

## **Managerial Planning in Disaster Logistics: Model Proposal for Logistics Administrative Structuring in Pandemics**

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### **Abstract**

In disaster management, it is necessary to make strategic, tactical and operational plans, determine goals and targets, organize necessary to reach these goals, and find resources. Logistics planning is done according to the numbers and basic needs of the victims. The problems experienced in local production and international transportation during the COVID-19 Pandemic process, which started in China and affected the whole world, and which is a type of biological disaster, caused disruptions in supply chains. The effectiveness of medical intervention and disaster management studies in pandemics depends on the efficiency of logistics services. The COVID-19 pandemic has demonstrated the importance of logistics planning specific to pandemic response activities, in line with Turkey's disaster response structure and legislation. Disaster and emergency legislation in Turkey, disaster management systems in different countries and pandemic response studies were also examined. Based on the literature research and face-to-face interviews, suggestions were made regarding the administrative structure of the institutions and organizations working at the command, tactical or operational levels in the pandemic response. By evaluating the response studies in the COVID-19 pandemic, an administrative structuring model was created for logistics activities in pandemics.

**Keywords:** COVID-19 Pandemic, Disaster Logistics, Disaster Planning, Disaster Management

### **1. INTRODUCTION**

When it comes to disaster in Turkey, the first type of disaster that comes to mind is earthquake, one of the geological disasters. Floods, landslides, winter storms, major fires and epidemics follow the earthquake, and extensive losses and damages may occur as a result of these disasters. In order to prevent or minimize losses and damages, disaster and emergency management plans are made according to the vulnerability and risk level in the disaster area. Thus, disaster management no longer only includes intervention and post-intervention, but also includes pre-intervention studies. In disaster management, it is necessary to make strategic, tactical and operational plans, determine goals and targets, organize necessary to reach these goals, and find resources. Logistics planning is carried out according to the number of victims and their basic needs determined according to the Sphere Humanitarian Aid Standard.

The COVID-19 Pandemic, which started in China in the last quarter of 2019 and affected the whole world which is a type of biological disaster, had significant effects on social life, economic structure and disaster management processes. The problems experienced in local production and international transportation during the pandemic process have caused disruptions in supply

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chains. Medical intervention plays a critical role in pandemics. The effectiveness of medical intervention and disaster management studies depends on the efficiency of logistics services. In this context, the COVID-19 pandemic has demonstrated the importance of logistics planning specific to pandemic response activities, in line with Turkey's disaster response structure and legislation.

Pandemic response activities in Turkey were carried out in line with the Pandemic Influenza National Preparedness Plan (URL 4), which was put into effect in 2019 (Telatar and Üner, 2020). Since the main activity regarding pandemic response is carried out in the field of health, the response work is carried out within the framework of the principles of emergency medical intervention in Turkey, as well as in the rest of the world. However, it is important to produce, supply, store and transport the materials needed in health services in order to carry out the response work quickly and effectively. The COVID-19 pandemic response activities have also shown that logistics competence and the effective coordination of the entire logistics system are critical factors in medical response operations.

When COVID-19 pandemic response is evaluated, disaster management requires not only medical interventions but also regarding several topics which fall under the responsibility of various institutions and organizations- at once and making and applying strategic decisions quickly. Actions carried out during pandemics show the importance of conducting pandemic response in a holistic manner by incorporating the ministries and their subordinates, the institutions, establishments, and non-governmental organizations to the response work. It is thought that the management of this multi-partnered and multi-disciplinary structure in accordance with the principles of holistic disaster management structuring (Kadioğlu, 2008) will contribute to a more effective and effective response. For this reason, it is considered important to re-plan the executive structure of the institutions and organizations involved in the pandemic management in accordance with the disaster management principles, and to give a wider place to the logistics activities carried out in the pandemic plans.

## **1. DISASTER LOGISTICS**

Disaster logistics has an important place in the field of disaster management and its importance in future disaster response studies will be better understood. Disaster logistics is also referred to as humanitarian aid logistics, and it has been examined and developed through workshops and academic studies conducted with the participation of disaster workers, especially in recent years.

### **1.1. The Concept of Disaster**

Disasters are force majeure events which threaten lives and cause loss of property, interrupt social life and cause psychological, economic and social damage, and interrupt or terminate normal life activities (Otero and Martí, 1995). For an event to be classified as a disaster, it must negatively affect social activities, cause physical losses, and cause such damage to communities that they cannot cope with the consequences of the event by themselves. Disaster is not the event itself but the result of the event. Events such as earthquakes and floods which occur somewhere are not considered disasters as long as they do not harm human life (Ergünay, 2008; Kadioğlu 2008).

Disaster management has been defined as a continuous and dynamic structure that includes a large number of partners operating in different fields. Disaster management covers the planning, coordination and management of disaster prevention, mitigation, response and recovery (Kadioğlu, 2008). The studies to be carried out should be planned and carried out in a way that includes all parts of the society. It is necessary to coordinate all the resources, institutions and organizations of the society to manage disasters by creating the necessary legislations and making

arrangements in institutional structures. To reach those goals, the necessary legislation and institutional structuring should be made in order to coordinate all the resources, institutions and organizations of the society into managing disasters (Kadioğlu, 2008).

## **1.2. Disaster Logistics**

Disaster and emergency logistics include systems and processes that mobilize resources, people, talent and knowledge to help disaster victims (Kadioğlu, 2011). Humanitarian Logistics is defined as “the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people” (URL 6). Disaster logistics refers to the management of logistics related to people, information, and resources in an effective and efficient manner with the aim of helping disaster victims (Tanyaş et al., 2013). Disaster management differs from normal logistics activities as it is non-profit (Ersoy, Börühan, & Esmer, 2016). Disaster logistics is the whole of systematic studies carried out to deliver shelter, clean water, food, clothing, medical supplies and other other materials which disaster victims need to survive and sustain their lives, at the right time, to the right place, to the right people, under the right conditions, in the right quantity and at the right cost.

### **1.2.1. Stages of Disaster Logistics**

Disaster logistics is a process that can be evaluated in three stages that complement each other and show integrity collectively (Pektaş 2012). The stages of disaster logistics are expressed as follows:

- Disaster preparedness
- Disaster response process
- Logistics activities after response

Disaster preparations and logistic response plans foresee the delivery of the right goods to the right place at the right time at the most affordable cost. In the agreements of suppliers (i.e. companies providing services and goods) to be made within the scope of these plans, criteria such as the financial strength, experience, references, reliability and financial strength of the companies should be taken into consideration as well as their capacities. The disaster response logistics consist of preliminary assessment and needs assessment, making and implementing a logistic action plan, and monitoring, evaluating, and reporting the disaster response process. With the disaster response activities ending, response teams in the disaster area leave their place to the relief supplies collection and maintenance teams. These teams are responsible for the collection of disaster materials in the area, their maintenance and delivery to warehouses, and after they take their place in the disaster area, they should first plan material collection and maintenance activities. (Tanyaş et al., 2013).

