, keeping MRP up to date in the ERP program | 4 | 4 7 | 112 | 2 3 | 4 | 2 | 24 |
| Water scarcity | Making production according to the order by reducing the stocked work, preventing the use of extra water | m | 9 4 | 108 | 8 | 4 | 4 | 48 |
| Excessive or unecessary pack蜡碱 | Evaluation of green packaging options | m | 7 5 | 105 | 5 3 | | က | 63 |
| omer on | suring Kh sitive sol | m | 7 5 | 105 | 5 3 | 2 | 7 | 30 |
| Wrong blend selection | · | n | 6 5 | 90 | | | | 1 |
| Inadequate personal protective equipment | | m | 6 5 | 06 | | | | 1 |
| Damage to products during handling and shipping | | m | 9 | 06 | 0 | | | ı |
| Raw material scarcity | | 4 | 7 3 | 84 | L. | | | ı |
| Wrong yarn number | | 2 | 9 / | 84 | _ | | | 1 |
| The risk of changing customers | | က | 4 7 | 84 | _ | | | 1 |

| | lew RPN | | ı | ı | ı | | ı | ı | ı | ı | | | 1 | | | , | , | | | | | | | | | |
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| Acti | ve a n | ef | fici | ent | use | of t | he E | 1 | | _ | n, l | nte | egra | tio | n c | f ERP | wi | th other | 6 | 8 | 6 | 288 | 2 | 7 | 6 | 84 |
| | Provid | ling | sus | tai | nabi | lity | trair | Ι' | _ | | plie | rs, | con | ıve | yin | g its p | urı | oose | 7 | 8 | 5 | 280 | 3 | 8 | 4 | 96 |
| P | Z an <mark>⊋</mark> in | g re | _ | | | | | | | _ | | | | | | | Z reni | ng the | 7 | 7 | 5 | 245 | 2 | 7 | 5 | 70 |
| | | | | | ' & | | | 100 | ` | | | | - | ٠ ا | <u>م</u> | | 4 | | | | | | | | | |
| | a | | υ m | pda m | m | | ntra ∼ | 7 | and 5 | trai ∽ | inin ه | g c | of su ∼ | · c | 7 | Η | 1 | | 6 | 7 | 5 | 210 | 3 | 7 | 4 | 84 |
| | Switch | ing | to | the | use | otr | | 1 | | | - 1 | so | urce | es, I | ola | nning | re | lated | 5 | 8 | 5 | 200 | 3 | 6 | 5 | 90 |
| Ensu | _ | | | 1 1 | | - 1 | ve e | quip | me | ent, | che | - 1 | _ | | | | | | 6 | 8 | 4 | 192 | 2 | 8 | 4 | 64 |
| Choo | | | | 1 1 | nigh | qua | lity | ene | rgy | sou | rce | s, l | usin | g te | | | | | 6 | 8 | 4 | 192 | 3 | 7 | 4 | 84 |
| | | | | Pr | | | | | | | | | | | e | | | | 5 | 9 | 4 | 180 | 4 | 6 | 4 | 96 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| qual | ity cor | ntro | | | | - 1 | | 1 | | | - 1 | - 1 | | | | | tc | quality | 3 | 8 | 7 | 168 | 2 | 6 | 7 | 84 |
| | Supp | ort | | | | | | Γ. | | | | | | | | | gra | am | 3 | 7 | 8 | 168 | 3 | 6 | 4 | 72 |
| Puttin | | | | | | - 1 | | 1 | | - | Г | - 1 | | | | | _ | necessary | 5 | 8 | 4 | 160 | 4 | 5 | 4 | 80 |
| | autic | stuc | | | | | | 1 | | _ | | | | | | | !S | | 4 | 8 | 5 | 160 | 1 | 8 | 5 | 40 |
| | ĕ | the | | | | | | | | | | | | | | | e c | osts | 4 | 8 | 5 | 160 | 2 | 6 | 5 | 60 |
| | | 1 | l . | | | - 1 | | 1 | | | | - 1 | | | - 1 | | | | | | | | | | | |
| | _ | | | _ | | - 1 | | 1 | | - | | - 1 | | | | | | _ | 4 | 8 | 5 | 160 | 3 | 5 | 5 | 75 |
| Exa | minin | g th | ie į | per | form | nanc | e o | fsu | ppl | iers | in | cer | tain | ιpe | eri | ods ai | nd | making | 6 | 5 | 5 | 150 | 2 | 5 | 5 | 50 |
| | Sub Risk Factors | purchasing desires | inagement policy errors | nsufficient ventilation | mation flow management | risk in distribution of harming the guality of | or naming the quanty of ucts purchased by custom | lequate recycling policies | rice and cost volatility | k of healthy partnership | ngsupply chain partners | Fuel prices | le disconnection in the | ner-company relationship | Inventory risk | sive amount of hazardous waste | k of qualified personnel | | | | | | | | | |
| | Ensu Choo Keepir qual Putting Evalua bein unlos | Active and Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide Provide 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5. CONCLUSION

