Student Self-administered case study

Managing quality inside a frozen pizza factory

Case duration (Min): 45-60

Operations Management (OPs)

Managing quality

Process design and analysis

Worldwide

Case summary:

Investigates how quality is managed in the production of frozen pizza.

Learning objectives:

Explain the concepts and definitions of quality.
Describe quality control systems and key issues in manufacturing.

Case problem:

How is quality managed in the production of frozen pizza ?

Company

Food Wholesale

Northern Foods plc

Northern Foods plc (Founded 1937) is a British food manufacturer, headquartered in Leeds, in the north of England. With revenues of nearly £1 billion and a skilled workforce of 11,000 people, Northern Foods is one of the leading food producers in the UK and Ireland. The company produces branded and retailer own label ready meals, sandwiches and salads, pizza (lead the frozen pizza market with their Goodfella's range), biscuits and puddings. Northern Foods produces both frozen pizza and chilled pizza. They make frozen pizza under the Goodfella and San Marco brands as well as producing high quality, own label pizzas for major UK and Irish multiples. Pizza production is based at three sites in Ireland; two in County Kildare and one in Longford. Northern Foods is committed to giving their customers authentic, restaurant-quality pizzas. 1 in 3 frozen pizzas eaten in the UK is a Goodfella's pizza.

First, if you are taking a taught management course then consult with your tutor and ensure that the case has not been scheduled into a teaching class or tutorial. If it has not:
1. Play/ read the media associated with the case. You may need to access the Internet and enter a URL to locate any video clips.
2. Attempt the Case study questions.
Consider attempting the case study as a group exercise; you could form a study group with fellow students.
3. Check the suggested answers - remember these are suggestions only and there are often many possible answers.
Discuss questions and answers with other students.
4. If you feel your answer(s) were weak then consider reading the relevant suggested readings again (also see the case study suggested references).

Title/ Media type	URL/ Media description
Inside a frozen pizza factory.	http://news.bbc.co.uk/1/hi/business/7733602.stm
Film	Product development manager Ciara Morgan gives a tour round the Goodfella's pizza site in Naas, Ireland - illustrating automated production in action and quality control.

NOTES:

Case study questions...

	Action	Pre/During/After class
1	**UNDERSTANDING QUALITY :** Discuss what is meant by quality and brainstorm how you might define quality in relation to a frozen pizza. What are the key aspects and other attributes of quality for the frozen pizza?	During
2	**CAUSES OF POOR QUALITY :** With reference to your previous answer, brainstorm possible causes of poor quality frozen pizzas.	During
3	**PRODUCTION PROCESS :** Having decided what a frozen pizza product is and its quality attributes, design a high level mass production process to produce frozen pizzas at a factory. (Optional – create a process/ flow diagram)	During
4	**QUALITY IMPORTANCE :** Why is QUALITY IMPORTANT to Northern Foods (quality and financial performance)? You should also discuss the costs associated with quality.	During
5	**QUALITY CYCLE :** Apply the quality cycle to the Northern Foods frozen pizza production process.	During
6	**QUALITY CONTROL :** How does Northern Foods ensure that only the highest quality product (frozen pizza) reaches the customer? Quality control starts with the production process. Consider the process you designed, the quality attributes defined and select the processes, sub processes etc in need of control. Identify critical control points (where inspection/ measurement should occur) and discuss who should carry out inspections. In short, design a quality control system for Northern Foods. How might Northern Foods assure the metal detectors are performing to high standards?	During
7	**QUALITY CONTROL TOOLS :** List quality control tools (e.g. cause and effect diagrams) that may be used by Northern Foods.	During

Answers...

QUALITY

(a) The characteristics of a product or service that bear on its ability to satisfy stated or implied needs, (b) A product or service free of deficiencies.

QUALITY ASSURANCE

The specific actions firms take to ensure that their products, services, and processes meet the quality requirements of their customers.

QUALITY CHARACTERISTICS

the various elements within the concept of quality, such as functionality, appearance, reliability, durability, recovery, etc.

