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## CA FINAL – SCM & PE (New Syllabus)

# Amendment Batch 4

(Notes for Private Circulation only)

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## -: Compiled by :-


**CA Rakesh Agrawal**

**[ M.Com., Grad. CWA, FCA, SET, DISA ]**

**Gold Medalist in Cost & Management Accounting**

# About CA Rakesh Agrawal

- He passed his B. Com examination from Ness Wadia College of Commerce, Pune in 1989 with distinction.
- He was the Captain of his college Chess Team.
- He was adjudged as the Best Mountaineer of the College for 1988 – 89 year.
- He received the Gold Medal from University of Pune in the Special subject of Cost & Management Accountancy at B. Com level.
- He passed his M. Com. Exam also from University of Pune (external), with the specialization in Advanced Cost & Management Accounting. Of course, he again cleared this exam with distinction.
- He cleared his ICWA examination in the first attempt in December, 1990 and stood Third in the Pune Chapter of Cost Accountants.
- He started teaching the subject of Costing at Pune Chapter of Cost Accountants in the year 1991, as a visiting faculty.
- He completed his CA Final examination in November 1992 attempt with 32nd Rank in All India Merit.
- He has cleared Information Systems Auditor (ISA) exam of ICAI in the very first attempt.
- He has passed State Eligibility Test (SET) in Commerce in the very first attempt.
- He has also passed the Mutual Fund exam and Derivatives Core Module, conducted by National Stock Exchange.
- He is the Founder of Vidarbha Professional Academy (1996), Nagpur.
- He has launched a free mobile app titled as “Costing Dictionary by CA Rakesh Agrawal”. You may download it from Google Playstore.
- He has an online store **www.carakeshagrawal.in** for e-commerce. Students can buy video lectures from this website and study anytime anywhere.
- He is a Teacher by Passion and Chartered Accountant by Profession.
- He is well known for Conceptual Coaching and Student Friendly nature. At the same time he maintains classroom discipline.
- He teaches you a subject for your life time. He also tries to co-relate the subject with day to day life.
- He believes that “Education is not merely getting a Degree, but it is gaining Knowledge”.
- He enjoys teaching and he wants all of you to enjoy learning the subject also.

- He can be contacted at :

  Email : ngp.rakesh@gmail.com

  Website : www.CaRakeshAgrawal.in

# Preface to Amendment Batch 4

Dear Student Friends,

First of all, I would like to thank you for your overwhelming response to the subject of Strategic Cost Management & Performance Evaluation. Many students are studying this subject through live classes at Pune or Virtual batches at our authorized centers or through video lectures at home.

There is always a question about how to update ourselves in future, after the batch gets over. Because, there is always a gap between completing a batch and appearing for the exam. In between this period, ICAI might have conducted some more exams, might have released RTPs, Mock Test Papers, Case Studies, New Module etc.

To cover these extra questions or changes at one place, the idea of Amendment Batch clicked to my mind. It is just an effort to keep you people updated. The new syllabus was introduced w.e.f. 1st July, 2017 and since that date, this is my **fourth** amendment batch notes. These amendment notes cover almost all changes which ICAI has introduced, up to 30th June, 2021. I have tried to identify the repeat questions (to the best of my ability) and removed them to avoid duplication of work. The Regular Notes dealt with in the classroom plus these Amendment notes will cover everything, which you wanted. However, you should always be prepared to expect something new in the exam. It is not a B.Com. exam to expect repeat questions with change in figures.

Index page of this copy will provide you a brief idea about the coverage of syllabus in these notes. I have included the answers to all the questions at respective places to save your time. At some places, I have modified the answers of ICAI and at some places I have changed the presentation of answer. At few places, I have done the spelling corrections and modified the sentence to provide it a complete meaning. I have given special student notes, if my opinion differs with ICAI opinion.

I hope you will get benefited with this and will feel more confident to take up the Institute's Exam. Your suggestions and constructive comments are always welcome to make further improvement. You may use my email id for such suggestions.

TQM says - "There is always a scope for improvement".

Best of Luck and Happy Learning !

CA Rakesh Agrawal

Email : ngp.rakesh@gmail.com

Website : www.CaRakeshAgrawal.in

# Suggested Answer of May 2020 Exam

I think in the history of ICAI, it might have happened for the first time, that ICAI made multiple attempts to conduct the May, 2020 exam; but Covid-19 failed all these attempts. ICAI officials might have experienced the fact of failure in an attempt and that too repetitively.

Friends, this exam was never conducted and hence there is no question of suggested answers. I have just made the reference here, because in future, students may forget the fact that this exam was never conducted as all and will assume that I have skipped it in my notes.



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# CA Final - SCM&PE
# November 2020 - Suggested Answers

**Question No. 1 is compulsory**.

Candidates are also required to answer any **four** questions from the remaining **five** questions.

Working notes should form part of the answer.

No statistical or other table will be provided with this question paper.

**Que. 1 : [ 20 Marks - Case Study ]**

Reference : Chapter 8 - Performance Measurement in Not for Profit Sector

This question is very similar to Q.21/64 from chapter 8, Volume II of our Version 3 notes. Just the name is changed. The earlier name was Silver Sands. It is excluded here to avoid duplication of work.

**Que. 2 : [ 20 Marks ]**

Reference : Chapter 4 - Lean System & Innovation - Target Costing

This question is very similar to Q.6/113 from chapter 4, Volume I of our Version 3 notes. Just the name and figures are changed. It is excluded here to avoid duplication of work.

**Que. 3 : [ 20 Marks ]**

Reference : Chapter 8 - Performance Measurement & Evaluation - EVA

This question is very similar to Q.10/16 from chapter 8, Volume II of our Version 3 notes. Just the name and figures are changed. Earlier name was Water Utility Services. It is excluded here to avoid duplication of work.

My view : In this question, chances of errors are more and hence my advice would be to keep it for option. The question was lengthy.

**Que. 4(a) : [ 5 Marks ]**

Reference : Chapter 6 - Decision Making

This question is very similar to Q.56/195 from chapter 6, Volume I of our Version 3 notes. Just the name and figures are changed. It is excluded here to avoid duplication of work.

My view : It was a bonus question.

**OR**

Reference : Chapter 7 - Pricing Decision

Similar Questions : Q.12/233, Q.13/233 & Q.14/233 from chapter 7, Volume I of our Version 3 notes.