In this study, possible risks were determined by conducting a risk analysis within the scope of sustainable supply chain management in a company manufacturing in the textile sector, and situations with high risk were determined with the help of FMEA method. While determining the risks, the literature was examined; and experts working in different departments of the company came together and brainstormed. With the expert opinions, new risks such as wrong blend selection, information flow errors, distribution planning errors, risk of wrong order disconnection in customer-company relationship, expressing customer dissatisfaction, difficulties in recycling waste, inadequacy of recycling policies were added to the study. The probability, severity, and detectability scoring of the identified risks were determined by the team with a consensus. In the study, 43 risks were determined by the team, and 25 of them had an RPN above 100. Precautionary recommendations were made for these 25 possible risks. In the measures taken, priority was given to reducing the probability of the risk. In cases where probability could not be reduced, work was carried out to reducethe severity or increase the awareness. For all risks, recommendations that offer proactive approaches in preventing risks were presented, and RPN values were reduced below 100. The success of the results of the study enabled it to be accepted in the company. Compliance with planned control activities is an important factor in reducing risks. For this reason, it is thought that the number of dangerous behaviors will decrease if the recommendations are followed. In this study, radical and important change proposals such as program integration, tightening of controls, training, moving towards green and sustainable practices, and updating the contract are presented. If the company complies with these recommendations, it will take the more sustainable supply chain management to a higher level. Risk analysis is not a one-time application; therefore, it is recommended to repeat it. Since the conditions will change over time, repeating the risk analysis at certain intervals will guide the company more accurately. In this context, the company is recommended to keep the risk analysis study up-to-date.

7. REFERENCES

- Abdel-Basset, M., & Mohamed, R. (2020). A novel plithogenic TOPSIS-CRITIC model for sustainable supply chain risk management. *Journal of Cleaner Production*, *247*, 119586. https://doi.org/10.1016/j.jclepro.2019.119586
- Ali, S. M., Moktadir, M. A., Kabir, G., Chakma, J., Rumi, M. J. U., & Islam, M. T., (2019). Framework for evaluating risks in food supply chain: Implications in food wastage reduction. *Journal of Cleaner Production*, *228*, 786–800. https://doi.org/10.1016/j.jclepro.2019.04.322
- Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. *International Journal of Production Economics*, 152, 131–143. https://doi.org/10.1016/j.ijpe.2013.12.026
- Beyene, T. D., Gebeyehu, S. G., & Mengistu, A. T. (2018). Application of failure mode effect analysis (fmea) to reduce downtime in a textile share company. *Journal of Engineering, Project, and Production Management*, 8(1), 40–46.

