

Reg. No. 063834934

Word count: 1,943

Logistics of Supply Chain Management

Dr Julia Edwards

THE EFFECT OF SEVERE WEATHER ON LOGISTICS IN THE UK

ASSUMPTIONS

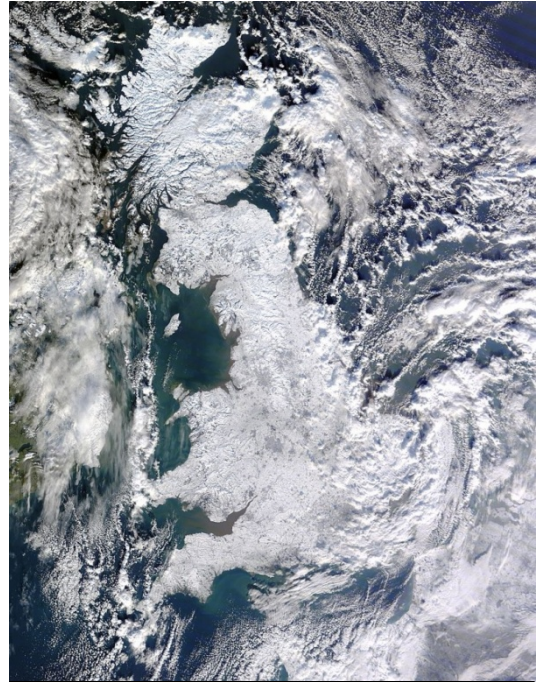
The company in question is one of UK's largest dairy products manufacturers: Dairy Crest. It operates by a just-in-time approach and handles all its logistics in house, including retrieving milk from farmers and delivering to retailers.

A GENERAL OUTLINE OF "THE BIG FREEZE"

As a result of a mechanism called arctic oscillations (1), winds from the north-east hit the UK just after Christmas and caused the temperature to drop far below zero. The cold temperature combined with snow resulted in a shortage of gas supplies, human fatalities, physical damage to infrastructure, absence of employees and massive disruptions to traffic and logistic operations (2). Many flights and trains were delayed and cancelled and the nation's supply of road grit almost ran out (3). The insurance company RSA estimated the total cost of the cold spell to be £14.5bn if it lasted for three weeks (4). This cold spell could be seen as isolated and not necessarily a result of the climate change but, as it happened in February 2009 as well (5), it would be useful to see what can be put in place to reduce the impact of "adverse weather" in the future.

For businesses, the transport issues due to snow were said to have the greatest impact, costing Britain an estimated £400m per day (2). The resulting absenteeism was estimated to cost businesses £230m a day if the employees were unable to work from home. The Forum of Private Businesses estimated the cost to be £23m a day for the businesses of Scotland (6). However, CEBR says that weather implications are almost always exaggerated and that the temporary conditions will have little impact for the quarterly GDP (7). Upstream in the supply network, vegetable and milk suppliers have had the greatest disruptions, with the cold making it difficult to prepare goods for the market and snowy roads halting deliveries (8). Because their products are fresh, the lead time is short and the just-in-time supply chain is very vulnerable to long lasting disruptions. The suppliers have a strict contract with the supermarkets and have to pick up the bill for the extra labour required to meet the demand.

Downstream on the supply network, the slower moving furniture, cosmetics and DIY sectors took the hardest blow whereas the food and clothes sectors saw an increase in sales (9). Some of John Lewis' stores had a decline in sales up to 32 percent from the same week last year (10). However, their internet sales were up by 55 percent, an indication that the reason for the decline was customers' travel difficulties rather than a decrease in demand. In the FMCG sector, Waitrose saw sales increase by 22 percent, the reason probably being customers taking measures to prepare for a long term disruption to transport. The disruption in Scotland was smaller than in the UK overall (10) and as Scotland, due to their geography, should expect colder weather; their contingency plans are probably better configured to tackle extreme winter conditions.



