As Per the Revised Syllabus of Mumbai University for S.Y. BMS, Semester IV, 2015-16

Production and Total Quality Management

S.A. Chunawalla
Conrad Coelho

Himalaya Publishing House
ISO 9001:2008 CERTIFIED
PRODUCTION AND TOTAL QUALITY MANAGEMENT

(As Per the Revised Syllabus of Mumbai University for S.Y. BMS, Semester IV, 2015-16)

S.A. Chunawalla
B.Com. (Hons.), D. Pharma, MBA,
Communication Consultant,
Benzer, Borivali (W), Mumbai - 400 103.
e-mail: chunawalla@yahoo.com

Conrad Coelho
NET (Management), MMS (Marketing), B.E. (Instrumentation)
BMS Co-ordinator and Assistant Professor,
Narsee Monjee College of Commerce and Economics,
Vile Parle (West), Mumbai - 400 056.
e-mail: conrad.coelho@nmccce.ac.in
Preface

The Production and Total Quality Management function offers competitive advantages to an organization in many ways, more important among them being shorter new product development time, improved productivity, better quality, efficient inventory management and reduction of non-value-adding activities.

This book offers a perspective on the newly blended subject in Semester IV of the Mumbai University BMS Programme on ‘Production and Total Quality Management’. Through this book, one can learn to analyze and improve business processes in services or in manufacturing by learning the concepts of Production Management and how to increase Productivity. Key topics include Product Development, Production Systems, Materials Management, Inventory Control Techniques, Problem Solving Techniques and more.

Quality is not only a cornerstone of operations management but also a critical component of an organization’s long-term viability and success. This book covers all the major aspects of Total Quality Management, from the philosophies and approaches to Quality to the most widely used Quality Improvement Strategies including the Lean Six Sigma methodology, International Quality Standards to the prestigious International and National Quality Awards. Thus, this book ensures a comprehensive understanding of the subject.

A special word of thanks to our family, friends and well-wishers for their encouragement and support in writing this book.

We express our gratitude to Himalaya Publishing House Pvt. Ltd. for publishing this book.

We invite readers for their comments on the book.

Authors
## Syllabus

### Production and Total Quality Management

[60 Lectures : 3 Credit]

**Learning Objectives:**
1. To acquaint learners with the basic management decisions with respect to production and quality management.
2. To make the learners understand the designing aspect of production systems.
3. To enable the learners apply what they have learnt theoretically.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Name of the Topic</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 2</td>
<td><strong>Materials Management</strong>&lt;br&gt;Concept, Objectives and Importance of Materials Management, Various Types of Material Handling Systems. <strong>Inventory Management</strong>&lt;br&gt;Importance – Inventory Control Techniques – ABC, VED, FSN, GOLF, XYZ, SOS and HML.&lt;br&gt;EOQ: Assumptions Limitations and Advantages of Economic Order Quantity, Simple Numerical on EOQ, Lead Time, Reorder Level, Safety Stock.</td>
<td>16</td>
</tr>
<tr>
<td>Unit 3</td>
<td><strong>Basics of Productivity and TQM</strong>&lt;br&gt;Concepts of Productivity, Modes of Calculating Productivity. Importance of Quality Management, Factors Affecting Quality; TQM – Concept and Importance, Cost of Quality, Philosophies and Approaches to Quality: Edward Deming, J. Juran, Kaizen, P. Crosby’s Philosophy. <strong>Product and Service Quality Dimensions, SERVQUAL</strong>&lt;br&gt;Characteristics of Quality, Quality Assurance, Quality Circle: Objectives of Quality Circles, Ishikawa Fish Bone, Applications in Organizations. Simple Numerical on Productivity.</td>
<td>16</td>
</tr>
<tr>
<td>Unit 4</td>
<td><strong>Quality Improvement Strategies and Certifications</strong>&lt;br&gt;Lean Thinking, Kepner-Tregor Methodology of Problem Solving, Six Sigma Features, Enablers, Goals, DMAIC/DMADV.&lt;br&gt;Taguchi’s Quality Engineering, ISO 9000, ISO 1400, QS 9000. Malcolm Baldrige National Quality Award (MBNQA), Deming’s Application Prize.</td>
<td>14</td>
</tr>
</tbody>
</table>
Note: 1. All questions are compulsory subject to internal choice.
2. Figures to right indicate full marks.