My view : It was again a bonus question.

**Que. 4(b) : [ 5 Marks ]**

Reference : Chapter 2 - Modern Business Environment - Cost of Quality

This question is very similar to Q.10/36 from chapter 2, Volume I of our Version 3 notes. Just the figures are changed. It is excluded here to avoid duplication of work.

My view : It was a bonus question.

**Que. 4(c) : [ 10 Marks ]**

Reference : Chapter 9 - Divisional Transfer Pricing

Comments : This question is similar to Q.7/112 from chapter 9, Volume III of our Version 3 notes.

My view : It is a tricky & time consuming question. Stay away from it in the exam hall.

**Que. 5(a) : [ 10 Marks ]**

Reference : Chapter 6 - Decision Making

Similar Question : This question is very similar to Q.24/161 from chapter 6, Volume I of our Version 3 notes. Just the figures are changed. It is excluded here to avoid duplication of work.

My view : In my opinion, there was a printing error in the question paper. Profit Volume Ratio of 30% should be printed only under the column of 600 units. Due to this printing error, ICAI developed two possible answers to cover up their mistake.

**Que. 5(b) : [ 10 Marks ]**

Reference : Chapter 12 - Standard Costing - Interpretation of Variances.

Similar Question : This question is very similar to Q.51/234 from chapter 12, Volume II of our Version 3 notes. Just the figures are changed. It is excluded here to avoid duplication of work.

**Que. 6(a) : [ 10 Marks ]**

**Student Note :** I have noticed certain errors in the drafting of question by ICAI. Hence, I have made suitable modifications in the question & answer to make it understandable to you. Original question as drafted by ICAI may lead to multiple interpretations.

ZAINA Pvt. Ltd. is a manufacturing company of electrical equipment. The company is facing the possibility of a strike by its direct production workers engaged on the assembly of one of its machines. The Trade Union is demanding an increase of 8% in wages from the beginning of this financial year. The company expects that if a strike takes place, it will last for four weeks and after that the Union will settle for an increase of 6% wages from the beginning of this financial year.

Strike would affect the production of Ceiling Fans. Ceiling Fan is generally sold for ₹ 2,000 per unit, under the normal situation. The estimated cost for Ceiling Fan is :

| **Particulars** | **Fixed Cost (₹)** | **Variable Cost (₹)** |
|---|---|---|
| Production cost | 8,00,000 p.a. | 1,200 per unit |
| Distribution cost | 3,00,000 p.a. | 80 per unit |
| Total cost | 11,00,000 p.a. | 1,280 per unit |

Direct labour comprises 60% of the variable production cost. The budgeted output is 30,000 ceiling fans in 50 working weeks per year.

**If the strike takes place**, then the following situation is expected by the company :

(a) Maintenance staff whose wages are included in the fixed production costs, would be used to carry out an overhaul of the conveyor system using materials worth ₹ 50,000. This work would otherwise be undertaken by an outside contractor at a cost of ₹ 1,50,000 including material cost.

(b) Sales of 500 Ceiling Fans would be lost completely during strike period. The balance that could ordinarily have been produced during the strike period, would be produced in overtime working. During overtime, the workers' efficiency would be 80% of the normal and wages will have to be paid @ one and a half times of normal wages. Similarly, it would also involve an additional fixed cost of ₹ 40,000.

(c) Production during strike period would be sold to the distributors at a discount of 25% of its normal selling price.

**Required :**

(i) Calculate the profit or loss with and without strike.

(ii) Taking purely economic point of view, Advise the management on whether to allow the strike to go ahead or agree to the Union's demand.

(iii) List any two factors, not considered in your above evaluation, that may have an adverse impact for the company, if the strike were to take place.

**Solution 6(a) :**

**Working Notes :**

- Normal production per week = 30,000 units / 50 weeks = 600 units per week
- Production during strike period of 4 weeks = ( 600 units x 4 weeks ) - 500 units = 1,900 units
- Production during remaining period of 46 weeks = ( 600 units x 46 weeks ) = 27,600 units
- Selling price during strike period = ₹ 2,000 - 25% = ₹ 1,500 per unit
- Normal labour cost per unit = 60% x 1,200 = ₹ 720 per unit
- Variable cost (excluding labour) per unit = 40% x 1,200 = ₹ 480 per unit
- To avoid strike, we have to accept the demand of labour union for 8% increase in wages. In such case, the labour cost per unit shall be = ₹ 720 + 8% = ₹ 777.60 per unit
- If we don't accept their demand for 8% increase, then the workers will go on strike for around 4 weeks period, and then they will accept 6% increase in wages. In such case, the labour cost per unit shall be = ₹ 720 + 6% = ₹ 763.20 per unit
- Overtime wages during strike period at 80% efficiency = ( ₹ 763.20 x 1.5 times ) / 80% = ₹ 1,431 per unit
- During strike period, our maintenance staff will carry out an overhaul of conveyor system and thereby it will save ₹ 1,50,000 after using material worth ₹ 50,000. Thus, the net savings due to strike shall be ₹ 1,00,000.
- Alternatively, the above matter of maintenance cost can be written as : (a) outside contractor cost of ₹ 1,50,000 without strike and (b) only material cost ₹ 50,000 if there is a strike. The net difference in cost shall remain ₹ 1,00,000 only. The wages of maintenance staff is already included in fixed production cost and hence it is not required to be considered separately again.

