
<https://doi.org/10.54318/eip.2021.dn.299>

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IMPACT OF DISRUPTION IN THE SUPPLY CHAIN ON THE FLEXIBLE PACKAGING INDUSTRY DURING THE COVID-19 PANDEMIC

UTICAJ DISRUPCIJA U LANCU SNABDEVANJA UNUTAR INDUSTRIJE FLEKSIBILNE AMBALAŽE UZROKOVANIH PANDEMIJOM VIRUSA COVID-19

JEL CLASSIFICATION: M10, M20, M21, M29.

ABSTRACT:

In the packaging industry, disruptions occurring in the supply chain can impact all the segments and have huge consequences on the operations conducted by the distributors. We are witnesses of an unprecedented crisis caused by the COVID-19 pandemic. It has influenced all layers of the society and forced us to make changes and adjustments to our every-day routine, regulations, economy. Disruptions can undermine the stability of the supply chain, causing business losses. Therefore, identifying the impact of different

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disruptions on the supply chain is crucial. Here, a timely and quick reaction is of great importance. The current pandemic has caused many disruptions in the industry and has impacted all parts of the supply chains in ways that have not been yet recorded, therefore making it even harder for the companies to respond to new challenges. The changes have not skipped the packaging industry, forcing the manufacturers to rethink their strategies and the consumers to change their views of a safe and reliable product. With the economic expansion, the demand for flexible packaging and has been growing. There are many advantages to flexible packaging. Besides the fact that it creates less environmental impact, it also requires fewer resources compared to traditional packaging production. Disruptions in the supply chains of the flexible packaging industry are one of the major economic concerns during the COVID-19 pandemic, and therefore the topic of this paper. Since the companies in the industry are in desperate need for a new approach regarding risk management and building business resilience, some strategies for overcoming the challenges of the crisis on the flexible packaging market have been presented here.

**KEYWORDS:****DISRUPTIONS, SUPPLY CHAIN, COVID-19, FLEXIBLE PACKAGING****APSTRAKT:**

U ambalažnoj industriji, poremećaji koji se događaju u lancu snabdevanja mogu uticati na čitavu industriju, posebno na poslovanje preduzeća koje se bave nabavkom. Svedoci smo još neviđene krize koju je pokrenula pandemija virusa COVID-19. Pandemija je uticala na sve slojeve društva i naterala nas da promenimo i prilagodimo našu svakodnevicu, propise, privredu. Takvi poremećaji mogu narušiti stabilnost lanca snabdevanja i uzrokovati poslovne gubitke. Zbog toga je detektovanje uticaja različitih poremećaja na lanac snabdevanja od velike važnosti. Isto tako, važna je i brza i pravovremena reakcija. Ova pandemija uzrokovala je poremećaje u industriji i utiče na sve delove lanca snabdevanja na način koji do sada još nismo susreli. Zato je mnogim preduzećima teško regovati na nove izazove. Promene nisu zaobišle ni ambalažnu industriju, već su naterale proizvođače unutar industrije da razmisle o svojim strategijama, a potrošače da promene način na koji vide siguran i pouzdan proizvod. S otvaranjem ekonomije, porasla je i potražnja za fleksibilnom ambalažom koja donosi mnoge prednosti. Osim što njena proizvodnja ima manje štetan uticaj na okolinu, takođe iskorišćava manje resursa nego što je to slučaj kod tradicionalne proizvodnje. Poremećaji u lancu snabdevanja fleksibilne ambalažne industrije neki su od glavnih ekonomskih interesa za vreme pandemije virusa COVID-19, te samim time i centralna tema analize u ovom radu. Kako je preduzećima u ovoj industriji hitno potreban novi pristup upravljanju rizikom i izgradnji poslovne otpornosti, u radu su predstavljene neke od strategija za savladavanje izazova u doba krize.

