

Application

International of Journal Management and Social Researches
Uluslararası Yönetim ve Sosyal Araştırmalar Dergisi
ISSN:2148-1415/ e-ISSN:2651-3072



Makale Başvuru/Kabul Tarihleri:
Received/Accepted Dates:
18.10.2019/18.12.2019

Volume 7, Issue 13, Year 2020

An Application Example on Cold Chain Management of Dairy Products

Öğr. Gör. Özhan GÖRÇÜN

Adıgüzel MYO Lojistik Programı
ozhangorcun@adiguzel.edu.tr
ORCID: 0000-0002-4912-4149

M. Serhat ÖZTÜRK

Masimpex Dış Ticaret A.Ş Genel Müdürü
mserhat2003@yahoo.com
ORCID: 0000-0003-3865-5806

Abstract

Cold Chain Logistics Management covers all the methods required to maintain the product to a constant degree. The food industry manages real-time point-to-point supply chain vision; From commercial to technical documentation approval and safety, from product traceability to production processes and quality compliance Cold chain management; provides inter-company information exchange and collaboration, real-time vision, effectiveness and traceability to the food and beverage industry. Control and monitoring of the cold chain is of paramount importance in order to ensure product quality and safety in the supply chain operation from point A to point B for products that are highly sensitive, such as perishable foods. Any event, problem or irregular grade recordings during the cold chain will not only harm the quality of the product, but can also endanger the health of customers. Moreover, it becomes a factor damaging brand integrity and reputation. Effective cold chain management with customers' increasing concern about product traceability, quality and safety is vital to your operational efficiency, your operations, your brand integrity and moreover your business performance. In this study, we will examine the processes applied in the scope of Cold Chain of Dairy products. We will focus on the importance of transporting and storing dairy products that require protection and handling sensitivity and are indispensable in our basic food chain.

Keywords: Cold Chain Storage, Frozen Food, Perishable Goods, Milk Logistics.

Süt Ürünlerinin Soğuk Zincir Yönetimi Üzerine Bir Uygulama Örneği

Özet

Soğuk Zincir Lojistik Yönetimi ürünün sabit bir derecede muhafaza edilmesi için yapılması gereken tüm yöntemleri kapsamaktadır. Gıda sektörü gerçek zamanı noktadan noktaya tedarik zinciri görüşü ile yönetir; Ticariden teknik dokümantasyon onaylamaya ve güvenliğine, ürün izlenebilirliğinden üretim süreçlerine ve kalite uygunluğuna kadar Soğuk zincir yönetimi; yiyecek-içecek sektörüne şirketler arası bilgi alışverişi ve işbirliği, gerçek zaman görüşü, etkinlik ve izlenebilirlik sağlar. Kolay bozulan gıdalar gibi dereceye hassasiyet gösteren ürünler için A noktasından B noktasına kadar olan tedarik zinciri operasyonunda ürün kalitesi ve güvenliğinden emin olmak adına soğuk zincirin kontrolü ve takibi fazlasıyla önem taşıyan bir husustur. Soğuk zincir esnasında herhangi bir olay, problem veya düzensiz derece kayıtları sadece ürünün kalitesine zarar vermez, ayrıca müşterilerin sağlığını tehlikeye sokabilir. Dahası marka bütünlüğünü zedeleyici bir unsur haline gelir. Müşterilerin ürün izlenebilirliği, kalite ve güvenlik konularındaki gün geçtikçe artan kaygıları ile etkili soğuk zincir yönetimi operasyonel verimliliğiniz, faaliyetleriniz, marka bütünlüğünüz ve dahası iş performansınız için hayati önem taşır. Bu çalışmamızda Süt ürünlerin Soğuk Zincir kapsamında uygulanan süreçleri inceleyeceğiz. Koruması ve taşınması hassasiyet isteyen ve temel besin zincirimizde vazgeçilemez öneme sahip olan Süt ürünlerin taşınması ve depolanmasının önemi üzerinde duracağız.