**(i) Calculation of Profit / Loss with and without strike :**

| Particulars | No Strike (₹) | With Strike (₹) |
|---|---|---|
| (a) Sales Revenue during normal period | 6,00,00,000 [30,000 units x ₹ 2,000] | 5,52,00,000 [27,600 units x ₹ 2,000] |
| (b) Sales Revenue during strike period | -- | 28,50,000 [1,900 units x ₹ 1,500] |
| (c) Total Revenue / Benefit [ a + b ] | 6,00,00,000 | 5,80,50,000 |
| (d) Variable production cost excluding labour cost | 1,44,00,000 [30,000 units x ₹ 480] | 1,41,60,000 [29,500 units x ₹ 480] |
| (e) Labour cost for normal production | 2,33,28,000 [30,000 units x ₹ 777.6] | 2,10,64,320 [27,600 units x ₹ 763.20] |
| (f) Overtime wages for strike period | -- | 27,18,900 [1,900 units x ₹ 1,431] |
| (g) Additional fixed labour cost | -- | 40,000 |
| (h) Maintenance cost | 1,50,000 | 50,000 |
| (i) Variable distribution cost | 24,00,000 [30,000 units x ₹ 80] | 23,60,000 [29,500 units x ₹ 80] |
| (j) Total Fixed cost | 11,00,000 | 11,00,000 |
| (k) Total cost [ d to j ] | 4,13,78,000 | 4,14,93,220 |
| (l) Profit / Loss [ c - k ] | 1,86,22,000 | 1,65,56,780 |
| (m) Decrease in profit [Diff.] | | 20,65,220 |

**(ii) Advise based on financial view :**

The total profit without strike is higher than with strike. If the workers go on strike, then the profit reduces by ₹ 20,65,220. Hence, on purely economic point of view, we should accept the demand of labour union by 8% increase in wages since beginning of this year and avoid strike.

**Student Note :** The above calculation is done for a year only. However, labour cost may be saved in future years also. ICAI has ignored this point in absence of such information.

**(iii) Other factors having adverse impact of strike :**

- Loss of company's goodwill due to strike
- Impact on the future performance of workers, who go on strike
- Strained relationship between trade union and management
- Customers may move away to other competitors during strike period
- Other workers may also go on strike to support the present workers
- Strike may continue for a longer period than expected

**Que. 6(b) : [ 10 Marks ]**

Reference : Chapter 12 - Standard Costing - Interpretation of Variances.

Similar Question : This question is very similar to Q.52/235 from chapter 12, Volume II of our Version 3 notes. Just the figures are changed. It is excluded here to avoid duplication of work.

My view : An easy question considering 10 marks.

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# CA Final - SCM&PE
# January 2021 - Suggested Answers

**Question No. 1 is compulsory**.

Candidates are also required to answer any **four** questions from the remaining **five** questions.

Working notes should form part of the answer.

No statistical or other table will be provided with this question paper.

**Question 1 [ 20 Marks ]**

RS Tools Ltd. is a leading force in manufacture and supply of modern agriculture equipment like Power Tillers, Kisan Krafts, Agriculture Reaper and other Lawn Care equipment. The company grew substantially over the course of decades and presently ranked 20$^{th}$ by size in the global arena and has become a household name in every agriculture family in the country.

As commonly happens when an enterprise grows in leaps and bounds in a way like this, RS Tools Ltd. is experiencing an increasing degree of supply chain complexities and for many years it did nothing to address the difficulties of its decentralized and fragmented network. The top management decided recently to enter into small irrigation component segment with the brand name 'SIRI', the demand for which is extremely seasonal, and majority of sales are forecasted to occur between April to July every year. The company currently is replenishing dealer's inventory every month, using direct shipment from its central warehouse which is not order driven and is not in sync with the industry average. This kind of dispatching the orders is proving too costly and too slow and not in consonance with the demand pattern. The top management of RS Tools Ltd has started getting doubts about the company's ability to supply its existing 300 plus dealer network, to meet the consistent market demand of its regular agriculture equipment along with the seasonal demand of its new branded products 'SIRI'. They recognized that this state of affairs cannot be to allowed to continue in the long run and decided to adopt a long-term program of strategic optimization.

The company has launched an initiative to achieve a target of 15% reduction in supply chain cost within next 3 years and constituted an expert group to oversee this task. Mr. Karthik, the management consultant, is unanimously appointed at the board meeting to head the expert group formed to revamp the supply chain management. The management is squarely convinced with three of his bold and frank remarks to the board that :

(a) "Most Companies begin with the best intentions to achieve successful and sustainable supply chain cost management, but somehow lost momentum, only to see costs increase in short term due to the implementation costs of SCM"

(b) "If you tell me your company hasn't been able to sustain any progress in supply chain cost reduction in short run, I wouldn't be surprised at all".

(c) "No producer has the ability to give the customers what they want, when they want and at the price they want unless the value chains also have been encouraged".

When the expert team headed by Mr. Karthik began investigation, they found three areas of feasible leverage to reduce supply chain costs which are listed below –

(i) Consolidating shipments and use of third-party logistics providers as the existing decentralized environment of sourcing and inbound logistic are being managed by teams in different places with insufficient transparency in supply chain.

(ii) Leveraging on maintaining optimum inventory by bringing the order cycle time down to an industry average of 15 days.

(iii) The existing supply chain has evolved rather than grown by design and hence had become unnecessarily complex and the enterprise as a whole is not taking the advantage of synergies and economies of scale.

Mr. Karthik undertook a supply chain network redesigning program –

- To reorganize the supply chain,
- To reduce cost to serve and
- To lay the groundwork for future capability in the supply chain.

He is determined to revitalize the Supplier Relationship management as well as the number of suppliers are very large in number and the company is burdened with quality, delivery and payment issues from the suppliers. He has decided to suggest the use of E-procurement process as a part of upstream supply chain as a remedy to this hiccup.

You being an associate consultant in his office have been asked by Mr. Karthik, to help him by preparing a briefing to be given to the board based on the above facts with particular references in the following :

(a) LIST the critical issues being faced by RS Tools Ltd under the present setup based on the facts of the above case. **(3 Marks)**

(b) In the light of the initial remarks made by Mr. Karthik at the time of he being designated to head the expert group, EXPLAIN the supply chain management and ANALYZE the validity of the views expressed by Mr. Karthik. **(4 Marks)**

(c) LIST the major benefits that RS Tools Ltd would reap by energizing the Supply Chain Management. **(3 Marks)**

(d) EVALUATE how Supplier Relationship Management is going to help RS Tools Ltd. **(4 Marks)**

(e) DESCRIBE E procurement and its process in the context of upstream supply chain management and DISCUSS its constituents. **(3 Marks)**

(f) ADVISE whether the outsourcing as suggested by Mr. Karthik would help RS Tools Ltd in setting logistic constraints. **(3 Marks)**

**Answer 1 :**

**(a)** Due to **decentralized and fragmented network** the supply chain in present set-up is complex and caused **following critical issues** being faced by RS Tools Ltd.

1. **Costly and slow supply** – Because currently RS Tools Limited is supplying from central warehouse.