### **1.3. Planning of Disaster Logistics**

Disaster recovery covers the planning of the post-disaster recovery and reconstruction activities. The difference between the planning activities of the recovery period and of the preparation period is that the former are activities needed to be done in an area that has changed and differentiated after the disaster. In the preparation period, planning is made considering factors such as assembly areas, how to reach these areas, the location of the emergency and temporary shelters to be established for disaster victims, and the condition of the infrastructure. After the disasters, one or more of the mentioned structures may have been changed or damaged in such a way that they cannot be used. In this context, recovery period planning is the planning which takes into account the preparation period plans and whose aim is to cope with newly emerging situations.

All disaster management studies in Turkey are carried out in line with the principles and methods determined within the framework of the "Turkey Disaster Response Plan" (TAMP). In general, TAMP determines the framework of the planning principles before, after and during the disaster, defines the roles and responsibilities of the service groups and coordination authorities that will take part in the disaster and emergency preparedness, response, recovery and reconstruction work. This plan includes the principles of intervention at every stage of the disaster regarding the coordination between non-governmental organizations, ministries, institutions, organizations, and private and legal persons assigned to disasters (URL 2).

## 2. PANDEMIC

Coronaviruses (CoV) are defined as a large family of viruses with features which can cause mild infectious diseases such as the common cold or more serious ones such as SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome/Middle East Respiratory Syndrome). These viruses were named "corona" (Latin word for "crown") viruses by virtue of the fact that the extensions in their cell structures resemble the shape of leaves. (URL 5).

When the pandemics that are effective worldwide are examined; It is known that the Plague Decayed between 1348 and 1350 and the Spanish Flu Decayed between 1918 and 1920, which occurred until the Covid-19 pandemic and had the most deadly consequences. In the Plague pandemic; It is estimated that 25 million people (30% of the Chinese population) died in China during the Plague Epidemic between 1348 and 1350. The Spanish flu pandemic; between March 1918 and December 1920, a deadly flu epidemic caused by the H1N1 virus of subtype and turned into one of the deadliest natural disasters in human history with over 50 million people (living at that time 1,86 billion, 3% of the population) caused the death. Sars Virus; which started in Hong Kong between November 2002 and July 2003, there have been 8422 cases and 916 deaths worldwide. Avian influenza; Avian influenza, which is known to be caused by viruses adapted to birds, has historically been studied, there have been outbreaks due to new virus subtypes. It is estimated that the H1N1 epidemic in 1918-1919 caused the death of 50 million people. Then there were outbreaks of 1957-1958 (H2N2), 1968-1969 (H3N2), 1977-1978 (H1N1) and 2003 – 2009 (H5N1) and (H1N1). The Covid-19 pandemic; which originated in China in September 2019 and spread rapidly worldwide, infected 672 Million people and caused the death of 6.8 Million people.

Along with COVID-19, there are seven types of corona viruses that can be transmitted to humans. It is known that three of these viruses, SARS-CoV, MERS-CoV and 2019-nCoV (ie. COVID-19), can cause infectious pneumonia and that the other four viruses (HCoV-229E, HCoV-OC43, HCoV-NL63 and HKU1-CoV) can easily be transmitted from human to human, are more active in spring and winter every year, and cause only the common cold (URL 5).

### 2.1. Effects of the COVID-19 Pandemic

It is stated that the COVID-19 pandemic has affected the whole world, causing negative physical, economic, social and psychological consequences. The pandemic threatens physical health as well as it interrupts social life as a result of the social distancing measures. Education was either suspended or continued in a distant way. Remote working systems were implemented. The pandemic, which has had negative effects on economic and social life, as well as on logistics, supply chain and production activities, is stated to have caused various disruptions.

As the COVID-19 pandemic has shown us, even countries with developed health care and disaster response systems can be helpless when it comes to outbreaks. During pandemics and outbreaks, apart from normal disaster response protocols, it is necessary for quarantine protocols to be implemented, healthcare professionals to work under extraordinary conditions while taking vital risks, and for the production, supply, transportation and distribution of medical supplies to be

planned together along with risk management. It has become a necessity to quarantine all or part of the society, to push vulnerable groups to an inactive and unhealthy life, to plan and conduct activities for the supply, production and distribution of staple food products during quarantine. These activities had to be planned and implemented effectively, taking into account critical issues such as the supply, production and distribution of drugs and medical devices required for hospitalized patients, and the need for intervention teams, distributors and manufacturers to work under more intense risk. A large number of people had to work in a short time and at a high intensity to track and execute this work (Lee, 2008; URL 7).

On the other hand, it was stated that there were delays in the delivery of products due to the pandemic (Ivanov and Das, 2020). As a result, it has been stated that the confidence in the supply of products such as food has been shaken (Siche, 2020). The reason for this increase in the demand curve is explained by panic buying, the impulse to stockpile and imitate the actions of others and negative thoughts about the future (Hobbs, 2020; Yuen, Wang, Ma, & Li, 2020). On the other hand, it has been observed that the demand curve for non-vital products gradually turns downward. The reason for this trend can be shown as the tendency of consumers to hold on to the money they have for the uncertain future (URL 1). Many industries such as aviation, fossil fuels, clothing and tourism have been negatively affected by the newly emerging supply and demand trend (Majumdar, Shaw and Sinha, 2020). This sudden fluctuation in demand caused uncertainty on the accuracy of forecasts about the future and consequently on the decision-making mechanisms regarding supply chains (Gunessee and Subramanian, 2020). It has been stated that this situation affected the product prices and that in the countries with stable and resistant currencies, the prices of vital products increased while the prices of other products decreased (de Paulo Farias and de Araujo, 2020).

The disruptions occurring and multiplying along the supply chains have caused great damage to the durability and sustainability of all stages of the chain with a ripple effect (Ivanov, 2020b; Ivanov and Dolgui, 2021). It was observed that while disruptions along the supply chain caused global supply to be interrupted, global demand increased at the same rate. It was observed that while global demand has been constantly rising during the COVID-19 pandemic, the capacities of supply chains have decreased due to numerous factors, such as the closure of borders and markets, continuous interruptions in the movements of shipping vehicles, disruption of international trade, reductions in workforce and distance from production facilities (Amankwah-Amoah, 2020a; Paul and Chowdhury, 2021).

