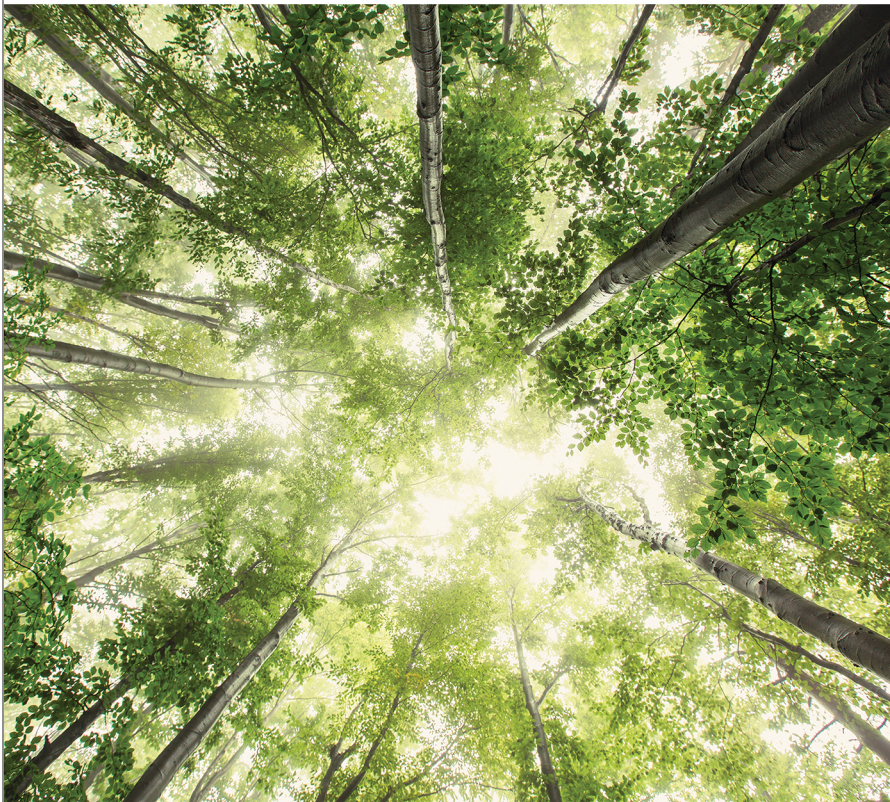


# Introduction to operations management



# Introduction to operations management



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# Introduction

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This free course, *Introduction to operations management*, provides you with a short introduction to operations management and strategy, clarifying some key themes and terminology, and exploring how operations managers can influence the short- and long-term success of their organisation. There are five sections:

1. What is the role of operations management?
2. The input–process–output model
3. What do operations managers really do?
4. Why is operations management important?
5. Are you an operations manager?

This OpenLearn course is an adapted extract from the Open University course [B207 \*Shaping business opportunities\*](#).

The full course explores how organisations work by looking at their internal functions (operations management, human relations, finance and marketing). You will also learn about the external environment for businesses and how the economic and political context helps shape how businesses respond to global challenges.

# Learning Outcomes

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After studying this course, you should be able to:

- understand the input–process–output framework, the extensions of it, and apply them to a wide range of operations
- examine the types of transformation processes occurring within operations
- define the roles and responsibilities of operations managers and the challenges they face
- reflect on your own operations management responsibilities, if applicable
- understand the content of an operations strategy and the decisions involved.

# 1 What is the role of operations management?

Imagine some of the challenges of running a large restaurant. Each day the restaurant manager has to ensure hundreds of customers are served on time with food of good quality while maintaining a friendly, helpful service. They are responsible for a team of employees ranging from chefs to front of house waiters etc., checking that the employees arrive on time and work effectively. Operations managers are responsible for ordering and arranging deliveries of food, drink and other supplies. The building also needs to be utilised and maintained efficiently. This scenario is typical of an operations manager's role.

The operations management function is usually responsible for a high proportion of an organisation's assets. Inefficient management of these assets can have very detrimental consequences. In the short term the operation needs to be configured to meet market requirements; this is a challenge in itself. Even bigger challenges can occur during periods of change when new products and services are introduced, new markets are provided for or new technologies are used. It is common for new ideas to be generated outside of operations but it is the role of the operations manager to implement those ideas.