**KLJUČNE REČI:****DISRUPCIJE, LANAC SNABDEVANJA, COVID-19, FLEKSIBILNA AMBALAŽA**

1. INTRODUCTION

Due to the COVID-19 pandemic, all aspects of our lives have changed dramatically. We have adapted our daily routines and the way we see and develop new sets of values and norms.² Disruptions can destroy the stability of a supply chain, resulting in business failure.³ Therefore, establishing the impact of different disruptions on the supply chain is of great significance.⁴ Unfortunately, the pandemic has caused many losses, in human lives and in economy. Sectors like manufacturing and supply chain logistics have been greatly affected as well.⁵ Timely reaction to any kind of disruption is crucial.⁶ Implementation of innovative technology under the supply chain can help company in achievement of higher efficiency.⁷ The supply chain management has to keep in mind the importance of resilience, as it has been identified as one of the most important factors for success.⁸ Anti-coronavirus measures have been passed by the authorities throughout the world trying to prevent the spreading of the coronavirus disease.⁹ The outbreaks have caused many disruptions in the supply chains, such they have not yet experienced and coped with.¹⁰ The changes have been visible throughout, especially in the packaging industry, flexible packaging in particular. Flexible packaging has found its use in many industries. Due to the outbreaks and lockdowns, people have been panic-buying specific products, such as different foods and sanitizers, and the manufacturers have been facing new challenges of designing adequate packaging for shipping those products, while meeting the required anti-COVID-19 measures.¹¹ One of the innovations that has helped the flexible packaging market rise is the use of lighter materials. Such materials enable more flexible, but strong and durable packaging that provide better protection and is appealing to the consumers.¹² Plastic is one of the most often used materials for flexible packaging. It offers a range of advantages, from efficient distribution, to longer shelf-life of the product.¹³

The focus of this paper will be disruptions in the supply chains and how they influence the flexible packaging industry during the COVID-19 pandemic. The paper has been structured in four chapters. Following the first, introductory part, the second chapter analyses the flexible packaging industry. The third chapter deals with disruptions in the supply chain and the interdependence between the supply chain and the flexible packaging industry during the COVID-19 pandemic. This chapter also addresses the strategies companies on the flexible packaging market can implement to better overcome these trying times and to prepare for the possible hardships in the future. Conclusions are presented in the fourth chapter. Secondary data from many relevant scientific magazines and other publications by the prominent institutions were used as the basis for this paper.

2 Perfect packaging (23.06.2021).

3 Aćimović et al. (2021)

4 Hu et al. (2017)

5 World Health Organization (11.03.2020)

6 Paul et al. (2018)

7 Stajić (2020), p. 65

8 de Sousa Jabbour et al. (2020)

9 Galanakis (2020)

10 de Sousa Jabbour et al. (2020)

11 Perfect packaging (23.06.2021)

12 <https://www.flexpack.org/advantages>

13 <https://www.persistencemarketresearch.com/market-research/flexible-plastic-packaging-market.asp>

The data was analysed with the methods of data description, analysis, synthesis and comparison.

2. BRIEF OVERVIEW OF THE FLEXIBLE PACKAGING MARKET

In the last two decades, the European and North American packaging markets have been dominating the industry. But, due to the rise in demand for packaged foods and other high-demand products during the COVID-19 pandemic, the Asian flexible packaging market has been developing rapidly.¹⁴ Global growth of the packaging industry in general has been stimulated by the growth of the middle-class population.¹⁵ The flexible packaging market has been recording considerable growth over the last two decades on global scale, enabled mainly by technological innovations and new views on how to achieve sustainability. In 2020, the flexible packaging market was worth USD 230.49 billion, and the projections say this number will only grow in the period from 2021-2026, reaching the value of USD 289.89 billion in the year 2026, the compound annual growth rate (CAGR) being 3.89%.¹⁶ The CAGR for 2020-2021 is expected to be 5.7%, since the global flexible packaging market is expected to grow to \$151.92 billion in 2021, compared to the value of \$143.79 billion in 2020. Furthermore, the projections for 2025 are USD182.04 billion at a CAGR of 4.6%.¹⁷ The share of the flexible packaging market in the general packaging market is 19%.¹⁸ The growth of this particular sector can be attributed to the rapid growth of e-commerce because most consumers opt for buying food and beverage, and many other products, online during this insecure pandemic times.