2. **Supply not in consonance with the demand pattern** – Currently RS Tools Limited replenishing dealer's inventory every month, which is not order driven and is not in sync with the industry average.

3. **Wide dealership and required infrastructure** – Since the dealers are large in quantum and fragmented too hence there is doubt about ability to supply its 300 plus dealers.

4. Regular agriculture product has **consistent market demand**, while new branded products SIRI has **seasonal demand.**

**(b)** Since **supply chain** encompasses all activities and information flows necessary for the transformation of goods from the origin of the raw material to when the product is finally consumed or delivered, hence **supply chain management is the continued management of the flow of goods and services and includes all processes that transform raw materials into final products;** It involves the active streamlining of a business's supply-side activities from sustainable perspective to maximize customer value and gain a competitive advantage in the marketplace.

The views expressed by Mr. Karthik are valid largely. Sustainable **supply chain cost management is continuous effort** rather than one-time initiative, wherein **commitment is required from top to bottom** of organisation to reap the desired results.

Complex the structure is, more and more time it would require, hence in short run cost may be more than benefits (in term of cost reduction). Since the Supply Chain Management has a purpose to maximise the customer value, hence yield better results when **supported by value chain analysis.**

**ALTERNATIVE Answer for 1(b)**

A complete chain serving the customers or consumers whether linked or interdependent is the composition of supply chain. It comprises vendors that supply raw material, producers who convert the material into products, warehouses that store, distribution centres that deliver to the retailers and retailers who sell the products to the ultimate user.

All activities associated with the flow and transformation of goods from raw material to end user is called supply chain. An important objective of SCM is to correlate the production and distribution of goods and services with the demand of the product.

**Analysing the Views of Mr. Karthik**

(i) Implementation of supply chain management should be viewed as an investment rather than cost that should be minimized. Implementation of SCM may demand relatively high investments in installing quality software and may also prompt certain hidden costs. Some expenses cannot be forecasted beforehand, and this may frustrate the top management if they are interested to reap in readymade results. So, this commitment is valid.

(ii) The term supply chain can be referred to as the entire network of organisation working together from design, produce, deliver, and service the products. In other words, all activities associated with the flow and transformation of goods from raw material to end user is called supply chain. It is a multifaceted exercise and cannot present any instant and onetime results. So, the comment is valid.

(iii) The following activities which are termed as primary activities under the value chain model forms part of SCM.

- Inbound Logistics covering procurement and related activities.
- Operations covering conversion of raw material into finished products.
- Outbound Logistics covering movement of products from plants to end users.
- Marketing and Sales
- Service

Supply Chain Management looks each of the above activities as integrated and interrelated to each other. So, the comment that unless value chains are encouraged customers' demands cannot be met is also valid.

**(c)** Supply Chain Management leads to strategic optimisation through enormous benefits such as inventory reduction, personnel reduction, productivity improvement; order management improvement, financial cycle improvement etc. Further it results in information visibility, new / improved process, customer responsiveness, standardization, flexibility & globalization of business performance.

Energizing the Supply Chain Management expected to reap following benefits to RS Tools Limited –

1. **Optimum inventory in consonance with the demand pattern** – by cutting order cycle time from 1 month to an industry average of 15 days will bring down the inventory to optimum level and improve the working capital cycle.

2. **Expertise of third party logistic (TPL) –** No, doubt outsourcing cause cost, but it will bring the expertise too apart from saving of time & resources which management can spend upon the core and value generating activities.

3. **Ease and transparency -** Current supply chain is evolved rather designed, hence energizing the supply chain management can remove the existing complexities and bring the ease to RS Tools Ltd. Further transparency regarding process and customer requirement will also be there due to generation, transmission and management information as part of supply chain management.

4. **Reduced supply chain cost –** either due to reduction in inventory to optimal level or streamline the activates over supply chain from procurement (such as e-procurement) to delivery to customer (such as using TPL) will result in supply chain cost management. It is important here to note that RS Tools Limited aim for 15% cost reduction target in three years' time.

5. **Generating capabilities and becoming future ready (sustainable supply chain) –** Currently RS Tools Ltd. is doubting their capabilities to continue the supply of regular products to existing 300+ dealers. It is extending the product range as SIRI is added and in future expected to expand the dealers' network too, hence energizing the Supply Chain Management can help in term of improved and enhanced capabilities.

**(d)** A supply chain when the flow relates to supplier it is termed as upstream flow, hence management of transaction with the supplier will be termed as **upstream supply chain management**. Upstream supply chain management rely upon **supplier relationship management** and **use of information technology.**

**Supplier relationship management** provides the structure for how relationship with suppliers are developed and maintained. This helps the organisation to gain the advantage out of supplier capabilities to innovation, ensure quality, be reliable – in terms of delivery and frequency, eliminate the variation in costs/price reductions and agility to reduce risk factors.

Revitalization of Supply relationship management expected to help RS Tools Limited in following manners –

1. **Extended value chain (& consolidated supply chain) to ensure quality and innovation –** Concern for quality is mentioned in case. Purpose of supply chain management is to improve the customer experience by offering more value. Value in product depends upon input used, hence supplier can play vital role in same. For this, relations with suppliers should be cordial, and Supplier relationship management is capable to ensure this.

2. **Reduce in number of suppliers for better management and favourable credit & trade terms considering the payment issue -** since it is mentioned in case that RS Tools Limited is burdened with the payment issue, hence may buy its supplies from limited suppliers. Because it is obvious if large volume purchase from limited suppliers or selected suppliers, they will offer relaxed credit terms at competitive prices. As against this if requirement is to avoid failure in delivery, then prefer multiple suppliers. Switching to new supplier may reduce the cost in some cases.

3. **Enhanced reliability in delivery -** Better relationship with supplier and sharing of information lead to enhanced reliability in delivery in term of quantity, frequency, place and time. However, an audit needs to be made of supplier performance and the opportunity, or otherwise, for RS to concentrate on suppliers ability to deliver on time. Clearly there are costs associated with this.

**(e)** A supply chain when the flow relates to supplier it is termed as upstream flow, hence management of transaction with the supplier will be termed as upstream supply chain management. The main activities of upstream supply chain are procurement and logistics. Upstream supply chain management rely upon supplier relationship management and use of information technology.