## Activity 1: Introduction to operations management

Allow around 50 minutes for this activity

Read '[Introduction to operations management](#)' (Walley, 2017).

This reading introduces the input–process–output model that you will explore in the next section, looks in more detail at the responsibilities of operations managers (which is the focus of Section 3), and explores how operations management can impact on an organisation (as discussed in Section 4).

## 2 The input–process–output model

The reading (Walley, 2017) introduced you to the operations input–process–output model.

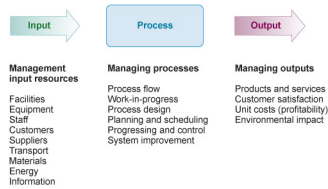


Figure 1: Operations input–process–output model

This framework shows that the operations management role is divided into three areas:

- **Managing input resources** – Operations managers must ensure that the right resources, such as people, equipment and materials, are available in the right quantity at the right time for the operation’s needs.
- **Managing processes** – All operations managers are responsible for processes. Processes are defined as a series of interlinked activities or steps that consume resources to meet a goal or output.
- **Managing outputs** – The operations function is responsible for meeting customers’ needs by delivering required products or services. The effectiveness and efficiency of the operation dictates how much resource is needed and this feeds straight through to unit cost and (where relevant) profitability.

### 2.1 Extensions to the input–process–output model

One of the leading operations management texts, *Operations Management* (Slack et al., 2007), has extended the basic process model by dividing operations management tasks into three distinct areas: design tasks, planning and control, and improvement. The framework also relates the operations function more closely to market requirements. This helps us understand how the different operations tasks link together. Screencast 1 will help you to understand the main themes of the operations management function.

Note: the video below was originally created for the OU module

[B207 Shaping business opportunities](#), so please ignore any reference to the module.

Video content is not available in this format.

[Screencast 1: Extending the input–process–output model](#)



## The Input–Process–Output Model

This screencast emphasises one of the main features of the Slack et al. framework: namely operations management's market-driven perspective. Operations management is about serving markets effectively and efficiently, rather than simply hitting output targets. The framework also highlights a major change in the last decade where system improvement and development have become a much greater part of an operations manager's role.

## 2.2 Transformation processes

Walley (2017) identifies three types of **transformation processes**:

- material processing
- information processing
- customer processing.

There are also listed six types of **transformational change** that occur within processes:

- physical transformation
- informational transformation
- possession transformation
- location transformation
- storage transformation
- physiological or psychological transformation.

The reading provides two worked examples of transformation processes and transformational change. Example 1, transformation processes at a library, is mostly an information processing operation; Example 2, transformation processes at a bakery, is predominantly a material processing operation.

In the next activity, you will be asked to apply a similar analysis to identify the transformation processes at a hotel.

### Activity 2: Transformation processes at a hotel

Allow around 30 minutes for this activity

Revisit the section ‘What is operations management?’ of [the reading](#) (Walley, 2017), exploring the two worked examples provided.

Now think about what transformation processes and transformational changes would occur at a typical hotel and fill in the table below with examples.

#### Transformational processes

Transformational change	Material processing	Information processing	Customer processing
<b>Physical</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>
<b>Informational</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>
<b>Possession</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>
<b>Location</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>
<b>Storage</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>
<b>Physiological/ psychological</b>	<i>Provide your answer...</i>	<i>Provide your answer...</i>	<i>Provide your answer...</i>

#### Feedback

Your answer might include some of the transformation processes and transformational changes listed in the table below.

## Transformational processes

Transformational change	Material processing	Information processing	Customer processing
<b>Physical</b>	e.g. Food processing in the hotel kitchen.		
<b>Informational</b>		The hotel booking process transforms customer information.	
<b>Possession</b>	e.g. Selling of drinks in the bar.	The hotel may exchange information with customers or suppliers.	
<b>Location</b>	Movement of luggage to customers' rooms.		Customers are moved between different parts of the hotel.
<b>Storage</b>	Items belonging to customers can be stored in safes or luggage rooms.  Back office activities such as cleaning will require materials to be stored in anticipation of use.		Customers are 'stored' in their rooms overnight.
<b>Physiological/psychological</b>			Good customer interaction has psychological benefits.  Physiological transformation could happen in hotel spa or in-house salons.