- Bilici, S., & Kosanoğlu, F. (2021). Değer akış haritalama ve fmea yöntemleri kullanılarak tekstil sektöründe yalın üretim uygulaması. *International Journal of Advances in Engineering and Pure Sciences*, 33(1), 131–142. https://doi.org/10.7240/jeps.784530
- Breen, L. (2008). A preliminary examination of risk in the pharmaceutical supply chain (PSC) in the national health service (NHS). *Journal of Service Science and Management*, 1(2), 193–199. https://doi.org/10.4236/jssm.2008.12020
- Dai, M., & Liu, L. (2020). Risk assessment of agricultural supermarket supply chain in big data environment. *Sustainable Computing: Informatics and Systems*, *28*, 100420. https://doi.org/10.1016/j.suscom.2020.100420
- Das, D. (2018). The impact of sustainable supply chain management practices on firm performance: Lessons from Indian organizations. *Journal of Cleaner Production*, 203, 179–196. https://doi.org/10.1016/j.jclepro.2018.08.250
- Dewanti, N. A. Y., Setyaningsih, Y., & Jayanti, S. (2018). Working environmental hazard at home-based workers in the charcoal industrial sector in Semarang. *KnE Life Sciences*, 4(5), 484–495. https://doi.org/10.18502/kls.v4i5.2578
- Erdil, A., & Taçgın, E. (2018). Potential risks and their analysis of the apparel & textile industry in Turkey: A quality-oriented sustainability approach. *Fibres & Textiles in Eastern Europe*, *6*(132), 30–42. https://doi.org/10.5604/01.3001.0012.2526
- Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics*, 181, 350–366. https://doi.org/10.1016/j.ijpe.2016.02.013
- Esmaeilian G., Ahmad M., Ismail N., Sulaiman S., & Hamedi M. (2008). Particular model for improving failure mode effect analysis (FMEA) by and using of overall equipment efficiency (OEE). In 2008 International Symposium on Information Technology, Kuala Lumpur, Malaysia (pp. 1–9). IEEE. https://doi.org/10.1109/ITSIM.2008.4631974
- Fithri P, Andra D. J., & Wirdianto E. (2020). The use of FMEA for the quality control analysis of greige fabrics (case study in the weaving department of pt. unitex, tbk). In *IOP Conference Series: Materials Science and Engineering* (Vol. 847). IOP Publishing. https://doi.org/10.1088/1757-899X/847/1/012002
- Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: a risk management approach. *International Journal of Production Economics*, *171*, 455–470. https://doi.org/10.1016/j.ijpe.2015.06.032
- Guan, G. F., Dong, Q. L., & Li, C. H. (2011). Risk identification and evaluation research on F-AHP evaluation based supply chain. In *IEEE 18th International Conference on Industrial Engineering and Engineering Management* (pp. 1513–1517). IEEE. https://doi.org/10.1109/ICIEEM.2011.6035447
- Gurnani, H., Ray, S., & Wang, Y. (2011). Special issue of production and operations management: "Global supply chain risk management." *Production and Operations Management*, 5(20), 786–786. https://doi.org/10.1111/j.1937-5956.2011.01283.x

- Hamdy, O., Elsayed, K. & Elahmady, B. (2018). Impact of sustainable supply chain management practices on Egyptian companies' performance. *European Journal of Sustainable Development*, 7(4), 119–130.
- Jing, X., Dongjie, Z., & Zhongsu, M., (2009). The research on the BP neural network application in food supply chain risk management. In 2009 International Conference on Information Management. Innovation Management and Industrial Engineering (pp. 545–548). IEEE. https://doi.org/10.1109/ICIII.2009.137
- Karasan, A., & Erdogan, M. (2021). Creating proactive behavior for the risk assessment by considering expert evaluation: A case of textile manufacturing plant. *Complex & Intelligent Systems*, 7, 941–959. https://doi.org/10.1007/s40747-020-00246-0
- Küçük, M., İşler, M., & Güner, M. (2016). An application of the FMEA method to the cutting department of a clothing company. *Textile and Apparel*, *26*(2), 205–212.
- Liu, M., & Fan, H. (2011, August). Food supply chain risk assessment based on the theory of system dynamics. In 2011 2nd International Conference on Artificial Intelligence,