The Big Freeze seen from space. ©NASA (27)

DISCUSSION

Although the European continent and islands suffer relatively few natural disasters, the United Kingdom consists of islands influenced by the climate of the Atlantic. Whether the reason for an apparent increase in adverse weather is climate change or not, the likelihood of risks associated with severe conditions is high and the impact can be devastating if contingency plans are not in place. Weather phenomena particularly evident in the UK include (11):

- Severe gales
- Heavy rain
- Heavy snow and icy roads
- Thunderstorms and lightning
- Heat and sun
- Dense fog

All these can disrupt transport and the longer they persevere, the more damage they do on the infrastructure (with the exception of dense fog) (12), extending the period it takes to repair the roads and train lines to re-establish normal operation. An example of this is heavy rain, which in the short term can cause reduced visibility and slippery roads, but over time can cause flooding and landslides, which takes a long time to repair.

“Despite the importance of transportation as a key driver and enabler of the economy, little research has been conducted in the UK into how vulnerable it will be to climate change.”

(Jaroszweski et al, 2010)

The immediate implication of extreme weather on the FMCG-supply chain would be a disruption to the domestic transportation of goods between manufacturers, ports, distribution centres (DC's) and retailers. This could over time result in increased inventories upstream in the supply network. As the flow of goods is lower than the customer demand, the inventories of the retailers diminish and will eventually lead to stock-outs. Apart from the obvious loss in sales, these stock-outs lead to a damaged brand loyalty both for the retailer and product out of stock. (13)

In order to minimize inventory costs, a just-in-time approach has been adopted by the FMCG-sector (8) and a part of this strategy is to minimise inventory buffers. Hence, in case of a halt in the system, the time for these buffers to run out is short and the supply chain is vulnerable to short term disruptions. For perishable goods, losses are even greater, as the inventory needs to be discarded when the “Display until”-date is reached. If a “market pull” system is adopted by the manufacturer, they may decrease production and wait for the weather to pass.

RECOMMENDATIONS

As this company is an FMCG manufacturer in the UK and dairy products are perishable over a fairly short term, the problem of cold and snowy weather should be considered of high importance and a strategy to identify, forecast and mitigate the risks associated with this phenomenon should be devised.

First of all, in order to identify the risks and plan for a potential weather threat, weather forecasts should be continuously monitored, especially during the winter months. These can be incorporated in the inventory management systems, so that products can be pushed down the supply chain ahead of a potential weather disruption in order to reduce the risk of stock-outs (14). As weather forecasts can be unreliable, a general increase in inventory levels could be adapted in the winter months as a general precaution; however, the cost of this must be assessed and justifiable. If the retailers are well integrated in this forecasting system, they may be willing to increase their inventory buffers and share the costs associated with this.

As demand can change both positively and negatively as a result of severe weather (10), the sales of individual products should be monitored by the retailers and passed on in order to improve the agility of the supply chain and avoid over- or under-stocking. Also, as customers start to worry that the supply of milk will run out, they panic buy, adding to the stock-out risk (15). It is therefore important to include the customers in the information flow and supply chain so that they can contribute to make the disruptions as small as possible, and retain trust in the brand.

As production quantity has direct impact on inventory levels if there are disruptions in the logistical operations, it is important to take an integrated view on the problem in order to minimise losses. The current just-in-time approach of the business dictates that the production level of outbound products is lowered according to the demand (16). However, as the livestock of the farms cannot be shut down and will produce a constant supply of milk, alternative less perishable products like butter could be produced at higher quantity to limit the waste of raw milk. Alternatively, the milk could be ultra pasteurised to allow for longer durability and longer lead times.



Autosocks improve traction on snowy roads. (17)

The most vulnerable components of the transport operation to icy roads are the tank trucks upstream and the product delivery trucks downstream of the processing plant. In order to maximise the mobility and dependability of these trucks in winter conditions, tyre chains or AutoSocks (17) could be applied temporarily to improve traction and allow for operation where roads are not properly gritted. These are common and at times compulsory for commercial trucks in countries at the same latitude as the UK, such as Canada (18). They require an investment of between £150 and £300 per drive wheel for a commercial truck (19), but can be used for many years to come if they are properly maintained and stored. Training the truck drivers in winter road driving is vital to avoid accidents (20).

Communication should also be established with the councils responsible for gritting the roads, to allow for monitoring and planning of delivery routes. Running simulations of weather scenarios can help management establish alternative delivery routes and specific contingency plans. Training the plant managers and staff in advance is important to make sure they know what to do in the event of snowfall or cold temperatures, as the bad weather could impact staff morale and motivation. If employees cannot come in for work due to the weather, the company has no obligation to pay those (21), but should try to find ways to enable them to work from home if possible and necessary.