## 3 What do operations managers really do?

In the next activity, you will take a practical look at the activities that operations managers perform as part of their daily duties. The interviews provide a good opportunity to study what operations managers do in practice, and compare the operations manager role across different sectors.

### Activity 3: Assessing what operations managers do

Allow around 90 minutes for this activity

Before you watch the interviews in the videos below, look again at the [input-process-output model](#) and the section 'What do operation managers do?' of [the reading](#) (Walley, 2017).

Now watch Video 1, Video 2 and Video 3 in which different operations managers are interviewed about their role. Then answer the questions below.

Video content is not available in this format.

Video 1: Interview with an operations manager in the private sector (Robin Howlett from Britvic)



Video content is not available in this format.

Video 2: Interview with an operations manager in the service sector (Kate Bailey)



Video content is not available in this format.

Video 3: Interview with an operations manager in the public sector (John Nelms, Hertfordshire Police)



- Apply the input–process–output model to each of the operations discussed.

*Provide your answer...*

### Feedback

By now you should be able to apply the input–process–output framework well to each of the operations described in the videos. You can see that Robin Howlett has to manage a small number of people but the factory and distributions centres are highly automated, with lots of capital equipment. The focus is very much on keeping the plant running so that it meets its market demands and return-on-investment obligations.

Robin also has to deal with input resources from outside the organisation in what is called a *supply chain*. You may have been surprised how many separate ingredients and packaging items there are within this supply chain. In this example, the process is readily identifiable and you can see the resources flowing through steadily. The outputs are fairly easy to define (packs of drinks).

The police example shows the real contrast between the manufacturing and the pure service process. John Nelms provides a list of inputs to the process, showing the range of resources they control both inside and outside of the operations centre. They have resources such as dog units and helicopters within their range of resources. John also describes one of their processes – the detection and arrest of a shoplifter. You may have realised that there is much more variety in both processes and outputs in this service compared with the FMCG.

In the case of public sector operations, outputs can be tricky to define and there can be problems defining who the customer is. For a police service, who is the customer? The person being transformed is often someone who has been arrested, not the general public who pay for the service. This separation of participant, payer and beneficiary is one of the additional complexities of public sector operations.

Kate Bailey's discussion allows you to think about management consultancy as an operation, with the inputs of skilled people, complex processes of interacting with clients and the wide range of customised outputs of solutions and advice to customers. Kate also highlights one of the biggest mistakes that managers make – they frequently don't pay sufficient attention to the design of their processes.

- What tasks do the three managers spend time on most days? Does this vary by type of operation in any way?

*Provide your answer...*

### Feedback

You can produce an extensive list of tasks that the operations managers have identified and the generic problems can be very similar in each of the operations. One good way of listing these is to follow the example of Slack et al. (2007) and use the three types of activity – design, planning and control, and improvement – to classify these operations management tasks. You will have seen this in the reading.

Design tasks	Planning and control	Improvement
Product/service design	Workforce planning	New product introduction
Layout and flow	Shift patterns	Continuous improvement
	Work allocation	Team-based working
	Scheduling of orders	
	Capacity plans	
	Stock control	
	Quality planning and control	
	Error correction	

All the operations managers mention some aspects of planning and control. The police operations involved rapid response to high risk incidents and prioritisation of work. The FMCG example showed how the operation was often only given 24 hours to respond to an order from a large retailer. All of the operations experienced fluctuation in demand, often through seasonal patterns, based on factors such as time of day, day of week and weather patterns. All of this complexity and variety needs to be managed. All of these operations would be easier to manage if there was no seasonality or variety. This highlights that operations managers often see change and innovation as a disruption to an otherwise stable process.

Robin Howlett explained the changing role of the operations manager where there is now much more emphasis on continuous process improvement.

- What do the managers say about coping with innovation and change?