The Flexible Packaging Market is segmented by¹⁹:

- material type: plastic, paper, aluminium foil
- product type: pouches, bags, films & wraps, other product types,
- end-user industry: food, beverages, pharmaceutical and medical, household and personal care
- geography.

The plastics segment includes polyethylene, polystyrene, polyvinyl chloride, polyamide, ethylene vinyl alcohol, and polypropylene.²⁰

Packaging can be seen as a system that enables goods be delivered to the consumers safe and ready-to-use. Companies should adopt broader approaches to the processes of packing, including the supply chain and the consumption of goods, if they want to reach sustainable production without affecting the environment, i.e., with the aim of reducing

14 <https://www.woodmac.com/research/products/chemicals-polymers-fibres/films-flexible-packaging/flexible-packaging/>

15 Packaging Europe (23.04.2021)

16 Mordor Intelligence (2020)

17 ReportLinker (July 2021)

18 Joker (21.08.2019)

19 Mordor Intelligence (2020)

20 <https://www.persisistencemarketresearch.com/mediarelease/flexible-plastic-packaging-market.asp>

their environmental footprint.²¹ All sorts of pliant materials are used for designing and manufacturing flexible packaging. Some of them include bags, pouches, labels, liners and wraps, utilising paper, plastic film, aluminium foil, metallised or coated paper, plastic film or any combination of these materials.²² Flexible packaging industry offers unique solutions to new challenges companies from different industries are facing. Some of the advantages of flexible packaging include using less material, less energy and creating less GHG emissions and waste.²³

There are more reasons why this industry is constantly developing²⁴:

- Flexible packaging market has been growing and the players on the market have to come up with new, cost-effective and attractive solutions to replace traditional rigid packaging. Flexible packaging has become the innovation for every company in the industry that wishes to focus on sustainability.
- Customers are attracted by flexible packaging and are willing to pay more for such products.
- Food products are in the focus of flexible packaging market and the flexible packaging of food takes up more than 60% of the total market.

Many companies dealing with flexible packaging have been impacted by the COVID-19 outbreaks and have been experiencing disruptions at the manufacturing sites and in the supply chains. The global food safety initiative (GFSI) certification programs started to provide six-month certificate extensions when the pandemic first started, with the effort to try and diminish such disruptions. They have enabled remote risk assessment regarding the COVID-19 and the possibility that new suppliers can be chosen without an on-site audit.²⁵

Market research shows that demand for packaged foods has risen by 10.5%. In line with that, the importance and advantages of flexible packaging options have been identified and recognized by all the players on the market. Such packaging contributes to less food being wasted and food products are kept fresh for a longer period of time. A prolonged shelf-life is always a goal, especially in the times of crisis. Companies need to adjust to new rules, especially since e-commerce has been expanding rapidly, demanding lighter materials and packaging solutions that save space in transport.²⁶ There are other great benefits to flexible packaging, like using fewer resources and having lower impact on the environment.²⁷ Although flexible packaging is not a new trend in the industry, being present since the early 1950s, it is developing fast, setting new standards and creating solutions that offer better protection, more attractive design and customer-friendly products, aiming at sustainable development and positive impact on the environment and on the consumers.²⁸ The flexible packaging market is characterized by high competition and moderate market concentration. The major companies that share the market maintain

21 Büsser, and Jungbluth (2009)

22 Büsser, and Jungbluth (2009)

23 Flexible Packaging Association (2016)

24 Mordor Intelligence (2020)

25 Mordor Intelligence (2020)

26 Perfect Packaging (23.07.2021)

27 Flexible Packaging Association (01.06.2017)

28 Flexible Packaging Association (2016)

their competitive advantage by using different business strategies (innovation, mergers, acquisitions).²⁹

3. SUPPLY CHAIN DISRUPTIONS AND FLEXIBLE PACKAGING MARKET

3.1. Supply chain disruptions on the flexible packaging market in general and during the pandemic

Most often, supply chain is treated as a unique unit.³⁰ Supply chains consist of many parts and players and are therefore vulnerable and sensitive to change. Their complexity and instability only grow because of the global economic expansion. The stability of a supply chain can be threatened by different disruptions, coming from different sources: social, demographic, political, regulatory and natural.³¹ Supply chains' resilience has been shaken by many disruptions, especially in recent times. These disruptions can bring insecurity, cost increase, even bankruptcy and supply chain disintegration³² and the players in the supply chain need to come up with solutions to overcome these disruptions and minimize the negative effects.³³ Majority of companies around world are aware that global supply chains can be easily disrupted.³⁴

The vulnerabilities in the supply chain manifest in five main areas³⁵:

- a) planning and supply network,
- b) transport and logistics,
- c) financial resilience,
- d) product complexity and
- e) organizational maturity.