Anahtar Kelimeler: Soğuk Zincir, Depolama, Dondurulmuş Gıda, Bozulabilir Ürünler.

INTRODUCTION

Cold chain is a physical process that manages / manages the supply chain logistics of certain specially processed foods. Equipment and processes used to protect chilled and frozen foods are called cold chains” Cooling and freezing storage, which enters into low temperature application, is the most effective and widespread preservation method used in many stages of food industry such as production, storage, marketing and consumption. However, this preservation method ensures that foodstuffs reach the consumer with minimum loss in quantity and quality (Ekinci and Yapar, 2004).

Breaking the Cold Chain in food products makes the products no longer a commercial value and makes them waste products. The first concept that comes to mind in fast perishable food logistics is the cold chain. It is necessary to maintain and maintain the heat levels necessary for the protection of cold chain products in all transport, storage, handling and other logistics activities. Therefore, the most important principle in the transportation and storage of such food products is that the cold chain is not broken (Erdal vd., 2010).

1. FOOD LOGISTICS AND SUPPLY CHAIN MANAGEMENT

The first concept that comes to mind in fast perishable food logistics is the cold chain. It is necessary to maintain and maintain the heat levels necessary for the protection of cold chain products in all transport, storage, handling and other logistics activities. Therefore, the most important principle in the transportation and storage of such food products is that the cold chain is not broken.

Almost all food products have been described as perishable and decomposable products in the literature. Accordingly, special conditions are needed in logistics processes such as storage and transportation for food products. At the beginning of these conditions, temperature controlled vehicles (refrigerated) are required for the transportation of such products. For storage, the store must be a cold store.

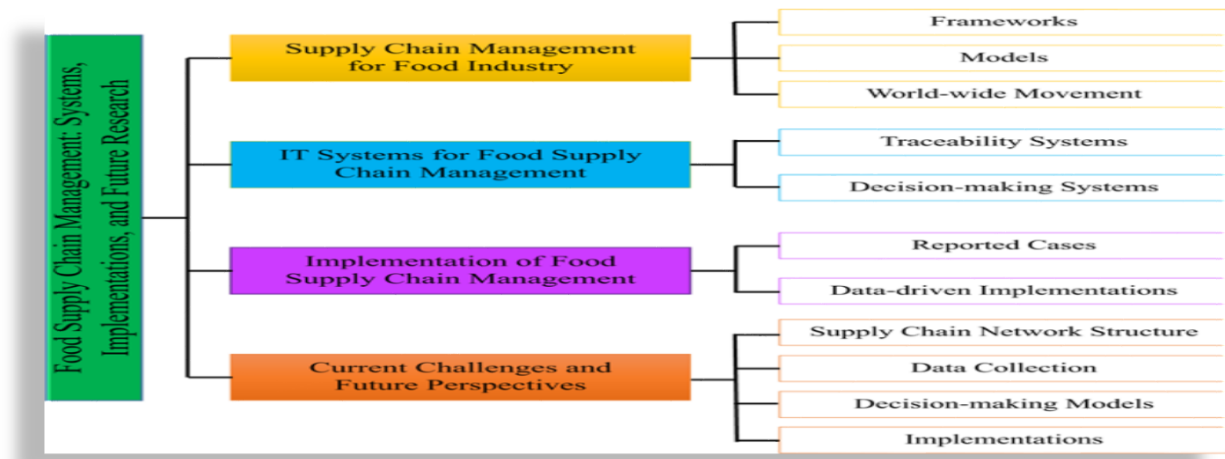


Table: 1 Food Supply Chain Management Systems Implementations and Future Research (Food supply chain management: systems, implementations, and future research Ray Zhong, Xun Xu, Lihui Wang.)

Ürünün üretilmesinden itibaren hedef pazar ve müşteriye ulaştırılması aşamalarında gerek taşıma, gerekse zincirin son halkası konumunda olan perakende satışta, soğuk zincirin korunmasında üretici ve perakende firmanın sorumluluğu bulunmaktadır. Yapılan taşıma frigorifik sistemle donatılmış

araçlarla olmalıdır. Herhangi bir süreçte ürünün korunduğu ısının değişmesi ürünün bozulmasına ve içerisinde zararlı mikroorganizmalar ve canlıların çoğalmasına neden olmaktadır.