Air, land, sea and rail modes of transport have all been interrupted due to the restrictions on the movement of vehicles (Gray, 2020). It has been observed that these measures, while harming international trade, also cause interruption and/or delay in demand flow (Chiaramonti and Maniatis, 2020). It can be said that the COVID-19 pandemic has triggered a change in the transportation methods. It is seen that the physical distribution activities, which have been in use for a long time, became less effective and have started to turn into e-commerce channels or physical distribution models used along with e-commerce channels (Dente and Hashimoto, 2020).

### **3. PANDEMIC IMPLEMENTATION MODEL PROPOSAL IN DISASTER LOGISTICS**

#### **3.1. Methods and Findings**

Commentaries and suggestions were made regarding the data collection process, data analysis and findings of the qualitative research for the executive structuring of logistic activities during pandemics that is to be proposed within the scope of this paper. First of all, the data on the articles determined using the systematic review method (the articles included in the systematic review were determined using the PRISMA work flow chart) were interpreted after a five-step process.

827 studies were obtained from the databases and Google academic search engine, and 4 studies were obtained as a result of the searches made on the academic internet platforms and the Google search engine. After the repeating 179 studies among them were excluded, the titles and abstracts of the remaining 652 studies were examined. Of the 163 studies determined during the screening phase, the contents and the journals in which they were published were examined in more detail. Studies that are not necessarily focused on the research subjects but rather carried out in other scientific fields such as medicine or psychology, in short, studies which are not directly related to disaster management or logistics are not included in the systematic review. In addition, articles which have not been published in peer-reviewed journals were also excluded from the data group. It was decided that the systematic review would include 39 studies after 124 studies which were found to be unsuitable in line with the inclusion criteria were excluded. Since the aim of the study was to propose a executional structuring model for logistics activities carried out in pandemics, 39 studies included in the systematic review were primarily grouped under the main topics such as COVID-19 pandemic, disaster management and disaster logistics. Within the scope of systematic review, the aims of the studies, the methods used, their findings and conclusions were examined. The Flow Chart for the Study Selection is shown in figure 1.

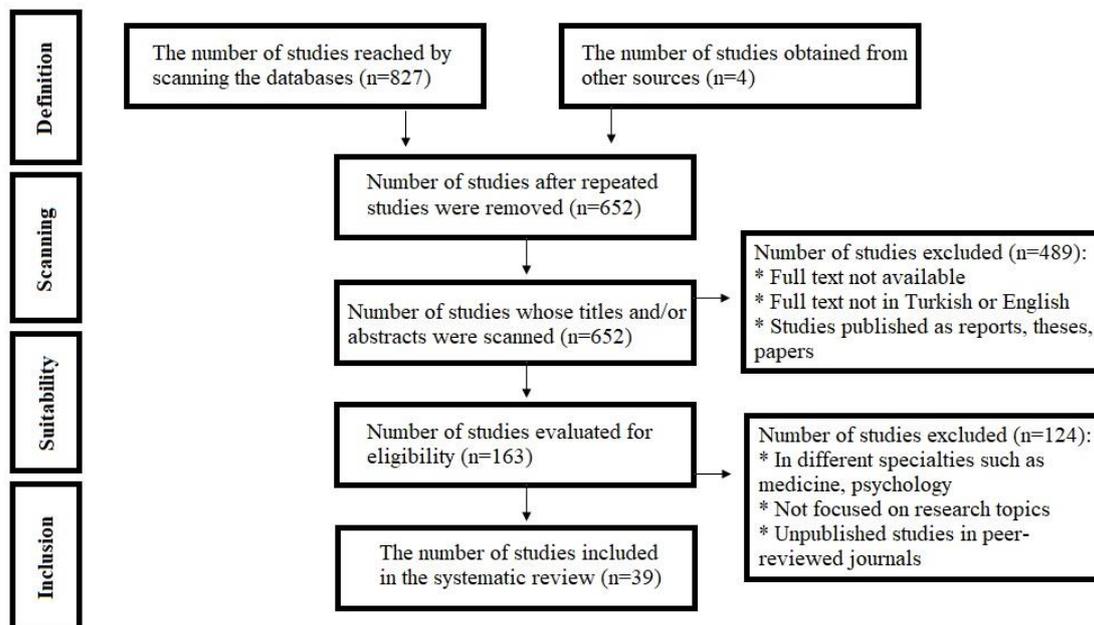


Figure 1. The Flow Chart for the Study Selection

After the systematic review, there follows the information and analyses on the personal interviews with the representatives of the institutions and organizations which are active during disasters. The interviews were examined using thematic analysis method and the findings were presented.

For the purposes of the research, studies on the logistic activities carried out during the COVID-19 pandemic, executional structuring of the institutions and organizations which take part in disaster response, disaster management and logistics were examined using the systematic review method. Systematic review is a reviewing process which includes the screening of studies on a topic, their selection according to predetermined criteria, and their inclusion and synthesis into the final compilation in order to answer a specific research question.

Since the aim of the study was to propose a executional structuring model for logistics activities carried out in pandemics, 39 studies included in the systematic review were primarily grouped under the main topics such as COVID-19 pandemic, disaster management and disaster logistics. Within the scope of systematic review, the aims of the studies, the methods used, their findings and conclusions were examined. The 26 studies included in the systematic review were conducted during the COVID-19 pandemic period, in 2020 and 2021. It is observed that the studies carried out in this period generally focus on disaster management, logistics activities and the effects of the pandemic on supply chains. In these studies, the qualitative method was generally used. It is seen that these studies are mostly compilations in which the activities carried out during the COVID-19 pandemic are evaluated.

Studies examining the disaster management processes and logistics activities in Turkey and other countries during the COVID-19 pandemic are also included. In addition, 3 studies that do not focus on the COVID-19 pandemic but examine the disaster management system and logistics activities in disasters in Turkey, were also included in the systematic review. In these compiling studies, the disaster system in Turkey has been evaluated in general and suggestions have been made regarding the executive structuring.