Q.1. Attempt any 2 questions (15 Mks)
   (a) (7.5 Mks)
   (b) (7.5 Mks)
   (c) (7.5 Mks)

Q.2. Attempt any 2 questions (15 Mks)
   (a) (7.5 Mks)
   (b) (7.5 Mks)
   (c) (7.5 Mks)

Q.3. Attempt any 2 questions (15 Mks)
   (a) (7.5 Mks)
   (b) (7.5 Mks)
   (c) (7.5 Mks)

Q.4. Attempt any 2 questions (15 Mks)
   (a) (7.5 Mks)
   (b) (7.5 Mks)
   (c) (7.5 Mks)

Q.5. Case Study (15 Mks)
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>OPERATIONS MANAGEMENT — AN INTRODUCTION</td>
<td>1 – 9</td>
</tr>
<tr>
<td>2.</td>
<td>PRODUCTION MANAGEMENT</td>
<td>10 – 17</td>
</tr>
<tr>
<td>3.</td>
<td>PRODUCT – DEVELOPMENT, CLASSIFICATION AND DESIGN</td>
<td>18 – 30</td>
</tr>
<tr>
<td>4.</td>
<td>PLANT LOCATION AND PLANT LAYOUT</td>
<td>31 – 46</td>
</tr>
<tr>
<td>5.</td>
<td>PURCHASE MANAGEMENT</td>
<td>47 – 52</td>
</tr>
<tr>
<td>6.</td>
<td>MATERIALS MANAGEMENT</td>
<td>53 – 62</td>
</tr>
<tr>
<td>7.</td>
<td>INVENTORY MANAGEMENT</td>
<td>63 – 74</td>
</tr>
<tr>
<td>8.</td>
<td>PRODUCTIVITY</td>
<td>75 – 80</td>
</tr>
<tr>
<td>9.</td>
<td>FUNDAMENTALS OF QUALITY MANAGEMENT</td>
<td>81 – 96</td>
</tr>
<tr>
<td>10.</td>
<td>PHILOSOPHIES AND APPROACHES TO QUALITY</td>
<td>97 – 107</td>
</tr>
<tr>
<td>11.</td>
<td>PROBLEM SOLVING TECHNIQUES</td>
<td>108 – 114</td>
</tr>
<tr>
<td>12.</td>
<td>LEAN MANAGEMENT AND SIX SIGMA</td>
<td>115 – 127</td>
</tr>
<tr>
<td>13.</td>
<td>INTERNATIONAL QUALITY STANDARDS</td>
<td>128 – 134</td>
</tr>
<tr>
<td>14.</td>
<td>QUALITY PERFORMANCE AND EXCELLENCE AWARDS</td>
<td>135 – 141</td>
</tr>
<tr>
<td></td>
<td>CASE STUDIES</td>
<td>142 – 149</td>
</tr>
<tr>
<td></td>
<td>MODEL QUESTION PAPERS</td>
<td>150 – 154</td>
</tr>
<tr>
<td></td>
<td>BIBLIOGRAPHY</td>
<td>155</td>
</tr>
</tbody>
</table>
INTRODUCTION TO OPERATIONS MANAGEMENT

There are four functional areas in a business organization — Marketing, Finance, Human Resources and Operations. Let us understand the role of each area by stating its functions in a laptop manufacturing company — the Marketing Department would be responsible for branding, sales and customer satisfaction, the Finance Department would oversee the accounts and monetary aspects of the business analyzing its profitability while the Human Resource Department would be responsible for the selection, training, rewarding and effective utilization of the required workforce. It is the Operations Department which does the activity of manufacturing the laptops and ensuring its performance is as per the required standards. The core of every organization consists of the activities that make the products. These activities are called ‘operations’.

Let us now understand the functions of the Operations Department in service organizations. In a five star hotel, these will include different functions such as facility management, security, food and beverage service, menu development, inventory management, etc. The five star hotel business is thus nothing but a 24/7/365 operations’ activity. In your college, for instance — the admissions, lecture scheduling, examinations, etc. would all be responsibilities of the Operations Department and thus your BMS Coordinator can be termed as the Operations Manager for the BMS program. As an activity now, try listing the different sub-departments of your College Fest that can be categorized under the Operations Department.

Operations Management is, thus, the ‘Heart of an Organization’. All other activities revolve around this activity. The end-product of the Operations Management activity is the creation of goods and services for the satisfaction of the consumer. These products could be tangible goods — such as cars, cell phones and soaps or intangible services — such as banking, education and aviation.