**E-Procurement** is the electronic methods beginning from identification of the organization's requirements and ends with payment to supplier. It can be seen as technology solution designed to centralise and automate interactions between an organisation and its' suppliers to improve the speed and efficiency of procurement practices.

**E-Sourcing, E-Purchasing and E-Payment are constituent of E-Procurement.**

**E-Sourcing** covers electronic methods for finding new suppliers and establishing contracts. E-Sourcing is inviting the tenders and quotations online from any part of the world, that too in cost and time effective manner; hence E-Sourcing is considered as the best possible way to find out the best supplier.

**E-Purchasing** covers product selection and ordering online, hence streamlines procurement and reduce overheads. Decentralised and need based orders are placed rather than by central ordering department.

**E-Payment** includes tools such as electronic invoicing and electronic funds transfers. This brings benefit of real-time settlement, error proof system and automatic and real-time record maintenance through ERP.

**(f)** Outsourcing is business practice used by companies to reduce costs (extra capital expenditure in technology) or improve efficiency by shifting task, operations jobs or processes to another party for a span of time. Outsourcing suggested by Mr. Karthik would help RS Limited in setting logistic constraints to large extent, because –

1. Currently it is feeling doubtful whether has **ability to serve the existing network of 300+ distributors,** while it is replenishing dealer's inventory every month. When it starts replenishing the inventory after every 15 days then existing logistic system

may fail hence outsourcing may be a way out to settle the existing logistic constraint.

2. Newly acquired **product SIRI has seasonal demand** only for 4 calendar months in a year, hence generating logistic capabilities for 4 months which remain idle for remaining months of year does not seem financially viable solution hence outsourcing in case of SIRI is seemingly best way to settle the existing logistic constraint.

**Note -** Third party logistics provider's expertise may enhance customer experience and management may get more time to focus on strategic aspects. Hence RS Tools Ltd. need to evaluate its value chain and try to categorise logistic either as value generating or non-value generating activity. If logistic is largely non-value generating activity from the customers' perspective of RS Tools Limited, it shall be outsourced and focus on the core. Overall, depending upon the application of various strategic cost management techniques, decision on outsource shall be taken.

**Student Note :**

- Conceptually correct and brief explanation is sufficient for each step.
- Alternative points and reasoning are also possible.

**Question 2(a) : [ 12 Marks ]**

ABC Ltd an investment company undertakes share market research for its clients. To design a tailor made investment strategy for clients the designated team of staff takes 4 months. The team comprises involvement of 3 divisions.

| Type of staff used | Proportion of variable cost incurred for respective months | | | | Total Variable Cost |
|---|---|---|---|---|---|
| | April | May | June | July | |
| Data Collection | 20% | 30% | | 50% | 100% |
| Research | | 40% | 40% | 20% | 100% |
| Advisory | 30% | 10% | 40% | 20% | 100% |

The variables costs of ABC Ltd are distributed among the 3 categories of staff in the following ratios :

| Department | Share in total variable costs incurred |
|---|---|
| Data Collection | 30% |
| Research | 50% |
| Advisory | 20% |
| Total Variable Cost | 100% |

The contribution from each department would be at the following percentages :

| Department | Required Contribution as a percentage on variable costs |
|---|---|
| Data Collection | 100% |
| Research | 80% |
| Advisory | 150% |

For calculation of monthly revenue generated the value of work executed is divided on the following lines :

| | | | |
|---|---|---|---|
| April | 30% | June | 30% |
| May | 20% | July | 20% |

The work executed by ABC Ltd in the month of April is ₹ 3,00,000, May ₹ 2,00,000, June ₹ 3,00,000 and in July ₹ 2,00,000.

CALCULATE the additional order to be received if the targeted contribution that the company wants to earn is ₹ 1,50,000 for the period April to July.

(You may assume that no fixed costs are relevant in arriving any calculations and the profit percentage of July is to be considered for calculating the additional order required in July.)

**Answer 2(a) :**

**Student Note :** There seems to be a drafting error in the above question. In my view, in the first table of the question, instead of proportion of variable cost incurred for respective months, it should be proportion of revenue generated for each month. In such case, table number 4 is not required.

Due to the above mistake, ICAI answer is not understandable. Inspite of positive P/V Ratio, we are getting a negative contribution at some places on monthly basis and at some places we are getting no variable cost to match with monthly sales. You are advised to ignore ICAI answer to avoid confusion.

The presentation of answer below is different from ICAI answer -

**Let's assume total variable cost during April to July as 'X'**

Using the data of proportion of variable cost and contribution as % of variable cost, we get -

| Department | Variable Cost | Contribution | Sales |
|---|---|---|---|
| Data Collection | 0.3X | 0.3X | 0.6X |
| Research | 0.5X | 0.4X | 0.9X |
| Advisory | 0.2X | 0.3X | 0.5X |
| Total Variable Cost | X | X | 2X |

The work executed by ABC Ltd in the month of April is ₹ 3,00,000, May ₹ 2,00,000, June ₹ 3,00,000 and in July ₹ 2,00,000.

Hence, total work executed during April to July (i.e. revenue) = ₹ 10,00,000 = 2X

Hence, Total Contribution during April to July i.e. X = ₹ 5,00,000

The targeted contribution that the company wants to earn is ₹ 1,50,000 for the period April to July and this target is already achieved. Hence, there is no need for additional order to be received.

**Question 2(b) : [ 8 Marks ]**

The newly appointed Finance Director Mr. Praveen, in the month of September wants to make the billing pattern simple and proposed to change the price quoting methodology of the organization. The details of his proposal are listed below –

The target cost for each research work is fixed in consultation with the client and the ABC Ltd. receives a bonus for completing the work below target cost.

For particular research conducted for Mr. Mohan, ABC Ltd has agreed upon a target cost of ₹ 20,00,000 and a target fee of ₹ 1,40,000. If the ABC Ltd completes the research at a lower cost than ₹ 20,00,000 then it will receive an additional profit up to a maximum profit of ₹ 1,80,000. If ABC Ltd completes the work for more than the target cost, then it will receive less profit but at least ₹ 40,000.

If the work is performed below the target cost, the client keeps 80% of the savings and leaves 20% of the surplus to ABC Ltd as an extra profit up to a maximum of ₹ 1,80,000. If the cost of research work exceeds the target cost, then client would bear 80% of the excess costs over and above the target cost and ABC Ltd would bear 20%, which is subtracted from the target fees as long as the fees is not less than ₹ 40,000.