Semi-structured interviews were conducted with the participants in order to collect the research data. Semi-structured interviews allow asking new questions based on the topics that may arise during the interview, as well as predetermined questions about the research topic (DiCicco-Bloom and Crabtree, 2006). This interviewing method was preferred for data collection because the interview process is flexible, follow-up questions can be asked during the interview, and it allows in-depth information to be obtained from the participants. Participants were asked 7 questions prepared by the researcher. In the course of preparing the questions, the opinions of an academican who is an expert in qualitative data analysis were consulted. Interview questions are presented below:

1. If your institution took part in the COVID-19 pandemic work, which disaster management fields did it work in?
2. Did you take part in the COVID-19 pandemic studies? Which fields have you worked in?
3. Can you evaluate the work carried out during the COVID-19 pandemic? What do you think are the areas that can be improved in disaster response and pandemic work?
4. Can you evaluate the responsibilities and duties of the institution you work for during pandemics? In your opinion, if changes should be made in these duties and responsibilities, in which areas should they be made?
5. During the course of the COVID-19 pandemic in Turkey, do you think it was easy to access medicine, medical supplies, and basic necessities? What are the precautions that should be taken in to avoid encountering problems in these matters in possible pandemics?
6. Which fields do you think logistics work should cover in pandemics? Which institutions should be involved?
7. What kind of an executive structure should be established to respond to pandemics? Which institutions should be included in this structure? What should be the duties and responsibilities of these institutions?

In the analysis of the data, the interviews conducted with the participants were analyzed using the thematic analysis method. The thematic analysis method includes analyzing the data and reporting the findings by identifying the common themes in the data (Braun and Clarke, 2006). An in-depth study of the participants' suggestions on the management structure that will be proposed within the scope of the study and their views on the activities carried out in the COVID-19 pandemic and since it allows it to be Deciphered together under common themes (Neuendorf,

2019) thematic analysis was carried out in the study. The data analysis was carried out by following the thematic analysis stages.

The main themes and sub-themes created are presented in Table 1. In this section, the opinions and suggestions of the participants were combined under the main themes and interpreted within the framework of sub-themes by quoting the participants directly.

Table 1. The Main and Sub-Themes Identified in The Interviews Were

<b>COVID-19 Pandemic</b>	<b>Disaster Management</b>	<b>Pandemic Management</b>
Effects on Society	Planning	Managerial Approaches
Preparation	Coordination	Administrative Structuring
Material Supply	Determination of Needs	AFAD
Distribution	Management	Holistic Management
Vaccination		Production
Management		Preparation
Communication		Communication

The findings obtained in the semi-structured interviews were grouped under three main themes by applying the stages of thematic analysis method. In accordance with the responses of the participants, the main themes “COVID-19 Pandemic”, “Disaster Management” and “Pandemic Management” were created, sub-themes were determined under each main theme.

### 3.2. National Pandemic Influenza Preparedness Plan

The studies conducted during the COVID-19 pandemic are based on the Pandemic Influenza National Preparedness Plan. The first legal work on epidemics and pandemics within the framework of the Turkish disaster and emergency response system is the circular No. 26268 and adopted during the avian flu period dated 23.08.2006. It is stated that the law adopted by the Prime Minister's circular in 2006 and re-organized within the scope of the influenza pandemic by the Presidential Circular No. 2019/5 draws up the operational framework of the COVID-19 pandemic response efforts that are currently being tried to combat (Telatar and Üner, 2020). The National Preparedness Plan for Pandemic Influenza, which was put into effect by the Presidential Circular 2019/5 within the scope of the aforementioned law, includes activity planning, strategic, tactical and operational structures at the national and local levels. The Ministry of Health's COVID-19 Guide, which was published quickly at the beginning of the COVID-19 pandemic and answers a large number of questions during the intervention phase (URL 5) is also based on this plan.

In the National Pandemic Influenza Preparedness Plan, it has been stated that risk communication as well as communication with the community is important in pandemic intervention. It is noted that it is vital that responsible, authorized, support and auxiliary units can communicate quickly and Decisively between themselves. In this context, it has been stated that it is important to use facilities such as telephone, tele-conference, message applications, pandemic social media groups. The importance of the existence and effectiveness of software that will be used for pandemic monitoring, which is an important part of risk management, has been emphasized. In addition, the necessity of developing this software in such a way that it can be used on mobile devices has been stated. It is underlined that all kinds of documents to be prepared by Jul education departments for the purpose of informing the public should be available from a single web address.

### 3.3. Administrative Structure of the National Pandemic Influenza Preparedness Plan

The main solution partner and the main responsible organization within the framework of the Pandemic Influenza Preparedness Plan, T.C. It has been designated as the Ministry of Health. Within the scope of the plan, the Ministry of Health and its affiliated components, together with the strategic, tactical and operational areas are responsible for all. In accordance with the plan,

two main units have been designated as the National Coordination Board and the Ministry of Health Operations Center to support the Ministry of Health in its fight against the pandemic. The Scientific Committee has been defined as a sub-unit working under the operations center.

When the National Pandemic Influenza Preparedness Plan is examined, it is seen that all the activities planned to be carried out in the pandemic preparedness and response processes are under the control and coordination of the Ministry of Health. In the plan, the Ministry of Health is defined as the main solution partner and the main support unit responsible for planning, decision-making, financial management, logistics, operations and coordination areas. However, individual interviews stressed as they are experts in several areas of a single unit is responsible for vast resources of the COVID-19 pandemic may result in gaps in practice, such as when it comes to a global pandemic, it is believed. On the other hand, it is evaluated that reducing the burdens on the command level and carrying out its work more effectively on strategic decisions will contribute to preventing disruptions that may occur in tactical and operational activities.

### 3.4. Model Proposal for Logistics Administrative Structuring in Pandemics

In the studies evaluating the management of the COVID-19 pandemic in Turkey, it was emphasized that AFAD takes a more active role in the management of the pandemic. In the model, it is proposed that the logistics activities to be carried out in pandemics should be carried out under the management and coordination of AFAD in accordance with its field of interest and expertise. It is considered that it is important for the Ministry of Health to support this area due to its expertise in pandemics and epidemics and its operational activities. In addition, it is important that the Red Crescent operates in the field of logistics with its resources and experience.

The main activities carried out during the pandemics will be carried out by the operations group, which is mainly carried out by the Ministry of Health and its subsidiaries. Logistics has been considered as a support function that shares the workload of operations services and increases the effectiveness of health operations. In order to reduce the heavy workload undertaken by the operation, the service groups involved in the logistics function are designed to operate in areas that were lacking during the COVID-19 pandemic. Some service groups have been added that are considered to be needed except for storage and transportation areas, which are the main activities of the logistics function. Activities in these areas are designed as separate service groups, as it is considered that they cannot be carried out by groups whose main function is different.