The following diagram details the interactions of the Operations Department with other departments.
OPERATIONS AND OTHER FUNCTIONAL AREAS

An organization is considered as a system having several sub-systems. Marketing sub-system has to make available the products to the consumers for their consumption. It receives sales orders, which are communicated to the production sub-system. Production utilizes raw materials, which are processed on plant and machinery to turn out a value-added finished product. In other words, an organization utilizes the available facilities to satisfy the market. While manufacturing products, the production function organizes its resources in accordance with the production plan. The finance function makes available finance necessary to carry out their functions to all other departments. HR is a support function which plans and provides manpower to all other sub-systems. It formulates suitable personnel policies.

All business sub-systems are interlinked and interdependent. Marketing may fail, if the production does not fulfill the expectations of customers by providing suitably manufactured products. Production may fail in the absence of the working capital necessary to buy raw material for turning out
the products. If skilled manpower is not available, all other plans will be stalled. The co-ordination amongst the various sub-systems is necessary for effective functioning of any organization.

**INTERFACE OF OPERATIONS AND OTHER FUNCTIONS**

**Management Accountants** must know process costing and variance analysis.

**Financial Managers** take capital budgeting decision based on production requirements. Cash flow statements and current asset management has to be examined in the light of production decisions. Make-or-buy or plant expansion has financial implications.

**Marketing Managers** have to understand production schedules to meet their delivery requirements. They should understand how products can be customized. Production has a great role to play in new product development.

**Human Resource Department** is interested in understanding job analysis, job descriptions, job specifications and job evaluation. They develop compensation plans and incentive systems, keeping production requirements in mind.

**SCOPE OF OPERATIONS MANAGEMENT**

Basically, this discipline has to decide about a production/operation system to generate customer satisfaction at optimum cost. In a one-man business, the three functions – manufacturing, servicing and control – will be carried out by one person. As the organization grows, there are several separate departments. In a bigger organization, each department has several sub-divisions. A typical production department can have sub-divisions such as production planning and control, production engineering, plant and maintenance and quality control. As such, there are certain long-term strategic decisions involved, influencing substantially the whole system. Mostly, these decisions are with respect to the Design and Planning aspects.

To illustrate, let us examine some of these decisions.

**Product Selection and Design**

The product mix makes our system either efficient or inefficient. Choosing the right products, keeping the mission and overall objectives in mind is the key to success. Design of the product, which gives it enough functional and aesthetic value, is of paramount importance. It is the design of the product which makes us competitive or non-competitive. Value engineering does help us to retain enough of features, while eliminating the unnecessary cost increasing features.

**Process Selection and Planning**

Selection of a process involves taking decisions about technology, machines and equipment. We have to optimize the output from a given process. Process planning, detailing the stages of the process, give us an idea of optimum automation and mechanization.

**Location Facilities**

Where can we locate our facility? It is a long-term commitment and a wrong decision may prove disastrous. Location should as far as possible cut down on production and distribution cost. Therefore, from the alternatives open to us, we have to evaluate and judge a suitable location for us. While evaluating, there are diverse factors to be considered.
Layout and Materials Handling Facilities

Plant layout deals with the arrangements of machines and plant facilities. The machines should be so arranged that the flow of production remains smooth. There should not be overlapping, duplication or interruption in production flow. Product layout, where machines are arranged in a sequence required for the processing of a particular product, and process layout — where machines performing similar processes are grouped together — are two popular methods of layout. The departments are laid out in such a way that the cost of material handling is reduced. There should be proper choice of materials handling equipment. These days, computer software is available for planning the process layout (e.g., CRAFT, CORELAP, etc.). Cellular Manufacturing Systems (CMS) and Flexible Manufacturing Systems (FMS) have made our concepts of layout planning undergo a tremendous change.

Capacity Planning

This deals with the procurement of productive resources. Capacity refers to a level of output of the conversion process over a period of time. Full capacity indicates maximum level of output. Capacity is planned for short-term as well as for long-term. Process industries pose challenging problems in capacity planning, requiring in the long run, expansion and contraction of major facilities in the conversion process. Some tools that help us in capacity planning are marginal costing (BEA), learning curves, linear programming, and decision trees.