This company has one national distribution centre located in Nuneaton. Some researchers have suggested that fewer cold and snow incidents will happen in the future (22), however, if climate change results in more extreme weather more often, moving processing plants and having more distribution centres closer to the end customer would spread and minimise the risks associated with transportation and other logistical operations.

In conclusion, continuous monitoring of weather, a well integrated supply network where farmers and customers are included, effective flow of information, temporary vehicle traction improvement and sufficient training of staff should bring this company safely through an extended period of snow and cold temperatures. However in the long run, making sure the company is not contributing to climate change is an equally important task.

BUSINESS OPPORTUNITIES

Any geographically universal challenge presents an opportunity to gain a competitive advantage over the other operators within the same area. If you can keep the business running smoothly, prevent stock-outs, avoid bad press and keep staff happy and productive at a low cost throughout the period of poor weather, chances are that some competitors will fall behind. But there are also a couple of opportunities that can help bringing your business ahead of other well running competitors.

The weather conditions have an impact on people's buying behaviour of fresh milk (15). People want security of supplies, but they have limited cold storage-facilities (refrigerators). Fresh pasteurised milk is perishable and relies on a fairly short lead time (23). Milk can be heated to a higher temperature (UHT) and packed under aseptic conditions, allowing an extended shelf life and the possibility to transport and store it at room temperature (24). This does impact the quality of the taste and nutritional content (25), but would allow customers to store more milk in their homes when the likelihood of a disruption is high. Branding and marketing would separate this product from fresh milk and help customers understand the advantages. This would shift inventory buffer costs to the absolute bottom of the supply chain, where there are most stakeholders to share them. Further research should be done in terms of production methods to limit the impact on quality.



Sharing and integrating transportation along the supply network is another opportunity that would make it less vulnerable to weather. Examples of this would be to rent farmers' tractors to transport the milk closer to the processing plant or combining truckloads with other manufacturers to spread the risk over more and smaller deliveries. If the company becomes exceptional at risk management, services can be offered to other companies. Lastly, online information to customers about the current stock-levels at different retailers and an open feedback system to understand the demand and expectations would make the supply chain more transparent and improve customer satisfaction.

REFERENCES

1. **The Economist.** Green.View: Oscilloscope. *The Economist Online*. [Online] 11 January 2010. [Cited: 20 February 2010.] http://www.economist.com/world/international/displaystory.cfm?story_id=15262021.
2. **The Independent.** The Big Freeze - An Audit. [Online] 10 January 2010. [Cited: 27 February 2010.] <http://www.independent.co.uk/environment/climate-change/the-big-freeze-2010-an-audit-1863350.html>.
3. —. More snow on the way as grit stocks dwindle. [Online] 10 January 2010. [Cited: 18 February 2010.] <http://www.independent.co.uk/news/uk/home-news/more-snow-on-the-way-as-grit-stocks-dwindle-1863529.html>.
4. **The Economist.** Predicting the Weather: Foggy with brickbeats. *The Economist Online*. [Online] 21 January 2010. [Cited: 27 February 2010.] http://www.economist.com/world/britain/displaystory.cfm?story_id=15351057.
5. **Channel 4.** Snowstorm: Britains Big Freeze. [Online] Channel 4, 26 February 2009. [Cited: 4 March 2010.] <http://www.channel4.com/programmes/snowstorm-britains-big-freeze/episode-guide/series-1/episode-1>.
6. **Business7.** Firms left counting the cost of big freeze. *Business7.co.uk*. [Online] 8 January 2010. [Cited: 27 February 2010.] <http://www.business7.co.uk/business-news/latest-business-news/2010/01/08/firms-left-counting-the-cost-of-big-freeze-97298-21951096/>.
7. **Centre for Economic and Business Research.** CEBR - Resources. [Online] January 2010. [Cited: 3 March 2010.] <http://www.cebr.com/Resources/CEBR/Impact%20of%20the%20snow%20Jan%202010.pdf>.
8. **The Guardian.** British supermarkets at root of vegetable supply problem. *The Guardian*. [Online] 15 January 2010. [Cited: 27 February 2010.] <http://www.guardian.co.uk/environment/2010/jan/15/carrots-vegetable-shortage-predicted-supermarkets>.
9. **The Scotsman.** Sales shiver as big freeze hits the high street. *The Scotsman*. [Online] 17 February 2010. [Cited: 28 February 2010.] <http://thescotsman.scotsman.com/consumerspending/Sales-shiver-as-big-freeze.6078165.jp>.
10. **The Times.** John Lewis reveals big freeze's toll on spending. *The Times Online*. [Online] 15 January 2010. [Cited: 15 February 2010.] http://business.timesonline.co.uk/tol/business/industry_sectors/retailing/article6989221.ece.
11. **Met Office UK.** What to do in severe weather. *Met Office*. [Online] 28 February 2010. [Cited: 2010 February 2010.] <http://www.metoffice.gov.uk/weather/uk/advice/>.
12. **Koetse, M.J. and Rietveld, P.** The impact of climate change and weather on transport: An overview of empirical findings. *Transportation Research Part D*. 14, 2009, pp. 205-221.
13. **Campo, Katia, Gijbrecchtsb, Els and Nisola, Patricia.** The impact of retailer stockouts on whether, how much, and what to buy. *International Journal of Research in Marketing*. 2003, 20, pp. 273-286.
14. **Harrison, Alan and van Hoek, Remko.** *Logistics Management and Strategy*. s.l. : Pearson Education Limited, 2008. p. 131.
15. **The Times.** Panic buying in supermarkets as the weather tightens its grip on Britain. *Times Online*. [Online] 11 January 2010. [Cited: 3 March 2010.] <http://www.timesonline.co.uk/tol/news/weather/article6982935.ece>.