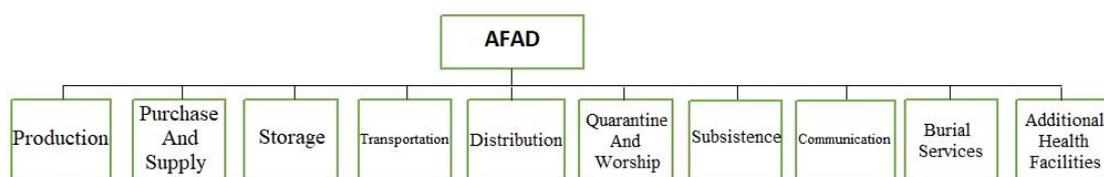


Figure 2. Structuring of Service Groups Related to the Proposed AFAD

Accordingly, the medical/medical equipment crisis experienced at the beginning and after the pandemic (Chowdhury et al., 2021; Ranney et al., 2020), producing the materials needed (Franco-Paredes et al., 2009; Oshitani et al., 2008), a production service group was added to the logistics model proposal. The main purpose of this group is to prevent the country from experiencing shortages of medical and medical supplies during pandemics, as well as to respond to social demand with domestic supply in cases where purchased supplies cannot be brought to the country due to logistical disruptions such as closing borders. In addition, the purchase service group was also evaluated within the logistics function due to its relevance to logistics activities. It is planned that this group will work on the purchase of the necessary material in disaster

conditions so that it can be brought to the country. The main tasks of the institutions, organizations and NGO's whose tasks are defined in the model proposal are consistent with the job descriptions made for them in the National Pandemic Influenza Preparedness Plan (2019).

It is proposed that the logistics function should consist of the following service groups (as shown in Figure 2):

- Production
- Storage
- Distribution
- Subsistence
- Burial Services
- Purchase And Supply
- Transportation
- Quarantine And Worship
- Communication
- Additional Health Facilities

#### **3.4.1. Production Service Group**

One of the most important shortcomings shown by the COVID-19 pandemic is that countries do not have sufficient medical supplies at the time of the global crisis, as supplies cannot be obtained from producing countries (Ranney et al., 2020). Therefore, the obligation of countries to produce medical supplies with their own resources has arisen. Due to the advantages provided by global trade and logistics, the fact that the supply and production of raw materials, semi-finished and finished products is usually provided from abroad has led to a major production crisis after the borders were closed at the beginning of the pandemic (Chowdhury et al., 2021). The crisis of masks, protective equipment and ventilators at the beginning of the pandemic was felt all over the world. The crisis was triggered by the fact that China, where these products are usually purchased, stopped shipping. Vaccines, medical supplies, protective equipment, test kits in the country or overseas demand for products such as possibly produced large enough so we won't have to purchase (Amankwah-Amoah, 2020b; Paul Chowdhury, 2021) is thought to be important. In this context, it is proposed that a unit responsible for production be put into operation within the scope of the pandemic plan and be considered under the logistics function in accordance with the nature of production. The subunits of the production service group also consist of "Vaccine, Drug and Test Kit Production" and "Mask and Protective Material".

#### **3.4.2. Purchasing and Procurement Service Group**

It is considered important to use the expertise of the Ministry of Health on the purchase of vaccines and medical / medical supplies, and to decide on domestic / international purchases under the direction of the Ministry of Health. It is proposed that the Turkish Medical Device Board affiliated to the Ministry of Health should coordinate the procurement work together with the Vaccine / Anti Serum Logistics Unit of the General Directorate of Public Health and the Vaccine / Preventable Diseases Department of the Ministry of Health. It is important that AFAD, which has expertise in emergency purchases, is supported in this process. In addition, it is planned to ensure the active participation of the Association of Turkish Pharmacists and ECZADER, which has expertise in medicines. With experts in the field of medical devices and medical supplies; Marmara medical device manufacturers and Suppliers Association (MASSİAD)'s, all medical device manufacturers and suppliers, Associations Federation (TÜMDEF)'s, all medical device manufacturers association (TÜDER)'s group to take place in this service is recommended.

It is important that the Red Crescent, which purchases and tenders large amounts of medical and medical supplies for use in both disaster and emergency situations and blood services, supports this group. It is planned that the technical and administrative specifications for the purchase process will be prepared by the Purchasing and Procurement Service Group and the purchase will be carried out together with the financial affairs group. It is considered important that these operations are carried out in coordination with all relevant institutions, organizations and NGOs.

### **3.4.3. Storage Service Group**

Since some of the stored materials require a cold chain and some of them consist of drugs, and drugs have special storage conditions, separate storage studies are being conducted for the two types of materials. In addition, materials that do not require special storage conditions, such as medical supplies / protective equipment, are also used in pandemic studies. These materials can be stored in a normal warehouse such as field hospital tents. In this context, storage services are divided into two areas as materials that require and do not require a cold chain. These are Materials that Require a Cold Chain and Materials that do Not Require a Cold Chain.

### **3.4.4. Transportation Service Group**

In pandemic response studies, it is considered important to transport the vaccine, medical and medical materials without damage (Yazıcı, 2020). The rapid delivery of materials to the relevant institutions and the needy is critical in combating the pandemic. It is proposed that the activities to be carried out by dividing the materials to be used in the response to the pandemic into two groups: materials that need to be transported in the cold chain and materials that do not need a cold chain.

### **3.4.5. Distribution Service Group**

Distribution activities in the pandemic, although not as intense as in other disasters, are important for the protection of vulnerable groups (Ranney et al., 2020) for which it has been evaluated as a separate service group.

The working area of the Distribution Service Group is considered to be the distribution of emergency supplies. Activities to be carried out by the Distribution Service Group; primarily vulnerable groups (Ranney et al., 2020), which includes the distribution of food, masks, protective equipment, hygiene materials and informative documents to all those in need. In this area, it is important to make need determinations together with the social service units of municipalities and to reach the needy people quickly.

It is proposed to designate head offices, health centers and pharmacies as distribution points for masks, protective January and hygiene kits that are planned to be distributed throughout the country. In coordination with the Pharmacists' Union and the PHARMACIST, it was envisaged that the distributions to be made to all citizens throughout the country in an integrated manner with AFAD AYDES and the HPP systems of the Ministry of Health should be monitored through these systems. In this way, it is planned that citizens will go to the distribution points in question and receive the material reserved for them and their families.

It is important that distribution activities are planned and carried out taking into account the special needs of vulnerable groups (Ranney et al., 2020). It is suggested that the assistance to individuals with physical disabilities or who are restricted from going out should be coordinated by AFAD and the Red Crescent, and the Red Crescent Branches located in 81 provinces throughout the country should participate in home deployments if necessary. However, it is recommended that materials be sent via cargo companies to the municipalities and E-Nabiz as the primary mode of movement and to the vulnerable groups determined in accordance with the information received from the MHRS (Central Physician Appointment System of the Ministry of Health).