 Management Science and Electronic Commerce (AIMSEC) (pp. 5035–5037). IEEE.
- McCormack, B., McCance, T., & Maben, J. (2013). Outcome evaluation in the development of person-centred practice. In B. McCormack, K. Manley, & A. Titchen (Eds.), *Practice development in nursing and healthcare* (pp. 190-211). John Wiley & Sons.
- Mcdermott, R. E., Mikulak, R. J., & Beauregard, M. R. (2009). *FMEA* (2nd ed.). CRC Press Taylor & Francis Group.
- Mutlu, N. G., & Altuntas, S. (2019). Hazard and risk analysis for ring spinning yarn production process by integrated FTA-FMEA approach. *Textile and Apparel, 29*(3), 208–218. https://doi.org/10.32710/tekstilvekonfeksiyon.482167
- Nagurney, A., Cruz, J., Dong, J., & Zhang, D. (2005). Supply chain networks, electronic commerce and supply side and demand side risk. *European Journal of Operational Research*, 164(1), 120–142. https://doi.org/10.1016/J.Ejor.2003.11.007
- Narasimhan, R., & Talluri, S. (2009). Perspectives on risk management in supply chains. *Journal of Operations Management*, *27*(2), 114–118. https://doi.org/10.1016/j.jom.2009.02.001
- Natarajarathinam, M., Capar, I., & Narayanan, A. (2009). Managing supply chains in times of crisis: A review of literature and insights. *International Journal of Physical Distribution & Logistics Management*, *39*(7), 535-573. https://doi.org/10.1108/09600030910996251
- Nguyen, T. L., Shu, M. H., & Hsu, B. M. (2016). Extended FMEA for sustainable manufacturing: An empirical study in the non-woven fabrics industry, *Sustainability*, 8(9), 939. https://doi.org/10.3390/su8090939
- Nogueira, F. G. E., Castro, I. A., Bastos, A. R. R., Souza, G. A., de Carvalho, J. G., & Oliveira, L. C. A., (2011). Recycling of solid waste rich in organic nitrogen from leather industry: Mineral nutrition of rice plants. *Journal of Hazardous Materials*, *186*(2–3), 1064–1069. https://doi.org/10.1016/j.jhazmat.2010.11.111

- Ortolano, L., Sanchez-Triana, E., Afzal, J., Ali, C. L., & Rebellón, S. A. (2014). Cleaner production in Pakistan's leather and textile sectors. *Journal of Cleaner Production*, *68*, 121–129. https://doi.org/10.1016/j.jclepro.2014.01.015
- Özyazgan, V. (2014). FMEA analysis and implementation in a textile factory producing woven fabric. *Textile and Apparel*, *24*(3), 303–308.
- Rostamzadeh, R., Ghorabaee, M. K., Govindan, K., Esmaeili, A., & Nobar, H. B. K. (2018). Evaluation of sustainable supply chain risk management using an integrated fuzzy TOPSIS-CRITIC approach. *Journal of Cleaner Production*, *175*, 651–669. https://doi.org/10.1016/j.jclepro.2017.12.071
- Song, W., Ming, X., & Liu, H. C. (2017). Identifying critical risk factors of sustainable supply chain management: A rough strength-relation analysis method. *Journal of Cleaner Production*, 143, 100–115. https://doi.org/10.1016/j.jclepro.2016.12.145
- Stamatis, D.H. (1995). Failure mode and effect analysis: FMEA from theory to execution (1st ed.). Quality Press.
- Thawkar, A., Tambe, P., & Deshpande, V. (2018). A reliability centred maintenance approach for assessing the impact of maintenance for availability improvement of carding machine. *International Journal of Process Management and Benchmarking, 8*(3), 318–339. https://doi.org/10.1504/IJPMB.2018.092891