Operational or Short-term Decisions

These deal with short-term planning and control problems. Some illustrative decisions are:

1. **Production Planning:** Planning is a pre-operation activity. It aims at anticipating the probable difficulties so that they can be eliminated before they materialize or be mitigated before they become grave. Production planning aims at setting the goals or targets and allocating the existing resources, viz., men, machines, materials and plant services, among varied production operations so that their best possible use can be made in the light of the set goals or standards.

   **According to Bethel, Atwater, Smith and Stackman,** “Production planning takes a given product or line of products and organizes in advance the manpower, materials, machines and money required for a predetermined output in a given period of time.”

   Thus, production planning is a management technique which attempts to gain the best utilization of a firm’s manufacturing facilities. It is gained by the integration and co-ordination of the manpower, machines, materials and plant services employed in the manufacturing cycle.

2. **Production Control:** Control is a management technique which aims to see that the activities are carried on in line with the predetermined standards. In case of production activities, production control tries to see that the actual manufacturing conforms to the predetermined standards and schedules of production. Production Control controls the flow of jobs through manufacture. Production control is considered to have a wider scope and thus it includes production planning. In practice, a joint reference is made of production planning and control and it is popularly known as PPC.

   **According to Soriegel and Lansburgh,** “Production control is the process of planning production in advance of operations; establishing the exact route of each individual item, part or assembly; setting, starting and finishing dates for each important item, assembly and
the finished products; and releasing the necessary orders as well as initiating the required follow-up to effect the smooth functioning of the enterprise.”

Thus, production control involves the following stages:

(a) **Planning** – setting targets of production.

(b) **Routing** – to decide the route or flow of production activity.

(c) **Dispatching** – to issue materials and authorizations for the use of machines and plant services.

(d) **Follow-up** – it compares the actual production with the targeted production. Deviations are found out and corrected and reasons are investigated.

3. **Inventory Control**: Inventory control deals with the control over raw materials, work-in-progress, finished products, stores supplies, tools, etc. The management of these items is closely related with the production function and so is included in production management.

The raw materials, supplies, etc. should be purchased at right time, of right quality, in right quantity, from right source and at right price. These five “R’s” consideration enables the scientific purchases.

Store-keeping is also an important aspect of inventory control. The raw materials, work-in-progress, finished goods, supplies, tools, etc. should be stored efficiently. The different levels of inventory should be managed properly and the issue of materials to departments should be made promptly and effectively. Proper records should also be kept for various items of inventory control.

4. **Quality Control**: The long-run success of the business largely depends on its ability to maintain the quality standards as decided by the management and accepted by customers. The quality standards are prescribed in terms of specifications like size, colour, shape, tastes, etc. The quality control is maintained by testing the actual production and by ascertaining whether they conform to the set standards. The raw materials, work-in-progress, finished products, etc., are inspected at various stages of production. There may be 100% quality control where each unit produced is inspected or there may be a policy of testing the samples where the entire lot produced is either passed or rejected on the basis of the tested samples. Various statistical techniques are used for the effective quality control.

5. **Method Study**: Standard methods should be devised for performing the repetitive functions efficiently. Unnecessary movements should be eliminated and suitable positioning of the workers for different processes should be developed. Such methods should be devised with the help of time study and motion study. The workers should be trained accordingly.

6. **Maintenance and Replacement**: In this, we cover preventive methods to avoid machine breakdowns, scheduled and breakdowns maintenance, policies regarding repair and replacement decisions. Maintenance manpower is to be scheduled and repair jobs are to be sequenced. There are some preventive replacements also. Machine condition is to be constantly monitored. Effective maintenance is a crucial problem for India which can help better capacity utilization and make our operations systems productive enough.

7. **Cost Reduction and Control**: Cost reduction ultimately improves productivity. The industry becomes competitive. Essentially, cost reduction and cost elimination are productivity techniques. Value engineering, budgetary control, standard costing, cost control of labour and materials, etc. help us to keep our costs optimal.
RECENT TRENDS AND DEVELOPMENTS’ IN OPERATIONS MANAGEMENT

Many recent exciting developments in technology and policy are revolutionizing many areas of Operations Management around the world and also in India. Some of them are:

**Remote Processing**

Because of telecom revolution, it has now become possible to do remote processing of major operations several thousand miles away. A company in Gurgaon processes GE’s credit cards in Europe. Several companies in India transcribe the doctor’s prescriptions for the health care industry in the US. Several companies process loan applications for foreign companies. Call centres are established to answer customer queries. Many companies do data conversion work. Back office work is outsourced, e.g., payroll accounting, internal auditing and credit appraisals. Legal deposition summaries can be prepared. Insurance claims are processed. Geographic information systems by digitized maps are created. Several thousand Indians do remote processing jobs for foreign companies. This number could go up in lakhs, given the pace of development of this industry. In operations management, this will be a key area. Operations can be outsourced globally because of telecom development.