### **3.4.6. Quarantine and Worship Service Group**

Decantment studies are considered to be among the most important studies in the pandemic process. Quarantine and restriction practices are considered as traditional methods in epidemics and pandemics and their effectiveness is recognized (Chen and Pan, 2020). It was possible only with the intensity of travel and relocation activities in the globalized world that an airborne Chinese-borne virus could affect the entire world in a matter of weeks. Therefore, it has become

standard practice in a large number of countries for people from abroad to be quarantined for a certain period of time. Although China is the country where the virus originated, thanks to strict home, travel and logistics quarantines, it has been able to keep death cases at reasonable levels until vaccination practices begin (Shaw et al., 2020).

In the administrative structuring model proposal related to pandemics, it was envisaged that quarantine practices should be carried out by AFAD with the support of the General Directorate of Public Health, General Directorate of Coast and Borders, Higher Education Institution, Ministry of Youth and Sports, Credit and Dormitories Institution, Red Crescent and Ministry of Internal Affairs. It is planned that the persons who will be quarantined will be determined by the General Directorate of Coast and Borders and the General Directorate of Public Health, and these people will be sent to the places determined by AFAD by the Ministry of Internal Affairs.

It is suggested that the selection and allocation of places for quarantine applications should be the responsibility of the General Directorate of Public Health. In addition, it has been foreseen that the necessary studies on the health status of the quarantined persons will also be carried out by this institution. Ministry of youth and sports, dormitories of the credit and dormitories institution and higher education institutions, sports complexes and other areas of public housing is to be used for temporary accommodation and quarantine applications. It is proposed that the Ministry of Internal Affairs should be responsible for ensuring the return of personnel involved in quarantine work by the Red Crescent and persons under quarantine, as well as for implementing legal sanctions for quarantine practices. It is envisaged that the structure in question will be controlled by AFAD's AYDES system, the Ministry of Health's HEPP and MHRS systems.

#### **3.4.7. Subsistence Service Group**

In accordance with the AFAD law, the Red Crescent is responsible for the food to be provided in disasters and emergencies. In addition, it has been stated in the Pandemic Influenza National Preparation Plan (2019) that the Red Crescent will meet the food of the medical teams and those living in the quarantine zones. It is proposed that this structure should be continued within the scope of the logistics management structuring model proposal. In this context, it is planned that the Red Crescent will meet the need for restitution by purchase or production in the areas where it is needed. With 37 catering vehicles in the Red Crescent inventory, 2 caravan kitchens, 4 container kitchens, 11 mobile kitchens, 4 mobile bread ovens and 23 soup kitchens (URL 3), it can be said that it has enough capacity to meet the urgent nutritional needs during the pandemic.

#### **3.4.8. Communication Service Group**

Within the scope of TAMP (URL 2), the Ministry of Transport, Maritime Affairs and Communications is planned to be the main solution partner in the Communication Service Group. It is recommended to apply the structure proposed in TAMP to logistics communication for disaster and emergency communication. Chief of the General Staff, Ministry of Interior, Ministry of Forestry and Water Affairs, Ministry of Health, TRT, TÜRKSAT, Kızılay, NGOs and private sector are participating as solution partners in TAMP. It is recommended that the components of this structure come together to contribute to disaster logistics and prepare a software that will coordinate between coordination, planning and communication, operation, logistics and financial affairs functions within the scope of the pandemic plan.

It is considered that it is important to have a logistics structure that can complete the materials needed by the operation on its own initiative by seeing the stocks before they reach the critical stock level and the existence of a financial affairs function that funds this structure. In this context, it is suggested that the studies should be carried out by TUBITAK and Istanbul Development Agency, as well as other units in the Communication Services Group, and that support should be obtained from universities if necessary. It is planned that these institutions and organizations will also provide services in the communication group.

The AYDES system, which is used by AFAD in the field of communication, is a decision support system created on the basis of geographical information systems and used in planning, intervention and improvement phases. The program, which is considered in three stages as an Incident Command System, Spatial Information System and Improvement System, consists of damage detection, need detection, demand tracking and survey reporting processes (AFAD, 2020b). In order to integrate the AYDES system with the HES and MHRs systems of the Ministry of Health and to complete the software gaps between the systems that will work together, it is recommended that these modules be harmonized by programmers and communication personnel.

#### **3.4.9. Burial Service Group**

It is suggested that burial services should be carried out by the Religious Affairs Directorate and the General Directorate of Cemeteries affiliated to this presidency as in the normal period. However, it has been evaluated that it is important to receive support from the General Directorate of Public Health and the Ministry of Health in the studies to be carried out in order to carry out burial services taking into account the restrictions of the pandemic period and the risk of transmission.

#### **3.4.10. Additional Health Facilities Service Group**

Within the scope of the Pandemic Influenza National Preparation Plan, it is suggested that the establishment of temporary hospitals, additional health service buildings, field hospitals and the procurement of necessary materials carried out by the operation units should be included under the logistics function within the scope of the model plan proposal. Since the Red Crescent has a great experience coming from history in this field, it is considered important that it supports the activities in this field.

It is recommended that the activities of the Additional Health Facilities Service Group be coordinated by AFAD. It is planned to include the Ministry of Internal Affairs and the Ministry of Health, the General Directorate of Public Hospitals and the General Directorate of Health Services, the Red Crescent and the General Staff in the service group. It is recommended that these institutions fulfill their duties to establish additional health facilities such as field hospitals where needed and to visit these facilities to serve.

### **4. DISCUSSION AND SUGGESTION**

The COVID-19 pandemic has been recorded as a disaster that has serious consequences in the physical, economic, social and psychological fields all over the world, in which more than four million people have lost their lives (URL 8). The COVID-19 pandemic has caused production and transportation activities to be disrupted and supply chains to be disrupted (Amankwah-Amoah, 2020b; Paul and Chowdhury, 2021). The disruptions caused by the pandemic in logistics activities have also affected disaster response efforts. The lack of access to the tools and equipment, equipment and medical supplies needed for disaster response in an environment where all health systems globally are on alert and overloaded has posed a significant problem.

COVID-19 pandemic response studies have shown the importance of logistics studies during pandemics, as well as in other disasters. Pandemic intervention has been treated as an emergency medical intervention all over the world. Within this framework, disaster management systems and health services have been established as a priority. However, in order for pandemic response efforts to achieve success, an effective, efficient, robust and sustainable managerial structure related to logistics efforts is considered to be a critical factor.