These vulnerabilities include real occurrences inherent to the industry, such as high cyclical nature or long delivery period, and the decision on the adequate stock for maintenance or on the access to product development. Supply processes that rely on just one source of supply are evidently bottlenecks in the business plan. However, since the companies have become adjusted to the dangers, even those with high number of suppliers can be concentrated in only one region or depend on highly concentrated suppliers themselves.³⁶

29 Mordor Intelligence (2020)

30 Aćimović et al. (2018)

31 SMITHERS (2021)

32 Vega Andres et al. (2015)

33 Barman et al. (November 2021)

34 Aćimović et al. (2019), p. 37

35 <https://jatrgovac.com/strategija-poslovanja-porast-rizicnosti-u-lancima-opskrbe/>

36 <https://jatrgovac.com/strategija-poslovanja-porast-rizicnosti-u-lancima-opskrbe/>

So far, the research on this topic has placed the focus on the supply chain stability under normal conditions, considering the effects of the inventory level on the condition of the system, but leaving out the impact of the disruptions. Following to that, a switched system model of the supply chain with multiple delays was constructed. The stability scope of inventory adjustment coefficients decreases with the increase of transport time and distance coefficients, while disruption classification has different effects on the supply chain. High level of disruption causes the inventory level of manufacture to change significantly, and the supply chain system to lose its stability and to recover slowly. However, under general disruption, the supply chain system gradually stabilizes.³⁷

Disruptions are beacons of weaknesses in the logistics of delivery and companies are usually unaware of them on a larger scale i.e., they have no greater impact on the general business processes. The disruptions often occur in specific, confined area and are often eliminated without major consequences with careful planning and flexible management. However, in times such as these, when the entire world is affected by the COVID-19 pandemic, these skills are put to a test.³⁸ This pandemic has been causing unprecedented disruptions that will possibly have more impact on the global economy than any before.³⁹

In the last couple of years, the operational risk in running the supply chains has been growing, heightened by the consequences of the COVID-19 pandemic during the last 18 months. The pandemic has caused many disruptions throughout the supply chains globally.⁴⁰ It is therefore no surprise that companies need new approaches to risk management and to building resilience.⁴¹ They have to consider the areas their suppliers come from and evaluate the level of impact the coronavirus has had in those locations. Then, they should assess if there is a possibility to reduce the risk by acquiring finished products and raw materials from alternative sources. Another important consideration is whether they should limit the operational capacity in those countries and potentially restrict movement between the warehouse and the consumers.⁴² The first outbreak of the pandemic revealed the (un)readiness of the flexible packaging manufacturers to operate in the conditions when they need to rely on a single supplier or the specific geographical area that has been more affected by the pandemic. Those manufacturers that did not have ready alternatives have been facing far bigger risks. A new supplier cannot be introduced as a steady supplier just like that. First, one has to order the samples of the raw materials and their compatibility should be verified by the manufacturers and the consumers. Since flexible packaging is mostly used for food products, regulations and norms are strict and no step in following them can or should be skipped.