**World Class Manufacturing**

The economy is integrated to the global economy and industry is facing global competition. It is, therefore, necessary to improve performance. Performance measures indicate the real problems and how to overcome them. If a system does not deliver, the blame cannot be placed at the door of culture, level of technology, or labour. Mostly, it is due to faulty performance measures. Identification and definition of the right type of performance measure is thus a priority.

World Class Manufacturing (WCM) concept has emerged of late. The following characteristics of WCM are used to fulfil the consumer expectations:

(a) Products of high quality.
(b) Products at the right price.
(c) Products with enhanced features.
(d) Products in a wide variety.
(e) Products delivered in time, in fact, short time.
(f) Products delivered with shorter lead times.
(g) Flexibility in fulfilling the demand for the product.

The above-listed performance measures are external to the manufacturing system but are vital for the success of the organization. These can be measured internally. Such performance measures improve the acceptability of the product.

The success of an organization in this competitive environment is due as its superior performance measuring system in manufacturing. Under WCM, the products should have specifications closer to the customer needs.
**Digital Manufacturing**

Digital manufacturing systems combine advanced 3D simulation tools, product life cycle management (PLM) software and virtual reality to manage a product visibly through the manufacturing process.

Digital manufacturing puts the IT on the production floor. In a manufacturing company, production floor is the biggest cost centre. The whole success of the product depends on how fast and efficiently the production is managed. CAD/CAM makes design phase smooth. ERP makes the supply phase smooth and CRM takes care of sales. Manufacturing has yet to catch up the pace set up by the above three. Digital manufacturing can make production smoother. It can make production match the design and sales. Engineers can simulate on the computer what they want to achieve on the production floor. Digital manufacturing can be applied to existing factories and new facilities. Digital manufacturing can be justified if it reduces ‘the cost per piece’.

**3D Printing**

This process is also called Additive Manufacturing. It is not very different from printing a document digitally at home. The page is replaced by a 3D object. Instead of ink, layers upon successive layers of materials are put together to create the object. BMW has used it to manufacture jigs and fixtures. They have used a printer called Stratasys replacing the traditional CNC manufacturing techniques. The US Air Force is building many such 3D printed parts for its UAVs. It may help medical field. There could be bioprinting of organs and printing of bone scaffolds. In space exploration, a printer could be used to manufacture parts in zero gravity. Manufacturing will change a great deal. They will be able to produce complicated and unique items in just the quantity they need, thus avoiding waste. Companies can make prototypes. They can also make product parts quickly and on demand. The object today can be printed in 70 materials only. This limitation could be overcome in future. A consumer can copy copyrighted artworks. This problem will have to be addressed. 3D printing will open up imagination. Customized products could be offered. The prices of 3D printers are high today, but will drop soon to make them as common as home printers today are.

**Supramolecular Chemistry**

Akzo Nobel, a chemical company and scientists at Eindhoven University of Technology, Netherlands are working on developing a supramolecular polymer that is able to heal itself. The new plastic called Supra B takes advantage of bonding that gives water its viscosity and surface tension. It is called hydrogen bonding that uses affinity between hydrogen and other atom such as oxygen and nitrogen. In Supra B, they have managed to quadruple the number of hydrogen bonds. It then does not require a chemical to join them together. It will provide a new scratch resistant coating for vehicles, laptops and other portable equipments.

**Flexible Electronics**

After tile-like thin TV sets, we can soon have stretchable TV sets which can be rolled and bent. Stretchable electronics could become a reality by the successful development of elastic conductors using carbon nanotubes by a group of Japanese scientists. Researchers have integrated the conductor with organic transistors to make rubber-like integrated circuits (ICs) stretchable by 70% without any mechanical or electronic degradation. ICs can be built on curved surface by this step. The surface then becomes ‘smart’ or ‘intelligent’. The matrix is made of unique combination of elastic polymers and ionic liquids in which the carbon nanotubes are uniformly dispersed. These steps generate stretchable
electronics — stretching axially and bi-axially without diluting electronic properties. The research will lead to large-area devices to become bendable androllable. Applications can include wearable and washable electronics.

