

Unit 12: Engineering Management

Unit code Y/615/1486

Unit level 4

Credit value 15

Introduction

Managing engineering projects is one of the most complex tasks in engineering. Consider the mass production of millions of cars, sending a man or women into space or extracting oil or gas from deep below the surface of the earth. Bringing the materials and skills together in a cost effective, safe and timely way is what engineering management is all about.

This unit introduces students to engineering management principles and practices, and their strategic implementation.

Topics included in this unit are: the main concepts and theories of management and leadership, fundamentals of risk management, operational management, project and operations management theories and tools, the key success measures of management strategies, and planning tools.

On successful completion of this unit students will be able to investigate key strategic issues involved in developing and implementing engineering projects and solutions, and explain professional codes of conduct and the relevant legal requirements governing engineering activities.

Learning Outcomes

By the end of this unit students will be able to:

1. Examine the application of management techniques, and cultural and leadership aspects to engineering organisations.
2. Explore the role of risk and quality management in improving performance in engineering organisations.
3. Investigate the theories and tools of project and operations management when managing activities and optimising resource allocation.
4. Perform activities that improve current management strategies within an identified element of an engineering organisation.

Essential Content

LO1 **Examine the application of management techniques, and cultural and leadership aspects to engineering organisations**

Main concepts and theories of management and leadership:

Influence on organisational culture and communication practices

Effect of change within an organisation on its culture and behaviour

Management and leadership theories:

Management and leadership theories

Managerial behaviour and effectiveness

Organisational culture and change

Organisational communication practices

LO2 **Explore the role of risk and quality management in improving performance in engineering organisations**

Fundamentals of quality management:

Introduction to monitoring and controlling

Most appropriate quality improvement methodologies and practices for different business areas, projects and processes in order to lower risk and improve processes

Risk and quality management:

Risk management processes

Risk mapping and risk matrix

Quality management theories

Continuous improvement practices

Principles, tools and techniques of Total Quality Management (TQM)

LO3 Investigate the theories and tools of project and operations management when managing activities and optimising resource allocation

Operation management:

Main areas and stages of projects and operations management

Most important methodologies focusing on eliminating waste and smoothing the process flows without scarifying quality

Project and operations management theories and tools:

Project appraisal and life cycle

Logistics and supply chain management

Operations management

Resources management

Sustainability

Legal requirements governing employment, health, safety and environment

LO4 Perform activities that improve current management strategies within an identified element of an engineering organisation

The key success of management strategies:

Following processes from end to end, from suppliers to customers

Identifying areas critical for the success of a project or process

Planning tools:

Gantt charts

Flow charts

Critical analysis and evaluation

Learning Outcomes and Assessment Criteria

Pass		Merit	Distinction
L01 Examine the application of management techniques, and cultural and leadership aspects to engineering organisations			D1 Propose recommendations for the most efficient application of management techniques
P1 Explain management and leadership theories and techniques used within engineering organisations	M1 Justify different management techniques with emphasis on cultural and leadership aspects and their applications to engineering organisations		
L02 Explore the role of risk and quality management in improving performance in engineering organisations			D2 Provide supported and justified recommendations for the most efficient and effective risk and quality management practices
P2 Describe the role and importance of risk and quality management processes and their impact on engineering organisations	M2 Explain how risk and quality management strategies encourage performance improvements within engineering organisations		
L03 Investigate the theories and tools of project and operations management when managing activities and optimising resource allocation			D3 Analyse the relative merits of theories and tools of project and operations management, with a focus on their relevance when managing activities and optimising resource allocation
P3 Identify project and operations management tools used when managing activities and resources within the engineering industry	M3 Analyse the most effective project and operations management tools used when managing activities and optimising resource allocation		

Pass	Merit	Distinction
LO4 Perform activities that improve current management strategies within an identified element of an engineering organisation		D4 Conduct a full analysis of the management processes within an engineering organisation (or case study) and make fully justified recommendations for improvements to the management strategies
P4 Define the range of processes available to improve management processes within an engineering organisation	M4 Explore activities that will improve management strategies within an engineering organisation	

Recommended Resources

Textbooks

BOWERSOX, D.J., CLOSS, D. and BIXBY, M. (2012) *Supply Chain Logistics Management*. 4th Ed. McGraw-Hill.

HILL, A. and HILL, T. (2009) *Manufacturing Operations Strategy: Texts and Cases*. 3rd Ed. Palgrave Macmillan.

OAKLAND, J.S. (2015) *Statistical Process Control*. 6th Ed. Routledge.

Websites

http://strategicmanagement.net/	Strategic Management Society (General Reference)
http://www.journals.elsevier.com/	Elsevier Journal of Operations Management (Journal)
http://www.emeraldgrouppublishing.com	Emerald Publishing International Journal of Operations & Production Management (e-Journal)

Links

This unit links to the following related units:

Unit 4: Managing a Professional Engineering Project

Unit 35: Professional Engineering Management