*Provide your answer...*

**Feedback**

One thing is clear from each of the interviews: operations managers much prefer stability and repetition to constant change of processes and outputs. In the case of the manufacturing example, the introduction of new products or platforms means that parts of the process need to be entirely reconfigured over a considerable period of time. During the transition period, there are problems with coping with much greater complexity and variety in the process. In the service operation the managers need to think about employee knowledge and skills, any redesigning of the process or layout (because this often includes a change to the service concept) and issues of obsolete stock.

A key issue is that the external environment often changes faster than operations can adapt. Similarly, there are internal pressures to cope with new ideas or innovation, such as new product introductions. As Walley (2017) states, operations managers are often responsible for the delivery of strategy or ideas, even when they have had little or no involvement with them. Those outside the operations function have to understand the time, skill and effort it takes for operations to be adapted to these change requirements.





# 4 Why is operations management important?

It is essential to develop a clear understanding of the impact of good or bad operations management practice on the performance of an organisation as a whole. In this section you will study the Hayes and Wheelwright model of operations strategy that classifies the impact that operations capabilities have on the ability of an organisation to compete in the marketplace. It allows us to start addressing the following questions:

- What are the benefits of getting operations management right?
- What happens if your operation is not managed correctly or appropriately?

## 4.1 The Hayes and Wheelwright four-stage model

One framework that helps to address these questions is the four-stage model of operations strategy by Hayes and Wheelwright (1984).

	Neutral	Supportive
Internally	<b>Stage 1</b> <i>Internally neutral</i> Objective is to minimise the negative impact of operations	<b>Stage 3</b> <i>Internally supportive</i> Objective is for 'operations' to provide credible support for the business strategy
Externally	<b>Stage 2</b> <i>Externally neutral</i> Objective is for 'operations' to help the business maintain parity with its competitors	<b>Stage 4</b> <i>Externally supportive</i> Objective is for 'operations' to provide a source of competitive advantage

Figure 2: The four-stage model of the operations function's contribution to organisational competitiveness

At the lowest levels of capability (**Stage 1**) the operation is seen as holding the organisation back. This is because the operation regularly underperforms, relative to its market requirements, and/or regularly makes mistakes that can deliver low quality product or service to the customer at tremendous cost of loss of reputation and rework.

A high proportion of operations are probably at **Stage 2**: they are striving to adopt best practice in their industry and are usually as good as their competitors at serving their market. These operations are good enough to help implement the organisation's strategy but the operation itself does not convey any competitive advantage.

At **Stage 3** the operation offers the best capabilities in the sector and so the competitive strategy can be linked to operations. The organisation can exploit the operations' capabilities to offer better prices, differentiated products, faster deliveries or greater flexibility to maximise returns and increase market share.

Very few organisations ever operate at the levels described in **Stage 4** of the model, where operations convey such a competitive advantage through their performance and capability that the entire organisation strategy can be built around the operation. In these situations the market expectations of what can be achieved are changed by the operations performance.

## 4.2 When operations are not managed well

There are, of course, many examples of operations that have not been managed well. Here, you will study two examples of organisations that have suffered the consequence of a lapse in good operations management practice.

The following activity looks at the impact of a failure of operations management on a single operation.

### Activity 4: Deepwater Horizon – surviving the oil spill

Allow around 30 minutes for this activity

Look again at Example 1 in the section ‘The importance of operations management’ of [Walley \(2017\)](#).

Now watch Video 4 and answer the questions below.

Video content is not available in this format.

Video 4: Deepwater Horizon – surviving the oil spill



- To what extent was this a failure of operations management practices?

*Provide your answer...*

### Feedback

There is no doubt that this failure was a direct consequence of poor operations management practices. The disaster was not caused by a single mistake, but a whole series of decisions and actions by BP staff and suppliers Halliburton and Transocean. These decisions and actions accumulated and lead to the eventual explosion and oil leak. There were failures in both the design of processes and systems as well as poor monitoring and control:

- The technical design contained a number of flaws where several rig components could not cope with the combination of events. Two mechanical valves designed to stop the flow of gas and oil to the surface failed, allowing the oil to leak. Another valve on a device, called a blowout preventer, did not work properly. A mud–gas separator also failed but this device should not have been used at the time.
- A range of safety and control procedures were either absent or failed. One blowout preventer had a flat battery and another a defective switch, indicating poor maintenance or repair. The gas detection system did not trigger an alarm when the gas leak occurred. There were a number of staff failures indicating poor attention to safety and poor training. Staff misinterpreted the results of a pressure test, thinking the process was in control. The increase in pressure and consequential leak took 50 minutes to detect. Staff failed to use venting pipes to take the mud and gas away from the rig.
- Materials used, such as the sealing cement, proved to have not met the requirements of the job.

