



National  
Qualifications  
2023

**X810/77/11**

**Business Management  
Case Study**

TUESDAY, 16 MAY

9:00 AM – 11:45 AM

---

It is recommended that you spend 15 minutes reading over the information provided in the Case Study before responding to the questions.

The questions can be found in the question paper X810/77/21.



\* X 8 1 0 7 7 1 1 \*

## Robert Bosch GmbH

Robert Bosch GmbH (Bosch) is a multinational engineering and technology company and Europe's largest vehicle components supplier. With its headquarters in Germany, Bosch has been at the forefront of technological innovation for over 130 years. Through a complex network of over 440 subsidiaries and regional offices, Bosch directly operates in over 60 countries worldwide. Bosch's global manufacturing, engineering, and sales services supply nearly every country in the world.

### *Core operations*

Although Bosch's brand is best known for its home appliances, such as dishwashers and food processors, consumer goods are only one area of its business portfolio.

Bosch's operating areas are divided into four business sectors.

1. **Industrial technology** involves developing products for factory automation, plant construction and engineering, mobile machinery, and providing automated packaging technologies to its business customers.
2. **Mobility solutions** involves providing technology for vehicle infrastructure and services for the automotive market. A strategic priority for this area is expanding in the markets of electrification and development of automated driving.
3. **Energy and building technology** offers products for building security, renewable energy solutions, and energy management. The portfolio encompasses advanced surveillance technology, fire detection equipment, heating systems and air conditioning units.
4. **Consumer goods** includes manufacturing household appliances and power tools for domestic customers. It offers a broad range of modern, energy-efficient, and increasingly data-connected household appliances from washing machines to refrigerators.

## Industry 4.0

The fourth industrial ‘robot’ revolution is paving the way towards factories which almost completely digitise manufacturing. Industry 4.0 is Bosch’s vision for the future where factories will be comprised of connected robotics which, alongside humans, are able to achieve artificially intelligent manufacturing. Since launching its vision in 2011, Bosch has expanded its Industry 4.0 portfolio of business-to-business products which focus on human-robot collaboration. Today, Industry 4.0 is a global market which has generated more than €4 billion in sales revenue for Bosch.

At Bosch’s plants around the world over 120,000 machines and 250,000 devices feature Industry 4.0 connectivity. This has led to an estimated 25% increase in productivity and reduced maintenance costs for the company by as much as 20%.

**(Exhibit 1 shows an extract of Industry 4.0 developments.)**

### Robot taxation

With an increasing density in robotics across global industry, the possibility of substituting human labour with machines on an unprecedented scale has never been more concerning. The World Robotics 2021 report shows a record of 3 million industrial robots operating in factories globally, an increase of 10% from the previous year.

A robot tax is a legislative strategy to financially discourage the replacement of workers by machines, mostly in low-skilled jobs. In 2017 the European Parliament considered the implementation of EU-wide legislation to regulate the increased use of robots. The proposed ‘robot tax’ on organisations would have been used to fund retraining of workers and financially support those made redundant by robots. However, this taxation proposal was rejected by the European Union (EU).

The EU’s decision to reject the robot tax was commended by the robotics industry, in which Bosch is deeply rooted, claiming it would stunt innovation and employment. In addition to stressing the undeniable benefits of robotics to productivity growth, critics of the robot tax argue that the difference between a robot and a machine is difficult to define, which makes applying a tax base complicated.

[Turn over

## **Change management strategy**

With the realisation of its Industry 4.0 vision, Bosch has no choice but to adjust its workforce as the requirement for manual labour decreases. As its business facilities and factories in various locations are affected in different ways by its technological developments, Bosch's change management programme is continually being reviewed.

Aiming to keep as many of its staff as possible, with their skills and expertise retained, Bosch firstly exercises options to rule out compulsory redundancies and instead reaches voluntary agreements.