In this study, first of all, the studies conducted in the COVID-19 pandemic, a systematic review of the administrative structure and disaster logistics related to institutions and organizations that perform logistics activities in response to pandemics were conducted. The researches to be included in the systematic review have been determined taking into account certain criteria. In addition, semi-structured interviews were conducted with 8 experts to evaluate pandemic studies, get their recommendations on disaster management and administrative structuring for logistics activities to be carried out in pandemics. The findings of the studies examined in the systematic review and the information obtained from the interviews have been established as the basis for the managerial model to be proposed in the study.

In order to reduce the damages of pandemics and to be more prepared against possible pandemics, a model has been proposed for the administrative structure of institutions and organizations responsible for logistics activities in pandemics. In the model, service groups and main solution partners were identified in order to make logistics intervention more effective based on the tasks assigned to institutions within the scope of the National Pandemic Influenza Preparedness Plan (2019). In the scope of logistics studies, new service groups were created in accordance with the plan and their tasks and areas of responsibility were defined. Institutions and organizations involved in logistics activities or providing support to the work are included in the service groups. In the model, it was emphasized that institutions and organizations, NGOs, professional chambers and private sector representatives who have the capacity in terms of logistics activities and can support pandemic studies should take responsibility for logistics studies.

The management structure proposed in the model is expected to contribute to solving the difficulties experienced in the logistics activities carried out within the scope of pandemic intervention by adopting a more holistic approach in a fast, effective and efficient way without being reflected in the medical intervention operations. The administrative structure was created taking into account that organizations and NGOs that are given more responsibility for pandemics in other disasters than pandemics participate more actively in pandemic response and use their resources more efficiently in activities to be carried out within the scope of the pandemic.

It is thought that the proposed administrative structuring model will contribute to making the logistics studies carried out in pandemics more effective. It is foreseen that the Production and Purchasing Service Groups defined in the model proposal can ensure that the gap in critical materials such as medical and medical equipment, protective equipment and masks that appeared in the early stages of the COVID-19 pandemic is closed by local production. In addition, it is expected that these service groups will carry out their activities on the production and purchase of critical materials such as vaccines, medicines, ventilators quickly and efficiently in disaster conditions.

On the other hand, it is thought that the storage and transportation support to be received from AFAD, Red Crescent and logistics professions will reduce the density on the storage systems of the Ministry of Health, which carries out its routine work during the pandemic, and that the commissioning of personnel and institutions specialized in the field of disaster management will contribute to an effective logistics operation. It is expected that the Ministry of Health, which is responsible for the entire pandemic process of the model proposal, will focus on medical operations by reducing its role in financial affairs, logistics and communication activities, thereby increasing the efficiency of the operation.

In the National Pandemic Influenza Preparedness Plan (2019), it is stated that drug and vaccine logistics is one of the most critical areas of pandemics. In order to prevent these areas from being affected by stockpiling and black-market activities, it has been proposed to carry out the necessary studies. It was emphasized that measures should be taken to supply, store, transport, distribute

and use medicines. Made in the proposal made in this study managerial planning of production, purchase, storage and distribution of entire groups of pandemics during vaccines, medicines, medical supplies and medical equipment is to take part in reaching those in need. It is proposed to produce materials, purchase items that cannot be produced in the shortest possible logistics chain under pandemic conditions, assign effective and authorized institutions for the safe and effective transportation, storage and distribution of all materials. In this context, it is expected that the proposed structuring in the study will contribute to preventing disruptions that may occur in the supply of medicines, vaccines, medical and medical supplies.

It is seen that the structure of disaster management in pandemics is usually evaluated from a health-oriented point of view in the literature. On the other hand, disaster logistics is given relatively less space in logistics research than in other fields. In this study, as a pandemic and disaster response logistics processes are tackled in terms of the principles of logistics, the logistics activities in Turkey that examine the structure of the disaster and pandemic execution of more execution of the academic work is considered to contribute to more effective interventions possible.

## REFERENCES

- Ali S. A., Baloch M., Ahmed N., Ali, A. A., & Iqbal, A. (2020). The outbreak of coronavirus disease 2019 (COVID-19)-An emerging global health threat. *Journal of Infection and Public Health*, 13(4), 644-646.
- Amankwah-Amoah, J. (2020a). Stepping up and stepping out of COVID-19: New challenges for environmental sustainability policies in the global airline industry. *Journal of Cleaner Production*, 271.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Chen, Q., & Pan, S. (2020). Transport-related experiences in China in response to the coronavirus (COVID-19). *Transportation Research Interdisciplinary Perspectives*, 8.
- Chiaramonti, D., & Maniatis, K. (2020). Security of supply, strategic storage and Covid 19: Which lessons learnt for renewable and recycled carbon fuels, and their future role in decarbonizing transport? *Applied Energy*, 271, 115216.
- Chowdhury, P., Paul, S. K., Kaisar, S., & Moktadir, M. A. (2021). COVID-19 pandemic related supply chain studies: A systematic review. *Transportation Research Part E: Logistics and Transportation Review*, 148, 102271.
- Dente, S.M.R., & Hashimoto, S. (2020). COVID-19: A pandemic with positive and negative outcomes on resource and waste flows and stocks. *Resources Conservation & Recycling*, 161.
- de Paulo Farias, D., & de Araújo, F. F. (2020). Will COVID-19 affect food supply in distribution centers of Brazilian regions affected by the pandemic? *Trends in Food Science & Technology*, 103, 361-366.
- DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, 40(4), 314-321.
- Ersoy, P., Börühan, G. ve Esmer, S. (2016). Afet lojistiği bütünleşik afet yönetimi. Karaman, Z. T. ve Altay, A. (Eds.), *Bütünleşik afet yönetimi içinde* (101-124). İzmir: İlkem Yayınları.
- Franco-Paredes, C., Carrasco, P., & Preciado, J. I. S. (2009). The first influenza pandemic in the new millennium: Lessons learned hitherto for current control efforts and overall pandemic preparedness. *Journal of Immune Based Therapies and Vaccines*, 7, 2.

Gray, R. S. (2020). Agriculture, transportation, and the COVID-19 crisis. *Canadian Journal of Agricultural Economics*, 68(2), 239–243. <https://doi.org/10.1111/cjag.12235>

Gunessee, S., & Subramanian, N. (2020). Ambiguity and its coping mechanisms in supply chains lessons from the COVID-19 pandemic and natural disasters. *International Journal of Operations & Production Management*, 40(7/8), 1201-1223.

Hobbs, J. E. (2020). Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics*, 68(2), 171–176.

Ivanov, D. (2020b). Viable supply chain model: Integrating agility, resilience and sustainability perspectives—lessons from and thinking beyond the COVID-19 pandemic. *Annals of Operations Research*. Erken görünüm.