**Munjal Global Manufacturing Institute (MGMI)**

In collaboration with MIT and Sloan School of Management, an institute to teach manufacturing management is being set up on the campus of Indian School of Business (ISB), Mahali by Hero Motor Corp. Ltd. The institute will help the small and medium enterprises (SMEs) sector by developing case studies, giving field exposure and providing human resources to the sector. The areas the curriculum will cover are:

(a) Operations management  
(b) Global supply chain networks  
(c) Product innovation and development  
(d) Manufacturing and operations innovation  
(e) Lean production  
(f) Six sigma  
(g) Sustainable manufacturing and operations  
(h) Operations strategy  
(i) Pricing strategy and operations  
(j) Operations for entrepreneurs  
(k) Performance management.

**National Manufacturing Policy**

This policy is a game changer in India. The policy aims to increase the share of manufacturing in the country’s GDP from the current 16% to 25% by 2022. The National Manufacturing Policy aims to create 100 million additional jobs in the next decade.

The National Investment and Manufacturing Zones (NIMZ) are being planned. There will be seven NIMZ. These will be standalone cities. Each NIMZ will have up to 5,000 hectares. The policy has envisaged fiscal sops to boost manufacturing. Small and medium enterprises will be reimbursed for technology purchase under this policy.

Industrial training and skills development programmes will be launched. Flexible labour laws and simplified and expeditious exit mechanism will be available for a sick unit. Financial and tax incentives to small and medium enterprises will be provided. Additional incentives for Green Manufacturing are being planned.

**Make in India Campaign**

The initiative launched on September 25 2014 is aimed at making India a global manufacturing hub and create millions of jobs. Under the programme, the government has identified 25 key sectors like in which India has the potential of becoming a world leader. The campaign aimed at making India the simplest and easiest place for doing business by eliminating paperwork, procedures, rules and acts and promoting use of latest technology.
Foreign direct investment (FDI) into the country has witnessed a 48% jump in the seven-month period (October 2014 to April 2015) after the launch of the campaign. In the last one year, the government had announced several steps to improve ease of doing business and attract foreign direct investment into the country. FDI increased by 31% to USD 9.50 billion during April-June 2015.

QUESTIONS

1. What do you understand by the term ‘Operations Management’?
2. List the activities of the Operations Department in a:
   (i) Laptop Manufacturing Company
   (ii) Bank
   (iii) Hospital
   (iv) Airport
3. Why is Operations Management called the ‘Heart of an Organization’?
4. Explain in detail the interactions of the Operations Department with the:
   (i) Finance/Accounting Department
   (ii) Marketing Department
   (iii) Human Resource Department
   (iv) Suppliers
5. Explain the scope of Operations Management in an organization.
6. Explain the following terms:
   (i) Capacity Planning
   (ii) Quality Control
   (iii) Method Study
   (iv) Remote Processing
   (v) 3D Printing
7. State some recent programmes launched to further develop operations management and in particular the manufacturing sector in India.

♦♦ ● ♦♦
ABOUT THE BOOK

Production and Total Quality Management is an indispensable function of Business Management and a vital area in a growing economy. This book explains the nuts and bolts of the subject in lucid language. All the ancillary topics have been covered in sufficient detail and the case studies provide good insight to real world problems. The book maintains a reference to the Indian business scenario throughout. It is an ideal guide for every student to clearly understand the subject and prepare well for the semester end examinations. Additional teaching resources including solved case studies and powerpoint presentations are available for faculty.

ABOUT THE AUTHORS

S.A. Chunawalla is a management thinker and author for more than a quarter of a century. He has taught management subjects and guided research projects of the students. His other popular books are Foundations of Advertising, Product Management and Compendium of Brand Management.

Mr. Conrad Coelho is a graduate in Instrumentation Engineering with a Master’s degree in Management Studies (Marketing) from Mumbai University and has qualified the NET (National Eligibility Test for Lectureship) in Business Management. He is the BMS Program Co-ordinator at Nanuee Monjee College of Commerce and Economics, Mumbai, and is a faculty for Production and Quality Management related subjects, Business Statistics and Business Mathematics since 2010. Prior to this, he has two years’ experience working for the Quality and Process Department at Reliance Communications Ltd.