Some of the measures in Bosch's change management programme involve:

- engaging with employee representatives, trade unions and works councils;
- operating referral platforms specifically set up for Bosch to refer surplus employees to alternative jobs in external partner organisations;
- using natural attrition through early retirement and voluntary redundancy packages;
- reducing working hours if agreeable and where possible;
- retraining staff and expanding internal transfer opportunities between locations and jobs within the organisation.

To enable flexible staffing, around 12% of the workforce currently have temporary contracts with Bosch while receiving the same training opportunities as employees with permanent contracts.

**(Exhibit 2 shows an extract of Bosch's 2021 performance data.)**

## Joint ventures in China

### *Bosch Hydrogen Powertrain Systems*

Bosch Hydrogen Powertrain Systems is a joint venture between Bosch and Qingling Motors, China's premium commercial vehicle manufacturer, with a 60:40 equity share ratio. The new company develops, assembles and sells fuel cell systems in China which are essential components in the manufacturing of electric trucks. The joint venture pools Bosch's expertise in fuel cell systems and Qingling Motors' extensive market experience of the automotive industry in China.

Although China offers less favourable foreign direct investment (FDI) conditions than the EU, Bosch predicts that the joint venture could enable more than one million fuel-cell-powered electric trucks to be supplied in China by 2030. The joint venture may also have the potential to tap into the Australian electric truck market via the China–Australia Free Trade Agreement.

### *Guangdong Vanbo Electric*

The joint venture of Guangdong Vanbo Electric was formed by the combination of Bosch and Chinese water heating giant, Guangdong Vanward, with each holding an equity stake of 50%. Both parent companies operate similarly as suppliers of water heating system solutions. Although Guangdong Vanward holds the majority of patents in the field of water heating in China, Bosch offers access to patents in specialist energy technology.

Despite the organisations working together before, the joint venture took three years of negotiation before being agreed, requiring monthly meetings in China and Germany to conclude on the legalities and terms. The outcome saw the joint venture position Bosch as its primary supplier of components and subsequently pushes Bosch's technologies onto its Chinese customers.

### *Weichai and Ceres partnership*

Recently, Bosch joined the existing joint venture between Chinese-based engine manufacturer Weichai Power Co and Ceres Power Holdings, a UK engineering company specialising in hydrogen technology. Weichai Power Co will be the majority shareholder, with Bosch and Ceres Power Holdings licensing their intellectual properties on hydrogen technology to the joint venture.

[Turn over

## **Relationship with Association of Southeast Asian Nations (ASEAN)**

Bosch has been present in Southeast Asia since 1919 and today operates in each of the ASEAN member countries. With around 10,000 employees, of which over 1,300 are working in research and development, and eight production plants in Southeast Asia, Bosch plays a significant role in contributing to the region's innovation-led economy.

With its young population, an economic growth rate of around 5% per year, and with the ASEAN region generating Bosch approximately €800 million in sales revenue annually, the emerging Southeast Asian economies are strategic growth opportunities for Bosch. During the last decade, regional offices and subsidiary companies were launched in Cambodia, Indonesia, Laos, Myanmar and Vietnam.

**(Exhibit 3 shows an extract of Bosch's activities in ASEAN.)**

## **Operations in Russia**

Amidst the ongoing war between Russia and Ukraine, Bosch suspended its supply of components to Russia following allegations from Ukraine's Foreign Minister that Bosch parts were discovered in Russian military vehicles. Risking the breach of existing supply contracts with Russian partner organisations, Bosch halted the delivery of components to its Russian customers and refused new orders from the country, pending its investigation into how its parts are being deployed.

Germany's Economy Ministry launched an investigation into whether Bosch violated an EU export ban on 'dual-use' parts, which are components that can be used for both military and civilian purposes. EU sanctions have restricted exports of dual-use goods since Russia's annexation of Crimea in 2014. More sanctions have been imposed since Russia's invasion of Ukraine.

Since the Russian invasion, Ukrainian politicians have stated that Western companies should withdraw from Russia for moral reasons. Some of Bosch's competitors have already withdrawn. Bosch employs approximately 3,500 people in Russia and uses three large-scale manufacturing locations. Prior to the war, Bosch reported a sales revenue of €1.6 billion in Russia in 2021.