16. **The Global Logistics Research Team, Michigan State University.** *World Class Logistics: The Challenge of Managing Continuous Change.* s.l. : Council of Logistics Management, 1995. pp. 95-100.
17. **Norwegian Design Council.** Autosock. [Online] 2002. [Cited: 4 March 2010.]
<http://www.norskdesign.no/industrial-design/autosock-article813-406.html>.
18. **Ministry of Transportation, British Columbia.** Ministry of Transportation Chain-Up Information. [Online] [Cited: 28 February 2010.]
http://www.th.gov.bc.ca/cvse/vehicle_saftey_and_standards/PDF/notices/091103_chains_map.pdf.
19. **Brindley Snow Chain Shop.** Snowchains Commercial Vehicles. [Online] [Cited: 3 March 2010.]
<http://www.snowchainshop.co.uk/products-list.aspx?category=snowchains-for-commercial-vehicles>.
20. **Kilpeläinen, Markku and Summala, Heikki.** Effects of weather and weather forecasts on driver behaviour. *Transportation Research part F.* 2007, 10, pp. 288-299.
21. **The Guardian.** Snowed in, out of pocket. *The Guardian.* [Online] 6 January 2010. [Cited: 27 February 2010.]
<http://www.guardian.co.uk/uk/2010/jan/06/snow-store-staff-wage-freeze>.
22. **Jaroszweski, David, Chapman, Lee and Petts, Judith.** Assessing the potential impact of climate change on transportation: the need for an interdisciplinary approach. *Journal of Transport Geography.* 2010, 18, pp. 331–335.
23. **Sepulveda, D.R. and al, et.** Production of extended-shelf life milk by processing pasteurized milk with pulsed electric fields. *Journal of Food Engineering.* 2005, 67, pp. 81-86.
24. **Tetra Pak.** UHT treatment. [Online] [Cited: 4 March 2010.]
http://www.tetrapak.com/products_and_services/processing_equipment/dairy_equipment/uht_treatment/Pages/default.aspx.
25. **Wormbs, Gunilla and al, et.** The use of Design of Experiment and sensory analysis as tools for the evaluation of production methods for milk. *Chemometrics and intelligent laboratory systems.* 2004, 73, pp. 67-71.
26. **The Guardian.** The Big Freeze. *The Guardian.* [Online] 7 January 2010. [Cited: 15 February 2010.]
<http://www.guardian.co.uk/global/blog/2010/jan/07/weather>.
27. **National Geographic.** NatGeo news watch. [Online] 10 January 2010. [Cited: 3 March 2010.]
<http://blogs.nationalgeographic.com/blogs/news/chiefeditor/2010/01/britains-big-freeze-picture.html>.