You should think about the reasons why managers may have made these mistakes. Sometimes it is not clear who has responsibility for particular decisions especially where tasks are subcontracted. Some decisions will be made under time or cost pressure. Put yourself in the position of a rig operations manager who is measured on the productivity of the assets. To what extent can you consistently make decisions that are based on what you consider to be low risks or ethical decisions?

- What impact did this failure have on the organisation?

*Provide your answer...*

#### Feedback

When you look at the impact of these failures the main consequences were the tragic loss of life on the rig during the accident as well as the ecological and social impacts of the oil pollution. The company experienced a number of other effects over the following years:

- The company had to agree to an \$18.7bn legal settlement to cover the costs of the disaster clean-up and compensation for businesses.
- It lost the opportunity to bid for new contracts with the US government.
- It threatened access to new and existing oil field opportunities for BP to develop.
- There was a considerable loss of reputation and this fed through to lower market appeal for its products and services.
- The company had to redirect its efforts during and after the crisis, potentially losing other market development opportunities.

This list shows the extent of the longer-term impact of the failure of operations management.

The following activity examines what happens if operations are not managed well across an entire supply chain.

A supply chain involves various participants who perform a sequence of activities in moving physical goods or services from a point of origin to a point of consumption.

(Crandall, 2014, p. 6)

### Activity 5: Horse meat in the supply chain

Allow around 30 minutes for this activity

Review the section 'The importance of operations management' of [Walley \(2017\)](#) and watch Video 5, which describe the issues around the horse meat scandal, and answer the questions below.

Video content is not available in this format.

Video 5: Horse meat scandal – the journey food makes from farm to plate



- To what extent was the size and complexity of the supply chain a contributing factor in the food contamination?

*Provide your answer...*

#### Discussion

The case details the levels of complexity within the supply chain. Meat moves across Europe in a relatively unregulated way. The commentators in these videos indicate that the high-quality products tend to be traceable from farm (or even animal) through the entire supply chain to customer. However, at the 'value' end of the market, the supply chain is more complex and there is less traceability. Price competition seems to make meat processors look more widely for meat supply: this increases the number of suppliers and therefore sources of meat for their processed product. Given that the market is price sensitive, suppliers are reluctant to spend more money developing

traceability mechanisms. The commentator in the video states that local government authorities have had to restrict the levels of checking they can do because of financial pressures. This places more of a burden on the companies within the supply chain to check for themselves.

Ideally, the entire supply chain should be designed so that price, quality and traceability can be achieved. The main challenge is to find one organisation that is part of this supply chain where managers are willing to take responsibility for the design and control of the entire supply chain.

- To what extent should food retailers manage and control the entire supply chain to prevent problems like this from occurring?

*Provide your answer...*

#### Feedback

Most large retail chains do have sophisticated merchandising and supply chain functions, such as the one described in the earlier video. Managers within these departments choose which products to stock on the shelves and where to source them from. This sourcing decision would normally include a supplier selection process whereby potential suppliers are assessed for their ability to provide products of the right quality, in the right quantities, to specific delivery schedules. In sophisticated assessments there could also be checks on suppliers further back in the supply chain (the supplier's supplier etc.).

## 5 Are you an operations manager?

At this point, you will reflect on the relevance of this topic to you, either as an employee/manager or as a participant in a service process. Now that you are being introduced to operations management theory, you will most likely start to analyse operations that you experience from a new perspective. You are encouraged to do this as a way of embedding your understanding of the subject.

The final activity of this course provides you with an opportunity to reflect on your own situation in relation to this subject.