During transport and storage, food products should be protected from microbial contaminants, physical contaminants, chemical contaminants and allergens that may be at risk. In this sense, among microbial infectious; viruses, microscopic parasites, and food poisoning bacteria from different sources, while physical infectious agents include hair, nails, dirt, metal, glass, plastic, stones, leaves, jewelry, dust, flies and bones. In chemical contaminants, cleaning chemicals, industrial production chemicals, medical and agricultural chemicals and pesticide poisons take the first place. Finally, foods that produce dangerous reactions with allergens are substances that cause an immune response to external proteins. It is necessary to eliminate the possible interaction of food contaminants with these and similar effects (Erdal; 2011).

Proper production and harvesting is essential to protect food products and make them ready for packaging. Food products damaged during production should be separated into waste and should not be taken into packaging. According to the nature of the group of food products, the package should be pre-cooled with open mouth (eg about 6-10 hours) after being placed in packages. Pre-cooled products should be sealed in such a way that the bags of protective transparent tapes in which they are located are not airtight; food products should be stored in the conditions required by the family. Care must be taken that the package is never pierced (Görçün;2009).

2. DETERMINATION OF FOOD PRODUCTS

A-Internal factors:

- Changes in the pH of the product
- Loss of moisture
- Oxidation
- Loss of food
- Overuse of anti-microbial drugs

B-External Factors:

- Microorganisms
- Changes (Suddenly) in temperature in the warehouse or transport means occurs when products come into contact with gases of organic origin (nitrogen, propane, butane, etc.).

2.1 Basic Rules in Food Transportation:

Food products must be wrapped with parcel or case with transparent cover. The protective transparent tapes (shilling) are pre-cooled and absorbed into the external environment by the gases produced by the foodstuffs, in particular ethylene, sulfidric acid, ammonium and its derivatives.

Smart packaging, also called active packaging; aims to produce and maintain high quality, close to fresh, long shelf life, safe foods as a result of the effects of the atmosphere of the packaging or packaging components and food or food products within the gas atmosphere of the packaging.

Food products damaged during production should be separated into waste and should not be taken into packaging. According to the nature of the foodstuffs group, they should be pre-cooled (eg about 6-10 hours) with the mouth open. Pre-cooled products should be sealed in such a way that the bags of the protective transparent tapes are sealed.

2.2 Packing Rules:

- The product should be whole,
- The product must be intact (those that become unsuitable for consumption by decomposition and deterioration should not affect the product),
- The product must be clean (free from visible foreign matter),
- The product should be of color and shape specific to the variety,
- The product should be in the specific taste and smell,
- The product should not have ruptures or ruptures for fruits and vegetables,
- There should be no sunburn on the product shell,
- There shall be no damage to the shell or outer surface due to low temperature for the product fruit and vegetables, (Ryan, J.2013,pp.28)

2.3 Loading of dairy products into vehicles:

The product should be whole, The product must be intact (those that become unsuitable for consumption by decomposition and deterioration should not affect the product), The product must be clean (free from visible foreign matter), The product should be of color and shape specific to the variety, The product should be in the specific taste and smell so that The product should not have ruptures or ruptures for fruits and vegetables, There should be no sunburn on the product shell, There shall be no damage to the shell or outer surface due to low temperature for the product fruit and vegetables, The products which do not have the above mentioned features should never be loaded into the vehicle and separated to the waste

3. COLD CHAIN MANAGEMENT OPERATIONS:

If food is stored in an enclosed space, the stacking devices to be used must never be gasoline, diesel, gas or diesel fuel. Otherwise, carbon dioxide will be emitted on the food products in the enclosed area during the operation of the truck, consuming these products will be dangerous for being toxic. The stacker used in this process should be battery powered due to international standards.