The global pandemic has been influencing the flow of raw materials and causing disruptions in the supply chains. It has restricted the movement not only of the goods, but the working people as well. The main role here is played by China because it is one of the largest suppliers of raw materials and finished goods in the world and the alarming situation there regarding the pandemic has caused many disruptions for many manufacturers and retailers. On a global scale, stock prices are fluctuating more than ever, and planning

37 Hu et al. (2017)

38 Rotom (30.03.2021)

39 Wilson (02.11.2020)

40 Sharma et al. (2021)

41 <https://jatrgovac.com/strategija-poslovanja-porast-rizicnosti-u-lancima-opskrbe/>

42 Perkov (16.04.2020)

and forecasting business operations and profit is almost impossible. The recovery from this crisis will be challenging and if it continues, no doubt some businesses will be left with no choice but to close when they run out of the supplied goods.⁴³

At the very beginning of the pandemic, a disruption between supply and demand occurred. Panic spread fast among the consumers in most countries where first cases of the COVID-19 infection happened and where there were announcements of “economic lockdowns” to stop the infection from spreading. For example, in Croatia, and many countries in the region, at the end of Q1/2020, the demand for food products rose to the point where panic buying left many shelves in stores empty within a few days. Consequently, this affected the flexible packaging manufacturers because food companies, trying to restock the depleted warehouses and shelves in retail stores, shortly ordered large quantities of packaging. Moreover, the export buyers often requested significant amounts of flexible packaging due to the fear of complete lockdown of the borders. This excess stock of goods had to be sold at certain point, and so, in the next period (the second half of Q2/2020), the demand for food products with longer shelf-life was declining. In addition to all the previously mentioned facts, there are several other factors that caused and have been causing disruptions in the balance between the demand and supply, e.g., the lack of or lower number of visitors in tourist destinations.

The COVID-19 pandemic has been an eye-opening experience, proving how the world has become very close-knit and interdependent. The perfect example is China and its “butterfly effect” during the pandemic. Namely, in the case of the most sought-after products, like PPE (personal protective equipment) and face masks, if China was not able to produce enough, the supply of these goods to the rest of the world was put on hold, even though there were some countries that started manufacturing their own materials, but, in most cases, with many difficulties in managing the challenges. Everybody in the economy world has been more or less impacted, suggesting that the scope of disruptions prompted by the COVID-19 pandemic is unprecedented. Many manufacturers are forced to slow down, or even stop the production entirely due to the disruptions in the supply. They choose mapping strategies to be able to predict and plan the supply of certain materials and to detect whether and why those materials could be delayed. The COVID-19 pandemic has been causing disruptions for some time now and the impacts of it are still present and strong, affecting the whole world. If we are to compare the COVID-19 pandemic with the most severe pandemic in recent history, the 1918 influenza which lasted for two years, we can only hope that this pandemic will, too, soon end.⁴⁴

As the economy is slowly opening again, the demand for flexible packaging is also on the rise. In line with that, at the end of 2020, the prices of all key raw materials used for the production of flexible packaging began to go up. Those materials include polyethylene (PE), polypropylene (PP), polyester (PET), aluminium (Al), and some other materials and liquid raw materials like paints, adhesives, additives, solvents and, especially, alcohol products which have been in high demand because alcohol is used as the basis for all kinds of disinfectants. In the second half of Q1/2021, many suppliers were forced to declare force majeure and could no longer guarantee for the usual orders regarding the amounts of raw materials, or the prices which were fluctuating on a weekly basis, if not

43 Rotom (30.03.2021)

44 Wilson (02.11.2020)

sometimes even daily. The supply chain has been experiencing disruptions other than just the fluctuation of the prices of raw materials. One of them is the fact that rates of container shipping from China have skyrocketed. This has affected everybody, especially those developing regions which cannot afford to be cut off from the supply.⁴⁵ Even though the costs of freight shipping have been coming into balance since the second half of 2020, recently, they have been spiking again. The cost of the shipping rates from Asia to Europe and the United States have been significantly growing since the second half of the year. Hopefully, freight costs may be balanced again because the supply is adjusting to higher demand.⁴⁶ The shipping rates have been rising simultaneous to the demand, but there is another reason why the costs have been spiking. Namely, Asian companies are ready to offer high prices for the containers because of their shortage and this shortage causes disruptions in the supply chain and, consequently, the costs are rising.⁴⁷ If we are to compare the rates of the freight on the route from Asia to North America from the year 2019 to those in 2020, the number is staggering. In December of 2020, the rates were 264% higher than in 2019. A lower, but still significant, spike was recorded for the Asia – U.S. West Coast route, where rates grow by 145% year over year. The freight rates from China to the U.S. and Europe have skyrocketed by 300%, compared with last March's rates.⁴⁸