QUALITY MANAGEMENT SYSTEM

management system to direct and control an organization with regard to quality

QUALITY SAMPLING

the practice of inspecting only a sample of products or services produced rather than every single one.

SIX-SIGMA QUALITY

Used generally to indicate that a process is well controlled, that is, tolerance limits are ±6 sigma from the centreline in a control chart. The term is usually associated with Motorola, which named one of its key operational initiatives Six Sigma Quality.

PRODUCTION

Activities involved in creating a product

PRODUCTION LINE

a set of sequential operations established in a factory whereby materials are transformed to produce an end-product or components are assembled to make a finished article

PRODUCTION RUN

completion of all tasks is associated with a production order

Question/ Answer

1 UNDERSTANDING QUALITY :

Discuss what is meant by quality and brainstorm how you might define quality in relation to a frozen pizza. What are the key aspects and other attributes of quality for the frozen pizza?

Quality - The characteristics of a product or service that bear on its ability to satisfy stated or implied needs. A product or service free of deficiencies. Fitness for use - The ability of goods or services to meet customer needs.
Frozen Pizza Quality: generally: flavour /taste, food safety, convenience cooking, appearance AND specifically – does what it says on the box (the product specification) – fit for use.
Students should recognise that quality is a judgement made by the consumer and consumers differ in their view of what quality means. For example, a consumer might be looking for a frozen pizza that, along with being safe to eat, is high in protein, contains grain that was not produced with the use of genetically modified organisms (GMOs), uses meat products from animals produced under specific conditions, and has environmentally friendly packaging. Another consumer might be looking for pizza that tastes good and is inexpensive.
Quality Attributes of Food Products include: Food Safety Attributes - Food borne Pathogens, Heavy Metals and Toxins, Pesticide or Drug Residues, Soil and Water Contaminants, Food Additives, Preservatives; Nutrition Attributes – Calories, Fat and Cholesterol Content, Sodium and Minerals, Carbohydrates and Fibre Content, Protein and Vitamins; Sensory Attributes - Taste and Tenderness, Colour, Appearance/Blemishes, Smell/Aroma; Value/Function Attributes - Compositional Integrity, Size, Style, Preparation/Convenience, Package Materials, Keep ability and Process Attributes - Animal Welfare, Authenticity of Process, Environmental Impact and Worker Safety.
The pizzas are date coded – what might determine the shelf life of frozen pizza?
The shelf–life of a frozen food product depends upon the quality of raw materials, rate of freezing, storage temperature and constant maintenance, and product handling by the retailer and consumer.

2 CAUSES OF POOR QUALITY :

With reference to your previous answer, brainstorm possible causes of poor quality frozen pizzas.

Inputs: poor quality raw materials.
Process: poor procedures, faulty machinery, poor training of staff.

3 PRODUCTION PROCESS :

Having decided what a frozen pizza product is and its quality attributes, design a high level mass production process to produce frozen pizzas at a factory. (Optional – create a process/ flow diagram)

Now watch the case video (showing a company that produces 2 million pizzas per week) and consider modifications to your process.
(00:19) beginning of PROCESS – flour store, (1) moved to where it is blended with oil, yeast and water (mixed) – carbon dioxide formed in the dough which then goes onto the conveyor belt to the next stage (2) (00:45), the dough is divided into an individual pizza base, rounded into a ball shape and moves along the conveyor belt to the next stage in the process; (3) (00:50)pizzas are automatically pressed into shape – at this point a person inspects the shapes to assure each base is pressed correctly; (4) (01:09) the bases enter the oven where they are stone baked; (5) (01:25) topped with tomato sauce – machine assures even distribution of sauce on base; (6) (01:40) the cheese topping is freshly grated (needs to be kept cold)and enters an automated weighing system which drops a predetermined amount onto the pizza located below; (7) (02:00)a pepperoni machine slices the pepperoni sticks into pieces which fall directly onto the pizza; other toppings are added (8) (02:12) at this point a person inspects the pizzas; (9) (02:20)the pizza is then frozen (the freezer is at -57 Celsius); (10) (02:35) the pizza continues along the conveyor belt where upon it is wrapped in film (shrink wrapped) and progresses to the carton stage. The pizza is placed in the cardboard carton box and is then (11) checked for weight (02:55), metal detected (The metal detectors are one of the critical control points to detect all types of contamination - If metal is detected, the system automatically rejects the "bad" product without slowing or stopping the production line: detection sensitivity is therefore of key concern) and date coded before final packaging and shipment.