Since the degree of protection and storage of each product is different from each other in food storage, it would be appropriate to make the products as uniform as possible. In other words, product based storage should be provided and heat fixing should be done in the storage according to the properties of the product.

Turkish Food Codex; “The process of storing raw, semi-finished and finished foodstuffs, additives, by-products, food packages and materials in accordance with the technique in conditions that do not impair their natural structure before they are put into consumption or processed” (Herrero,1998)

All processes and elements to be considered between transport and storage processes in milk and milk products:

- Business Environment
- Business
- Cleaning and Disinfection
- Pest Control
- Raw Material, Auxiliary Material, Additives
- Water, Ice and Steam to be Used in the Workplace

3.1 Cold Chain and Technical Issues

- Technical Equipment
- Storage and Removal of Liquid Waste Lines and Solid Wastes
- Staff Hygiene
- Packaging and Labeling
- Lighting and Ventilation
- Transport and Storage
- Education

Good hygiene practices in milk storage and cooling Storage and cooling of milk: Milk should be cooled to 8 ° C if not collected within 2 hours after milking, below 8 ° C if collected daily, and below 6 ° C if not collected daily. When transporting milk to processing and production facilities, it should be ensured that its temperature does not exceed 10 ° C (Erdal,211).

3.2 Milk Collection, Transport and Distribution:

Collection, transport and distribution: Milk collection / transport should not be carried out by persons at risk of transferring disease-causing microorganisms to milk. The milk collector / seller must be adequately trained in the preservation of raw milk hygiene and wear clean clothing. Prior to collection, the milk collector / carrier should check the milk of each producer to determine if there are signs of milk spoilage or smell. Milk should be collected under hygienic conditions (Tucker 1998).

Equipment used in collection, transportation and distribution: The equipment is easy to clean, disinfect, resistant to corrosion and will not pose a danger to human health, and will not impair the properties of the milk. Equipment (tankers, valves) should be cleaned (at least once a day) and disinfected after each batch of shipments.

Milk tankers should not be used for any purpose other than milk transport. When transporting milk, it should be ensured that the temperature does not exceed 10 ° C (Atp Handbook,2017).

Periodic health checks of the drivers should be done. For the protection of raw milk, a collection plan is made in such a way that the milk is delivered to the farm during the day. All tanks, vehicles and equipment are cleaned and disinfected after each collection. The quantity and quality of milk to be collected from the point is transferred to the planning unit by the field manager one day in advance.

This data is converted into a collection plan with a web-based go googlemaps harita map supported program. With this plan, it is determined which type of vehicles will be collected by the next day, TL / ton costs are determined during the planning and different planning alternatives are tested. Vehicles are tracked 24/7 with GPS / GPRS based vehicle tracking systems. (Görçün,2017).

The drivers immediately notify the milk collection center and quantity via the voice response system. Based on this information, the information about the time when the milk is collected by the software (on the basis of point and quality) is immediately calculated and transferred to the company online. At the stations where milk collection routines are agreed, fuel intake, tire change and other minor repairs are carried out immediately.(Görçün,2017).

RESULT

Developments in the Cold Chain Management of Perishable Foods and the opportunities emerging in global trade have increased in terms of hygiene and quality conditions for food products as well as differences in product types and price levels based on the demands of consumers along with competitive economic arrangements.

Food companies that build their supply chain on defined targets survive in today's conditions. The information we receive from our companies that support the preparation of this article in the food sector and who share documents can be reached to a point by evaluating the dimensions of Storage, Transportation and Security in Cold Chain Management.

REFERENCES

Ayyıldız, R (2001) "Et Ve Et Mamulleri İmalatı Tesisi Sanayi Profili", T.C Sanayi Ve Ticaret Bakanlığı Sanayi Araştırma Ve Geliştirme Genel Müdürlüğü, Ankara.

Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for Such Carriage (ATP), Economic Commission for Europe's Inland Transport Committee, <http://www.unece.org/trans/main/wp11/wp11fdoc/ATP-2007e.pdf>.