Bosch plans to impose the suspension of all of its operations in Russia indefinitely.

## Exhibit 1

### Extract of Industry 4.0 developments

Energy management	In over 100 of its plants worldwide, Bosch is utilising artificial intelligence (AI) in its energy management systems for manufacturing to reduce its energy consumption. In its factory in Homburg, Germany, this technology is allowing the company to cut its energy requirements by over 40% per manufactured product.
Inventory management	With Bosch's AI technology, material usage is measured and automatic reordering is carried out. This has resulted in a 30% reduction in inventory held and up to 50% space saved in Bosch's newest Industry 4.0 factories.
Logistics	Capable of lifting and moving heavy items from one location to another, driverless transport vehicles serve to support the employees in their daily work.
Quality management	In 2021, Bosch developed AI which detects and remedies anomalies and malfunctions in the manufacturing process at an early stage. AI carries out the visual inspection of work, fully automating and improving the quality assurance process. Currently supporting its production in around 50 plants and 800 production lines, Bosch aims for this technology to eventually be rolled out to all of its plants worldwide.
Robotics	Human-robot collaboration assumes a central role in Industry 4.0. Bosch developed the world's first robot which could work in close proximity with humans, without the need for additional protective casing.

[Turn over

## Exhibit 2

### An extract of Bosch's 2021 performance data

<b>Financial data</b>	<b>€ bn</b>
Cost of sales	52.9
Gross profit	25.8
Research and development expenditure	6.1
Depreciation	3.4
Profit for the year (after tax)	2.5
Capital expenditure	3.9
Current assets	45.3
Non-current assets	51.8
Equity	44.3
Dividend (in millions)	143

<b>Environmental data</b>	
Greenhouse gas emissions (1,000 metric tons CO <sub>2</sub> e)	907
Carbon offsets (1,000 metric tons CO <sub>2</sub> e)	907
Waste to landfill (1,000 metric tons)	87.4

<b>Workforce data</b>	
Workforce (thousand)	400
Training days (thousand)	599
Accidents at work rate (accidents per 1 million hours worked)	1.6

## Exhibit 3

### An extract of Bosch's activities in ASEAN

#### *Indonesia*

- Bosch facilitates the deployment of multiple electric vehicle charging stations in the country. This is bringing Indonesia closer to its ambition of electric vehicles constituting 20% of its domestic vehicle sales by 2025.
- Bosch is supporting the aquaculture industry by investing in technology which helps to counteract the depletion of fish population, significantly raising farmers' yields.

#### *Malaysia*

- Bosch helped launch the Digital Transformation Acceleration Programme to provide help and support to Malaysian businesses adopting emerging technologies in their production process.
- Bosch's three manufacturing plants in Malaysia contribute to its worldwide supply network by exporting battery packs for eBikes, which are increasing in popularity in the global market.

#### *Singapore*

- Bosch's regional headquarters in the ASEAN area employs around 750 associates and is located in Singapore. In 2021, the company generated €110 million in sales revenue in Singapore.
- Bosch's Innovation Hub in Singapore was launched in 2021 to help grow start-up companies under Bosch's brand name by providing them with funding.

#### *Thailand*

- With scooters and motorcycles representing a major mode of transportation in the ASEAN area, Bosch aims to satisfy the increasing demand for two-wheel vehicle components by expanding its plant in Thailand from 2024.

#### *Vietnam*

- Bosch and the Directorate of Education and Training in Vietnam developed an extensive curriculum for technical and vocational education in the country.

**[END OF CASE STUDY]**

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

*Acknowledgement of copyright*

Case Study — Information is adapted from [www.bosch.com](http://www.bosch.com).

SQA has made every effort to trace the owners of copyright of this item and seek permissions. We are happy to discuss permission requirements and incorporate any missing acknowledgement. Please contact [question.papers@sqa.org.uk](mailto:question.papers@sqa.org.uk).