As has already been mentioned, the COVID-19 pandemic has affected all levels of life and economy, creating disruptions in all industries and showing how unstable and unprepared our global economy is. This has proven to be true of food supply system as well.⁴⁹ The long-term effects of the pandemic are yet to be seen, but all agree that the scope of the pandemic is unprecedented and can hardly be compared to any such event in history. The pandemic has influenced all layers of the society and caused the economy to reinvent itself. The supply chains have been disrupted or even become unavailable, causing many to find other alternatives and the prices to go over the roof. Traditional sales of goods is no longer an option and many turn to e-commerce which was growing before the pandemic, and has been expanding rapidly since. Naturally, many want to make the purchase from the safety of their homes and order goods online. Consequently, this has been affecting the manufacturing and the delivery processes.⁵⁰ The demand for raw materials such as polymer resins has been spiking so much that the prices of those materials went up manyfold. As the disruption in 2020 caused some facilities to close, the maintenance processes necessary to keep up the operations were postponed till the first half of 2021.⁵¹ The disruption has also caused shortage of the materials for supply which continues in 2021. All the players on the market need to rethink their positions, supply chains and logistics strategies. E-commerce and home delivery businesses have experienced growth and prosperity during the pandemic.⁵² Because of higher demand for the goods to be delivered, traditional packaging solutions are no longer an option. E-commerce purchases have prompted the manufacturers to design more resistant and durable packaging.⁵³

45 UNCTAD (23.04.2021)

46 Attinasi et al. (2021)

47 Attinasi et al. (2021)

48 Tan (24.01.2021)

49 Marusak et al. (May 2021)

50 Perfect packaging (23.06.2021)

51 Packaging Europe (07.07.2021)

52 Packaging Europe (07.07.2021)

53 Packaging Europe (23.04.2021)

3.2. Interdependence of supply chain disruptions and flexible packaging industry during the COVID-19 pandemic

Disruptions in the supply chain can have major impact on the packaging industry and all those connected to it.⁵⁴ Due to that, new technologies and innovations are crucial for further development of the sector. New markets are sure to be developing in the future and the manufacturers have to move away from the traditional thinking and management. The new, disruptive technologies in flexible packaging industry could include intelligent packaging, recyclability, packaging openability, biobased polymers and digital printing. Flexible packaging products are expected to be in high demand for a long time in many areas of the world, including the mature markets of Europe and North America and the emerging markets of Asia and Central and South America. New solutions in the flexible packaging industry are offered in the form of *intelligent packaging*. It is supposed that intelligent solutions in the flexible packaging industry will offer many advantages. They will decrease costs and increase food safety. In addition to that, they will help prevent counterfeiting and open the door for new regulations and trends in demand. Intelligent packaging will prompt new ideas and views regarding the function of the packaging. It will no longer be just a product container, but rather, it will offer many new functions, like monitoring, tracking, warning, remediation, authentication, communication and brand protection. Next to intelligent packaging, *recyclability* is also recognized as one of the most disruptive technologies in the flexible packaging industry. This sector produces less waste because less material is used for the production of flexible packaging. However, there are still materials used for the production that are not easily recyclable and it is suggested that more easily recyclable materials should be introduced in the next ten years. So far, the issues regarding the recyclability of the materials used in flexible packaging include the thin film structure and the multi-layered composition. Often, some packaging items cannot be properly recycled because they have been contaminated with food waste. These are the issues many companies in the industry have been facing, especially because their business plans include sustainability and recyclability. The introduction of new, more recyclable materials will not be enough to meet the challenges. Governments will have to adjust and change their landfill policies and facilities for waste sorting.⁵⁵ An important step for improving and strengthening the organizations within the industry could be the integration of the suppliers and the buyers.⁵⁶ So far, the COVID-19 pandemic has caused the demand for some types of packaging to plummet, while, on the other hand, it enabled other packaging solutions to develop.⁵⁷

54 Wilson (02.11.2020)

55 <https://info.cdf1.com/cdf-blog/top-25-impacts-on-flexible-packaging-supply-chain>