### Activity 6: Reflecting on operations management – your own perspective

Allow around 30 minutes for this activity

Many people will be able to readily apply the framework to their own role, even if they do not work in the organisation's core operations that deliver their main products, or services, to external customers. Departments conventionally classed as 'non-operations' will still contain processes with outputs, each with corresponding processes. For example, a finance manager has outputs such as financial reports, and a HR manager has outputs such as recruited or trained staff. It is important, therefore, that you apply the concepts explored in this course as much as you can to your own situation.

Review [the reading](#) (Walley, 2017) one more time and read the final sections 'Are you an operations manager?' and 'Summary'.

If you are reflecting on the role of operations management as an employee/manager, you should answer the questions in Part 1 of this activity. If you are approaching this activity in your role as a participant, you might want to go straight to the questions in Part 2 of this activity.

#### Part 1

For an operation of your choice, address the following questions:

- What input resources are involved?

*Provide your answer...*

- What processes can you identify?

*Provide your answer...*

- What outputs are you asked to deliver?

*Provide your answer...*

### Discussion

If you apply the operations frameworks to your own work, you should be readily able to identify your own input resources, processes and outputs. It is useful to think about how your own operations must perform in terms of dimensions such as quality and cost.

### Part 2

For those of you who analyse your role as a participant in operations, answer the following questions for any operation of your choice:

- Are you an input resource in the process?

*Provide your answer...*

- What processes do you participate in?

*Provide your answer...*

- What transformation process is taking place?

*Provide your answer...*

### Discussion

Looking at operations from the perspective of the customer can yield some insights. You should think about how you assist in the process of service delivery. Examples include:

- providing information or filling in forms
- performing duties such as carrying or packing items that you purchase
- contributing to the overall service experience by helping create ambiance or atmosphere in a restaurant or part of a crowd at a sports event.

When you think about yourself in a service process, are you moved from stage to stage just like a product in a factory? Self-service restaurants, for example, have a sequence of carefully timed steps that allow the smooth flow of customers through the ordering process.

Finally, you may be able to identify the transformation process that is taking place. Are you being psychologically or physically transformed in a healthcare-related process? Is there a location transformation on a flight? Many examples are quite complex because different types of transformation can take place at the same time. Does the flight transform you psychologically or physically at the same time as the location transformation? Is this something important for airlines to consider and even manage?

## Conclusion

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Congratulations! You have now reached the end of this free course, *Introduction to operations management*. This course has introduced the operations management function to you. After studying this course, you should now feel that you can:

- define the roles and responsibilities of operations managers and the challenges they face, with them usually controlling most of an organisation's assets, and being responsible for the design, planning and improvement of their processes
- understand the input–process–output framework, and extensions of it, and apply it to a wide range of operations
- examine the types of transformation processes occurring within operations, converting input resources to value-added outputs
- understand that well-designed and well-run operations can impact on the long-term competitiveness of an organisation, and badly run operations expose the organisation to many risks – sometimes relatively simple errors in management can lead to very costly failures that go beyond simple rework or waste
- analyse the content of an operations strategy
- know that if you manage any type of resource, you can consider yourself to be an operations manager as you will be responsible for some kind of process.

This OpenLearn course is an adapted extract from the Open University course [B207 Shaping business opportunities](#).



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## Acknowledgements

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Figure 2: Adapted from Hayes and Wheelright in Neely, A. (1998) *Measuring Business Performance*, *British Books for Managers*, Cambridge, Cambridge University Press.

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### Videos

Video 1: Interview with Robin Howlett from Britvic, Britvic History, Britvic.

Video 2: Interview with Katherine Bailey, \*\*\*Nuance Open Plan Office: K2 Space on flickr.com. This file is licensed under the Creative Commons Attribution Licence <http://creativecommons.org/licenses/by/2.0/>

Video 4: 'Deep Water Horizon', Still Gulf of Mexico map showing areas contaminated with oil, BBC; Hanging tree, First Digital Music BMI, ZFC Music ASCAP; Artifacts, Seven Mile Lane Music ASCAP; Fiddlers Moon, First Digital Music BMI, ZFC Music ASCAP.

Video 5: 'Horse meat scandal – the journey food makes from farm to plate', Worries about the journey food makes from farm to plate, BBC; Horse meat scandal one year on - BBC Breakfast, BBC.

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