4 QUALITY IMPORTANCE :

Why is QUALITY IMPORTANT to Northern Foods (quality and financial performance)? You should also discuss the costs associated with quality.

Sales, differentiates the product from competitors, meets and satisfies customer expectations.
In 2007 one manufacturer announced that about five million frozen pizzas with pepperoni toppings were being recalled due to the pepperoni possibly being contaminated with E. Coli.
Activities that prevent, appraise and remove defects cost money and tie up organizational resources. However such actions improve revenues and cause other (failure) costs to reduce.

QUALITY MANAGEMENT

Refers to systematic policies, methods, and procedures used to ensure that goods and services are produced with appropriate levels of quality to meet the needs of customers

FITNESS FOR USE

The ability of a good or service to meet customer needs

QUALITY OF CONFORMANCE

The extent to which a process is able to deliver output that conforms to the design specifications

DEFECT

Any mistake or error that is passed on to the customer

COST OF QUALITY

Refers specifically to the costs associated with avoiding poor quality or those incurred as a result of poor quality

QUALITY CONTROL

The task to ensure that a good or service conforms to specifications and meets customer requirements by monitoring and measuring processes and making any necessary adjustments to maintain a specified level of performance

5 **QUALITY CYCLE :**

Apply the quality cycle to the Northern Foods frozen pizza production process.

Customer needs are translated into product attributes and the design; from this, quality attributes (see previous) are defined. Northern Foods must then decide how to measure each quality attribute for which standards (targets) need to be set. Following this, Northern Foods will establish tests for each standard, prevent, find and correct causes of poor quality (see previous) through a testing program and continue to make improvements i.e. Maintain a quality controlled production system.

6 **QUALITY CONTROL :**

How does Northern Foods ensure that only the highest quality product (frozen pizza) reaches the customer? Quality control starts with the production process. Consider the process you designed, the quality attributes defined and select the processes, sub processes etc in need of control. Identify critical control points (where inspection/ measurement should occur) and discuss who should carry out inspections. In short, design a quality control system for Northern Foods. How might Northern Foods assure the metal detectors are performing to high standards?

A good answer will consider testing/ inspection points for inputs, the process and outputs i.e. input, process and output controls. IN – ensure incoming raw materials meet needs (consider testing materials or ensuring suppliers are certified); PROCESS - Inspect/ test work in process (a person inspects the shapes to assure each base is pressed correctly, machine assures even distribution of sauce on base, temperature controls, weighing)and OUT – inspect finished product (plus metal detection) prior to shipping.
They could assure the detectors are performing to high standards, by testing each one frequently to verify sensitivity. An additional layer of control might be added with detectors - they require an access code that prevents unauthorized adjustments.

7 **QUALITY CONTROL TOOLS :**

List quality control tools (e.g. cause and effect diagrams) that may be used by Northern Foods.

Flow , pareto, control and trend charts; histograms, scatter diagrams.

Case study references

Cole, G A. and Kelly, P P. (2011) 'Management Theory and Practice', Ed. 7. Cengage EMEA.

Collier, D. and Evans, J. (2009) 'OM', Ed. 1. Cengage Learning.

Evans, J. and Collier, D. (2007) 'Operations Management Integrated Goods & Services Approach, International Edition', Ed. 2. South Western.

Kelly, P P. (2009) 'International Business and Management', Cengage Learning EMEA.

Schroeder, R. (2006) 'Operations Management: Contemporary Concepts and Cases', Ed. 3. McGraw-Hill Higher Education.