56 Vachon, and Klassen (2006)

57 Feber et al. (April 2020)

3.3. Solutions for companies in the flexible packaging industry

Planning and forecasting can be very useful and crucial for predicting disruptions in supply chains. Much thought has been given to the resilience of the supply chain in the last two decades. Resilience is the capacity to anticipate and respond well to any disruptions that might occur. It means that companies make adjustments and adapt quickly to changes in order to bounce back from difficult situations. They can, for example, move the production to a different source if they detect a disruption in the region where they operate; or they can broaden their supplier network. However, this long-term resilience does not do much for the disruptions that occur suddenly, without any warning and the question arises as to how companies should cope with these unexpected events in the short term?⁵⁸ The COVID-19 pandemic has revealed some concerns and prompted issues regarding the health and safety of the workers, difficulties and obstacles in planning and logistics, the lack of materials and parts needed for production, unanticipated leaps and drops in demand and the financial flow issues.⁵⁹

The most progressive companies will model the scope of different shock scenarios to lay down action plans for the remodelling of their supply chains and minimizing future risks. A comprehensive understanding of the risks regarding the supply chain includes two different elements:

1. Basic vulnerabilities in the supply chain that make it fragile
2. The level of exposure or sensitivity to unpredictable events (or shocks) that use these vulnerabilities.

Instead of waiting, organizations can already start strengthening the resilience of their supply chains. Soft spots will remain within the connected trade systems and global shocks will be unpredictable and will be getting fiercer. Under such circumstances, operational efficiency will not be able to deal with the new reality and the investments in the resilience and continuity today will certainly pay out in the future.⁶⁰ It is important for all business organizations to learn from this pandemic and to plan future steps. All have learned how a pandemic can occur suddenly and can have devastating effects on a global scale. We can only hope that such a crisis does not happen again soon, but it is best to be prepared. There are many useful steps that can help us prepare better for future endeavours:

1. **Taking care of our employees.** When the first coronavirus outbreak happened, there were many disruptions in setting up work from home. Now, these can be avoided because everybody is familiar with the protocols for remote working.
2. **Staying close to customers.** There was much panic when supplies, usually always on stock, went scarce. Many customers chose to look for other suppliers. Panic and frustration during a crisis are understandable and they can be alleviated by keeping

58 Rotom (30.03.2021)

59 Woetzel, and Krishnan (16.02.2021)

60 <https://jatrgovac.com/strategija-poslovanja-porast-rizicnosti-u-lancima-opskrbe/>

the customers informed about the state of the supplies and in that way, helping them stay loyal.

3. **Join membership organizations.** This step is particularly important to distributors. When the pandemic started in 2020, the distributors in the cleaning industry were soon left without the products used for cleaning and disinfecting. Those distributors that belonged to a membership organization were lucky enough to have a broader network of suppliers, no matter which industry they were a part of. This proves that it is useful to be a member of such an organization because it can provide you with better connections and some more safety regarding the reliability of the supply chain.
4. **Cybertechnology issues.** This is connected to the issue of working from home. Namely, companies invest in the firewalls and protection of their IT systems in the offices, but there is the issue of the computers workers use at home. Due to that, these protection measures need to extend to all the technology used by the employees for business purposes.
5. **Being flexible is crucial.** Flexibility is something all business subjects can benefit from, be it during pandemic times, or in the times of prosperity. It is crucial for the protection of all the elements of a successful business.⁶¹

In all industries, including the packaging, adaptation is crucial for survival during these testing times. Companies are looking for other ways for overcoming disruptions in their supply chains and they are applying different strategies for eliminating any vulnerabilities. Current approaches include one popular strategy known as “China Plus One”, where companies look for other centres of production or distribution, alongside China. Domestic suppliers are also likely to be given a chance.⁶² In addition to that, companies can take advantage of location intelligence for fast digitalization and visualization of all the aspects of their supply network – suppliers, facilities, distribution and buyers – providing unique insights and strengthening the resilience of the supply chain.⁶³

Changes in the supply chains of the packaging industry will definitely occur once the pandemic recedes. Some of them will surely include the following:

- Bringing manufacturing and a part or all of the supply chain back to the home country to be able to protect future business and prevent high fluctuation in demand.
- Sustainable materials, such as recycled and recyclable packaging, will be given priority; recycled PET and other post-consumer plastics will keep landfills empty and direct used plastics towards recycling facilities.
- Larger packaging companies will be directing their business efforts toward vertical integration. This could offer a better control over the supply chain and a more stable road towards achieving their sustainability goals.
- There will be new trends occurring in the packaging industry, especially in designing CPG brands to make them more user-friendly and suitable for both online and traditional sales.⁶⁴

61 Wilson (02.11.2020)

62 Packaging Europe (22.04.2020)

63 <https://www.esri.com/hr-hr/covid-19/business-continuity/supply-network-resilience>

64 Packaging Europe (07.07.2021)

In the packaging industry, changes of the packaging format can occur quickly because of the flexibility which characterizes the sector.⁶⁵ COVID-19 has impacted so many layers of our every-day lives that we are sure to be carrying the changes that have occurred due to the pandemic forever. Safety will be a priority for the consumers even when the pandemic is long forgotten, and they will choose to buy food items in a packaging that is safe and reliable. Besides these characteristics, consumers will be looking for new technologies being integrated in the flexible packaging solutions.⁶⁶ Packaging has to be functional, but companies should strive to increase recycling rates, while maintaining performance.⁶⁷ The right path to sustainability, progress and profit on the flexible packaging market is innovation and sustainability.⁶⁸

4. CONCLUSION

Supply chain is a very complex system, and its stability has been constantly under threat of very fast processes of globalization and internationalization in the last few years. Usually, the instabilities occur periodically and always cause the costs to rise. Also, they are often the source of business collapse, bankruptcy etc. Considering the consequences disruptions in the supply chain can have, it is extremely important to try to forecast and avoid them. The COVID-19 pandemic has brought unpredictable challenges for the companies to face. Disruptions caused by the pandemic can have much deeper impact than any of the challenges the economy has been facing before. This is why the companies are searching for new approaches to risk management and building resilience. The changes are occurring throughout the industries and the packaging industry has been significantly affected, flexible packaging industry in particular. This branch has been facing huge challenges, simultaneous to the growth of demand for food and hygiene products. Food companies have tried to restock their supplies as quickly as possible and ordered large amounts of packaging in a very short period of time.

Flexible packaging industry has been developing in general in the past years, thanks to their ability to create unique solutions. This has proven true in these critical times of the pandemic as well. Companies in this industry follow sustainability goals by using less resources and creating less impact on the environment. Higher demand for packaged goods, especially the boost of e-commerce, prompted the need for developing new solutions, using lighter, impact-resistant materials for safer and quicker delivery of products in demand.

The beginning of the pandemic showed (un)readiness of the flexible packaging manufacturers to operate under the conditions of high dependency on only one supplier of raw materials or when the supply of such materials is directed towards the specific geographical area. Those companies that did not have alternatives ready up their sleeves have found themselves in much bigger difficulties and risks. All companies involved need to consider the regions where their suppliers come from and assess the impact of the coro-

65 Rogerson (09.04.2021)

66 Perfect Packaging (23.06.2021)

67 Packaging Europe (23.04.2021)

68 Report Linker (July 2021)

navirus pandemic in those locations. They should consider the possibility of reducing the risk by acquiring raw materials and finished products from alternative sources. Also, it is important to discuss whether it is necessary to reduce the production capacity and potentially, introduce more physical distancing between the warehouses and the consumers.

With the economy again being revived, the demand for flexible packaging has been growing. But, at the end of 2020, the prices of all the raw materials needed for the production of flexible packaging started to grow. The supply chain has also been disrupted by the soaring costs of freight shipping from China. Disruptions in the supply chain have considerable impact on the packaging industry. Companies need to act now and start strengthening the resilience of their supply chains to be ready to meet the challenges of the future. Like all others, companies operating in the flexible packaging industry will, too, need to adjust and try to anticipate the disruptions in the supply chain. To be able to do that, they need to understand the supply chain operations completely and create back-ups and new solutions to disruptions. New, smart, innovative solutions are crucial for attracting and keeping the customers, while following the path towards sustainability.

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