If the actual work is performed at a cost of ₹ 19,00,000, CALCULATE the following :

(i) Cost saving for the project.

(ii) ABC Ltd's share in surplus.

(iii) ABC Ltd's total profit.

(iv) Total cost to Mr. Mohan for market research work. **(1 x 4 = 4 Marks)**

Now assume that ABC Ltd. has spent ₹ 24,00,000 for performing the work. Ascertain :

(v) Cost overturn.

(vi) Mohan's burden.

(vii) ABC's burden

(viii) Total Cost to Mr. Mohan for market research work **(1 x 4 = 4 Marks)**

**Answer 2(b) :**

**Student Note :** In the first reading, who is Mr. Praveen and who is Mr. Mohan cannot be captured properly. After a careful reading, I came to the conclusion that - Mr. Praveen is Finance Director of ABC Ltd. i.e. the service provider. Mr. Mohan seems to be the client of ABC Ltd. who wants to get the research work done from ABC Ltd.

Hint : ABC Ltd's Profit = Share in Surplus + Agreed Fees for the work

**If the actual cost of work performed amounted to ₹ 19,00,000**

**(i)** Cost Saving for the project = ₹ 20,00,000 – ₹ 19,00,000 = ₹ 1,00,000

**(ii)** ABC Ltd's Share in Surplus = ₹ 1,00,000 x 20% = ₹ 20,000

**(iii)** ABC Ltd's Total Profit = ₹ 20,000 + ₹ 1,40,000 = ₹ 1,60,000

**(iv)** Total Cost to Mr. Mohan for market research work = Actual cost of the project + Amount payable to ABC Ltd. = ₹ 19,00,000 + ₹ 1,60,000 = ₹ 20,60,000.

**If the actual cost of work performed amounted to ₹ 24,00,000**

**(v)** Cost overrun = ₹ 24,00,000 – ₹ 20,00,000 = ₹ 4,00,000

**(vi)** Mohan's burden = ₹ 4,00,000 x 80% = ₹ 3,20,000

**(vii)** ABC's burden = ₹ 4,00,000 x 20% = ₹ 80,000

**(viii)** Total Cost to Mr. Mohan for market research work = Actual cost of the project + Fees payable to ABC Ltd. - Burden borne by ABC Ltd. = ₹ 24,00,000 + ₹ 1,40,000 - ₹ 80,000 = ₹ 24,60,000

**Question 3 : [ 20 Marks ]**

Alpha and Beta are two divisions of the Active Multinational Ltd. (AML). The Division Alpha manufactures auto components which it sells to other divisions and external customers.

The Division Beta has designed a new product, Product BZ, and has asked Division Alpha to supply the auto component, Component AX, that is needed in the new product. Each unit of Product BZ will require one Component AX. The Component will not be sold by Division Alpha to external customers. Division Alpha has quoted a transfer price to Division Beta of ₹ 40 for each unit of Component AX.

It is the policy of the company to reward managers based on their individual division's return on capital employed.

Division Alpha produces the Component AX in batches of 1,000 units. The maximum capacity is 8,000 units per month. Variable cost amounts to ₹ 12 per unit. Fixed costs per month are ₹ 60,000 which is incurred specifically to produce Component AX.

Product BZ will be produced in batches of 1,000 units in Division Beta. The maximum customer demand is 8,000 units of Product BZ. Variable costs will be ₹ 8 per unit plus the cost of component AX. Fixed costs of ₹ 90,000 are to be incurred specifically to produce Product BZ.

The head of Division Beta has given the following forecast :

| Demand | Selling price per unit (₹) |
|---|---|
| 2,000 units | 120 |
| 4,000 units | 100 |
| 5,000 units | 90 |
| 6,000 units | 82 |
| 7,000 units | 70 |
| 8,000 units | 65 |

**Required :**

**(a)** CALCULATE, based on a transfer price of ₹ 40 per Component AX, the monthly profit that would be earned as a result of selling Product BZ by (Here the situation is governed by the actions of the manager of Division Beta) :

(i) Division Beta

(ii) Division Alpha

(iii) Company as a whole **(5 Marks)**

**(b)** FIND out the profit maximizing output from the sale of Product BZ for the Active Multinational Ltd. **(6 Marks)**

**(c)** CALCULATE, using the marginal cost of Component AX as the transfer price, the monthly profit that would be earned as a result of selling Product BZ by -

(i) Division Alpha

(ii) Division Beta

(iii) Company as a whole **(3 Marks)**

**(d)** The Operation Head of the company requires internal transfer between the divisions at marginal cost from the overall company's perspectives. If marginal cost is used as the transfer price, the manager of the Division Alpha will not be motivated as there will be no incentives to the division to transfer components internally.

What transfer pricing policy would you SUGGEST to help the company to overcome the conflict between optimum decision making and performance evaluation? **(6 Marks)**

**Answer 3 :**

**Student Note :** In the question, we are asked to calculate monthly **profit** and not contribution. Secondly, profit at which volume of output is not clearly mentioned. It means, we need to calculate profits at all the possible volumes of output for Alpha, Beta and AML.

However, ICAI answer seems to be inadequate and confusing. Hence, the answer presented below is a modified answer.