ATP HANDBOOK, (2007)" Transport of Perishable Foodstuffs of the Inland Transport Committee of the Economic Commission for Europe" (UNECE), Genoa, 2007

Chatzidakis, S.K.Chatzidakis, K.S (2005) "A Heat Transfer Simulation Study of A Multi-Compartment Isothermal Liquid Foodstuff Tank Tested According To The International ATP Agreement", Energy Conversion and Management 46 (2).

Erdal, E., (2000) "Et Ve Et Ürünleri, Sektörel Araştırmalar", Türkiye Kalkınma Bankası A.Ş. Araştırma Müdürlüğü, TKB Matbaası, Ankara,2000.

Dinçer, İ. (1997) "Heat Transfer in Food Cooling Applications," Taylor & Francis Press, Bristol City,

Gac, A. (2002) "Refrigerated Transport: What's New?", International Journal of Refrigeration 25.

Gigiel, A.J., S.J. James and J.A. Evans, (1998) "Controlling Temperature During Distribution And Retail", 3rd Karlsruhe Nutrition Symposium, European Research towards Safer and Better Food Review and Transfer Congress, Congress Centre, Karlsruhe, Germany, Proceedings Part 2.

Görçün, Ö.F, Saygılı, M. (2008), "Important Factors on Perishable Foods Transportation and Food Logistic Systems and Turkish Food Logistic Sector" Türkiye 10. Gıda Kongresi, Erzurum,

Görçün, Ö. Kayıkcı, Y. Görçün Ö.F. (2008) "Carriage Time Sensitive and Perishable Goods in the Air Transportation" Türkiye 10. Gıda Kongresi, Erzurum.

Erdal, M, Görçün, Ö, Görçün, Ö.F. Saygılı, M. (2011). "Entegre Lojistik Yönetimi", Beta yayınevi.

Görçün, Ö. Duruel, M Lojistik, (2017) Lisans yay, İstanbul.

Hunt, A. (2006) "Protecting Perishable Foods During Transport by Truck", Agricultural Marketing Service, Transportation and Marketing Programs, United States Department of Agriculture, Handbook Number 669, Washington.

İstanbul Ticaret Odası Web Sitesi, (2018) <http://www.ito.org.tr/ITOPortal/Dokuman/15.50.pdf>.

İstanbul Ticaret Odası (İTO),(2018), <http://www.ito.org.tr/ITOPortal/Dokuman/15.50.pdf>.

Mantriota, G (2002), "Influence of Suspended Cargoes on Dynamic Behavior of Articulated Vehicles", Heavy Vehicle Systems International Journal Of Vehicle Design 9 (1).

Manuela Hernandez-Herrero, Artur X. Roig-Sagues; Emilio I. Lopez-Sabater, Jose J. Rodríguez- Jerez, , and M. Teresa Mora-Ventura, "Halo Tolerant Histamine-Forming Bacteria Isolated During The Ripening Of Salted Anchovies", 3rd Karlsruhe Nutrition Symposium, European Research towards Safer and Better Food Review and Transfer Congress, Congress Centre, Karlsruhe, Germany, Proceedings Part 2: October 18-20 1998.

Özkol, N. (2015) "Uygulamalı Soğutma Tekniği", TMMOB Makine Mühendisleri Odası Yayın No: 115.

Olvio , A.(2000), "Feeding the Cities: Food Supply and Distribution" Focus 3, Brief 5 Of 10, International Food Policy research institute Washington, D.C

Ryan, J. (2013), "Guide to Food Safety and Quality During Transportation: Controls, Standards" Elsevier Publishing.

Tucker, G. and Richardson. (1998). "Validation of Food Pasteurization Treatments Using An Amylase Time Temperature Integrator", 3rd Karlsruhe Nutrition Symposium, European Research towards Safer and Better Food Review and Transfer Congress Congress Centre, Karlsruhe, Germany, Proceedings Part 2.

Zhong, Xun Xu, Lihui Wang. (2017) Food supply chain management: systems, implementations, and future researchRay Industrial Management & Data Systems ISSN: 0263-5577 .