Ivanov, D., & Das, A. (2020). Coronavirus (COVID-19 / SARS-CoV-2) and supply chain resilience: A research note. *International Journal of Integrated Supply Management*, 13(1), 90–102.

Ivanov, D. & Dolgui, A. (2021). OR-methods for coping with the ripple effect in supply chains during COVID-19 pandemic: Managerial insights and research implications. *International Journal of Production Economics*, 232, 107921.

Jianhua, G. (2020). Çin'in yeni koronavirüs zatürresine karşı savaşı: Mücadeleler, sonuçlar ve yansımalar. *Kuşak ve Yol Girişimi Dergisi (BRIQ)*, 1(2), 90-102.

Kadioğlu, M. (2008). Modern, bütünleşik afet yönetimin temel ilkeleri. M. Kadioğlu ve E. Özdamar (Eds.), *Afet Zararlarını Azaltmanın Temel İlkeleri içinde* (1-34). Ankara: Japonya Uluslararası İş Birliği Ajansı (JICA) Türkiye Ofisi.

Kadioğlu, M. (2011). *Afet yönetimi: Beklenmeyeni beklemek en kötüsünü yönetmek*. İstanbul: T.C. Marmara Belediyeler Birliği Yayını.

Küçük, B. (2023). *Entegre Lojistik Yönetimi Yüksek Lisans Ders Notları*, Maltepe Üniversitesi, İstanbul.

Lee, Y. M. (2008). Analyzing dispensing plan for emergency medical supplies in the event of bioterrorism. *Proceedings of the 2008 Winter Simulation Conference*, 2797-2808.

Li, J. Y., You Z., Wang, Q., Zhou, Z. J., Qiu, Y., Luo, R., & Ge, X. Y. (2020). The epidemic of 2019-novel-coronavirus (2019-nCoV) pneumonia and insights for emerging infectious diseases in the future. *Microbes and Infection*, 22(2), 80-85.

Majumdar, A., Shaw, M., & Sinha, S. K. (2020). COVID-19 debunks the myth of socially sustainable supply chain: A case of the clothing industry in South Asian countries. *Sustainable Production and Consumption*, 24, 150–155.

Neuendorf, K. A. (2019). Content analysis and thematic analysis. Brough, P. (Ed.), *Research methods for applied psychologists: Design, analysis and reporting in* (211-223). New York: Routledge.

Oshitani, H., Kamigaki, T., & Suzuki, A. (2008). Major issues and challenges of influenza pandemic preparedness in developing countries. *Emerging Infectious Diseases*, 14(6), 875-80.

Otero, R. C., & Marti, R. Z. (1995). The impacts of natural disasters on developing economies: implications for the international development and disaster community. *Disaster Prevention for Sustainable Development: Economic and Policy Issues*. Washington DC, World Bank, 11-40.

Paul, S. K., & Chowdhury, P. (2021). A production recovery plan in manufacturing supply chains for a high-demand item during COVID-19. *International Journal of Physical Distribution & Logistics Management*, 51(2), 104-125.

Pektaş, T. (2012). İlçe bazında afet lojistiği: Başakşehir uygulaması (Yayınlanmamış yüksek lisans tezi). Bahçeşehir Üniversitesi, İstanbul.

Ranney, M. L., Griffeth, V., & Jha, A. K. (2020). Critical supply shortages - The need for ventilators and personal protective equipment during the Covid-19 pandemic. *The New England Journal of Medicine*, 382(18), e41.

Rothan H. A. & Byrareddy S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity*, 109, 102433. Shaw R., Kim Y., &

Shaw, R., Kim, Y. K., & Hua, J. (2020). Governance, technology and citizen behavior in pandemic: Lessons from COVID-19 in East Asia. *Progress in disaster science*, 6, 100090.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., ... Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, 76, 71-76.

Tanyaş, M., Günalay, Y., Aksoy, L. ve Küçük, B. (2013c). İstanbul ili afet lojistik planı kılavuzu (Rapor No. Dfd-39). İstanbul Kalkınma Ajansı.

Telatar T. G. ve Üner, S. (2020). Covid-19 pandemisi mücadelesinin Pandemik Influenza Ulusal Hazırlık Planı açısından değerlendirilmesi. *Sağlık ve Toplum Özel Sayı*, 55-56.

URL 1, <https://www.epw.in/journal/2020/15/commentary/indias-food-system-time-covid-19.html> (Son Erişim: 10.10.2021)

URL 2, <https://www.afad.gov.tr/turkiye-afet-mudahale-plani> (Son Erişim: 12.10.2020)

URL 3, [https://www.kizilay.org.tr/Upload/Dokuman/Dosya/kizilay\\_fr\\_2020\\_tr\\_web-01-07-2021-48114193.pdf](https://www.kizilay.org.tr/Upload/Dokuman/Dosya/kizilay_fr_2020_tr_web-01-07-2021-48114193.pdf). (Son Erişim: 01.07.2021)

URL 4, <https://hsgm.saglik.gov.tr/tr/bulasicihastaliklar-haberler/ulusal-pandemi-hazirlik-plani.html>, (Son Erişim: 12.03.2021)

URL 5, <https://covid19.saglik.gov.tr/Eklenti/40982/0/covid19toplumdasalginyonetimirehberipdf.pdf> (Son Erişim:16.10.2021)

URL 6, <http://www.fritzinstitute.org/PDFs/WhitePaper/FromLogisticsto.pdf>, (Son Erişim: 03.03.2022)

URL 7, [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200609-covid-19-sitrep-141.pdf?sfvrsn=72fa1b16\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200609-covid-19-sitrep-141.pdf?sfvrsn=72fa1b16_2), (Son Erişim: 08.07.2020)

URL 8. <https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---18-may-2021>, (Son Erişim: 20.05.2021).

Wang, L., Wang, Y., Ye, D., & Liu, Q. (2020). Review of the 2019 novel coronavirus (SARS-CoV-2) based on current evidence. *International Journal of Antimicrobial Agents*, 55(6), 105948.

Yazıcı, S. (2020). COVID-19'un soğuk zincir lojistiğine etkisi. *Journal of Awareness*, 5(3), 391-400.

Yuen, K. F., Wang, X., Ma, F., & Li, K. X. (2020). The psychological causes of panic buying following a health crisis. *International Journal of Environmental Research and Public Health*, 17, 3513.

Zhang, S. X., Wang, Y., Rauch, A., & Wei, F. (2020). Unprecedented disruption of lives and work: Health, distress and life satisfaction of working adults in China one month into the COVID-19 outbreak. *Psychiatry Research*, 281.