**(a) Monthly Profitability Statement based on Transfer Price of ₹ 40 :**

| Particulars | Demand for Product BZ (in units) | | | | | |
|---|---|---|---|---|---|---|
| | **2,000** | **4,000** | **5,000** | **6,000** | **7,000** | **8,000** |
| (a) Transfer price of AX | 40 | 40 | 40 | 40 | 40 | 40 |
| (b) Variable cost of AX | 12 | 12 | 12 | 12 | 12 | 12 |
| (c) Contribution p.u. of AX [ a - b ] | 28 | 28 | 28 | 28 | 28 | 29 |
| (d) Total contribution of Alpha [ Qty. x (c) ] (₹ '000) | 56 | 112 | 140 | 168 | 196 | 224 |
| (e) Fixed cost - Alpha (₹ '000) | 60 | 60 | 60 | 60 | 60 | 60 |
| (f) Profit / (Loss) to Alpha [ d - e ] (₹ '000) | (4) | 52 | 80 | 108 | 136 | 164 |
| (g) Selling price p.u. of BZ | 120 | 100 | 90 | 82 | 70 | 65 |
| (h) Variable cost p.u. of BZ [ 40 + 8 ] | 48 | 48 | 48 | 48 | 48 | 48 |
| (i) Contribution p.u. of BZ [ g - h ] | 72 | 52 | 42 | 34 | 22 | 17 |
| (j) Total contribution of Beta [ Qty. x (i) ] (₹ '000) | 144 | 208 | 210 | 204 | 154 | 136 |
| (k) Fixed cost - Beta (₹ '000) | 90 | 90 | 90 | 90 | 90 | 90 |
| (l) Profit / (Loss) to Beta [ j - k ] (₹ '000) | 54 | 118 | 120 | 114 | 64 | 46 |
| (m) Total Profit of AML [ f + l ] (₹ '000) | 50 | 170 | 200 | **222** | 200 | 210 |

**(b)** From the above working, it may be noticed that the total profit for Active Multinational Ltd. (AML) is maximum at an output of 6,000 units. Maximum profit is ₹ 2,22,000.

**(c) Monthly Profitability Statement based on Transfer Price of ₹ 12 i.e. Marginal cost :**

| Particulars | Demand for Product BZ (in units) | | | | | |
|---|---|---|---|---|---|---|
| | **2,000** | **4,000** | **5,000** | **6,000** | **7,000** | **8,000** |
| (a) Transfer price of AX | 12 | 12 | 12 | 12 | 12 | 12 |
| (b) Variable cost of AX | 12 | 12 | 12 | 12 | 12 | 12 |
| (c) Contribution p.u. of AX [ a - b ] | 0 | 0 | 0 | 0 | 0 | 0 |
| (d) Total contribution of Alpha [ Qty. x (c) ] (₹ '000) | 0 | 0 | 0 | 0 | 0 | 0 |
| (e) Fixed cost - Alpha (₹ '000) | 60 | 60 | 60 | 60 | 60 | 60 |

| | | | | | | |
|---|---|---|---|---|---|---|
| (f) Profit / (Loss) to Alpha [ d - e ] (₹ '000) | (60) | (60) | (60) | (60) | (60) | (60) |
| (g) Selling price p.u. of BZ | 120 | 100 | 90 | 82 | 70 | 65 |
| (h) Variable cost p.u. of BZ [ 12 + 8 ] | 20 | 20 | 20 | 20 | 20 | 20 |
| (i) Contribution p.u. of BZ [ g - h ] | 100 | 80 | 70 | 62 | 50 | 45 |
| (j) Total contribution of Beta [ Qty. x (i) ] (₹ '000) | 200 | 320 | 350 | 372 | 350 | 360 |
| (k) Fixed cost - Beta (₹ '000) | 90 | 90 | 90 | 90 | 90 | 90 |
| (l) Profit / (Loss) to Beta [ j - k ] (₹ '000) | 110 | 230 | 260 | 282 | 260 | 270 |
| (m) Total Profit of AML [ f + l ] (₹ '000) | 50 | 170 | 200 | **222** | 200 | 210 |

**Student Note :** Change in transfer price will affect the profitability of only individual divisions. However, the overall profitability of the organisation will remain same.

**(d)** Transfer at marginal cost is unsuitable for performance evaluation since they do not provide an incentive for the supplying division to transfer goods and services internally. This is because they do not contain a profit margin for the supplying division. Top Management's intervention may be necessary to instruct the supplying division to meet the receiving division's demand at the marginal cost of the transfers. Thus, divisional autonomy will be undermined. Transferring at cost plus a mark-up creates the opposite conflict. Here, the transfer price meets the performance evaluation requirement but will not induce managers to make optimal decisions. **To resolve the above conflicts the following transfer pricing methods have been suggested.**

**Dual Rate Transfer Pricing System**

The supplying division records transfer price by including a normal profit margin thereby showing reasonable revenue. The purchasing division records transfer price at marginal cost thereby recording purchases at minimum cost. This allows for better evaluation of each division's performance. It also improves co-operation between divisions, promoting goal congruence and reduction of sub-optimization of resources.

**Two Part Transfer Pricing System**

This pricing system is again aimed at resolving problems related to distortions caused by the full cost based transfer price. Here,

Transfer price = Marginal cost of production + a lump-sum charge (two part to pricing)

While marginal cost ensures recovery of additional cost of production related to the goods transferred, lump-sum charge enables the recovery of some portion of the fixed cost of the supplying division. Therefore, while the supplying division can show better profitability, the purchasing division can purchase the goods at lower rate compared to the market place.

**Question 4(a) : [ 10 Marks ]**

Sri Manufacturers Ltd. manufactures a single product. Standard cost per unit is as follows :

| **Particulars** | | **₹** |
|---|---|---|
| Materials | 12 kgs x ₹ 5 per kg. | 60 |
| Labour | 10 hrs x ₹ 7 per hour | 70 |
| Variable Overheads | 10 hrs x ₹ 3 per hour | 30 |
| Fixed Overheads | 10 hrs x ₹ 3 per hour | 30 |
| Profit | | 60 |
| Selling Price | | 250 |

Overheads are allocated on the basis of direct labour hours. In the month of March 2020, there was no difference between the budgeted and actual selling price and there was no opening and closing stock during the period.

The other details for the month of March 2020 are as under :

| **Particulars** | **Budgeted** | **Actual** |
|---|---|---|
| Sales | 2,500 units | 2,000 units |
| Direct Materials | 30,000 kgs @ 5 per kg. | 30,000 kgs @ 5 per kg |
| Direct Labour | 25,000 hrs @ ₹ 7 per hour | 22,500 hrs @ ₹ 7 per hour |
| Variable Overheads | ₹ 75,000 | ₹ 67,500 |
| Fixed Overheads | ₹ 75,000 | ₹ 75,000 |

**Required :**

RECONCILE the budgeted and actual profit with the help of variances according to each of the following methods :

(i) The conventional method **(3 Marks)**

(ii) The relevant cost method assuming that -

(a) Materials are scarce and are restricted to supply of 30,000 kgs for the period. **(3 Marks)**

(b) Labour hours are limited and available hours are only 25,000 hours for the period. **(4 Marks)**

**Answer 4(a) :**

**Student Note :** Conventional method means, absorption costing method and relevant cost method means, marginal costing method of reconciliation of variances.

Sales price per unit, Material price per kg, Labour rate per hour and Variable OH rate per hour are same for Budget & Actual. Hence, we will get NIL variance for Sales Price, Material Price, Labour Rate and Variable OH Expenditure variance. Hence, it is not calculated by ICAI.

Budgeted Fixed OH and Actual Fixed OH is same, hence Fixed OH Expenditure variance is NIL.

For scarce resources, we need to calculate opportunity cost i.e. loss of contribution as a variance.

**Computation of Variances :**

**Material Usage Variance**

= Standard Price x ( Standard Quantity – Actual Quantity )

= ₹ 5.00 x ( 24,000* Kgs. – 30,000 Kgs.)

= **₹ 30,000 (A)**

$$\left[2{,}000 \text{ units} \times \frac{30{,}000 \text{ kgs.}}{2{,}500 \text{ units}}\right]$$

**Labour Efficiency Variance**

= Standard Rate x ( Standard Hours – Actual Hours )

= ₹ 7.00 x ( 20,000* hrs. – 22,500 hrs.)

= **₹ 17,500 (A)**

$$\left[2{,}000 \text{ units} \times \frac{25{,}000 \text{ hrs.}}{2{,}500 \text{ units}}\right]$$

**Variable Overhead Efficiency Variance**

= SRR/hr. x ( Standard Hours – Actual Hours )

= ( ₹ 75,000 / 25,000 hrs. ) x ( 20,000 hrs. – 22,500 hrs.)

= **₹ 7,500 (A)**

**Fixed Overhead Volume Variance**

= SRR/unit x ( Budgeted Output – Actual Output )

= ( ₹ 75,000 / 2,500 units ) x ( 2,500 units – 2,000 units )

= **₹ 15,000 (A) -** it is for absorption costing method only

**Sales Margin Volume Variance (i.e. Profit volume variance)**

= Std. Profit per unit x ( Budgeted Output – Actual Output )

= ₹ 60 x ( 2,500 units – 2,000 units )

= **₹ 30,000 (A) -** it is for absorption costing method

**Sales Contribution Volume Variance (i.e. Contribution volume variance)**

= Std. Contribution per unit x ( Budgeted Output – Actual Output )

= ₹ 90 x ( 2,500 units – 2,000 units )

= **₹ 45,000 (A) -** it is for marginal costing method

**Notes :**

**Scarce Material**

Based on conventional method, direct material usage variance is ₹ 30,000 (A) i.e. 6,000 kg x ₹ 5. In the situation where material is scarce, material usage variance should also include contribution lost per unit of material. Excess usage of 6,000 kg. leads to loss of contribution of ₹ 45,000 i.e. 6,000 kgs x ₹ 7.5 per kg. (i.e. ₹ 90 / 12 kg.). Total material usage variance based on relevant cost method, when material is scarce will be : ₹ 30,000 (A) + ₹ 45,000 (A) = ₹ 75,000 (A). Since labour is not scarce, labour variances are identical to conventional method.

One unit requires 12 kgs. of raw material, hence excess usage of 6,000 kgs. leads to loss of 500 units (i.e. 6,000 kg. / 12 kg.). On these 500 units, we lost an opportunity to earn ₹ 45,000 (500 units x ₹ 90). It is not the function of the sales manager to use material efficiently. Hence, loss of contribution from 500 units should be excluded while computing sales contribution volume variance.

Therefore, sales contribution volume variance, when materials are scarce will be NIL. i.e. ₹ 45,000 (A) - ₹ 45,000 (A).

**Scarce Labour**

In conventional method, excess labour hours used are : 20,000 hrs. – 22,500 hrs. = 2,500 hrs. However, one unit requires 10 hrs. and hence, contribution lost per hour = ₹90/10 hrs. = ₹ 9 per hour. Therefore, total contribution lost, when labour is scarce will be 2,500 hrs. x ₹ 9 = ₹ 22,500. Therefore, total labour efficiency variance, when labour hours are scarce will be = ₹ 17,500 (A) + ₹ 22,500 (A) = ₹ 40,000 (A).

Excess usage of 2,500 hrs. leads to loss of 250 units (2,500 hrs. / 10 hrs. per unit). Hence, loss of contribution shall be ₹ 22,500 (i.e. 250 units x ₹ 90 per unit). It is not the function of the sales manager to use labour hours efficiently. Hence, loss of contribution from 250 units should be excluded while computing sales contribution volume Variance.

Therefore, sales contribution volume variance, when labour hours are scarce will be ₹ 45,000 (A) - ₹ 22,500 (A) = ₹ 22,500 (A).

**Fixed Overhead Volume Variance**

Fixed overhead volume variance does not arise in marginal costing system. In absorption costing system, it represents the value of the under or over absorbed fixed overheads due to change in production volume. When marginal costing is in use, there is no fixed overhead volume variance, because marginal costing does not absorb fixed overheads.

**Based on the above discussion and calculations, we can prepare reconciliation statement as follows :**

**Statement Showing "Reconciliation between Budgeted Profit & Actual Profit"**

| Particulars | Conventional Method (₹) | Relevant Cost Method (₹) | |
|---|---|---|---|
| | | Scarce Material | Scarce Labour |
| Budgeted Profit (2,500 units x ₹ 60) | 1,50,000 | 1,50,000 | 1,50,000 |
| Profit / Contribution Volume Variance | 30,000 (A) | NIL | 22,500 (A) |
| Material Usage Variance | 30,000 (A) | 75,000 (A) | 30,000 (A) |
| Labour Efficiency Variance | 17,500 (A) | 17,500 (A) | 40,000 (A) |
| Variable Overhead Efficiency Variance | 7,500 (A) | 7,500 (A) | 7,500 (A) |
| Fixed Overhead Volume Variance | 15,000 (A) | N.A. | N.A. |
| **Actual Profit** | **50,000** | **50,000** | **50,000** |

**Question 4(b) : [ 5 Marks ]**

The Business Digest, a fortnight business magazine, in its recent release has published an article titled "Why you can safely ignore Six Sigma". This was highly critical of Six Sigma. The pointed criticism levelled under five sequentially numbered paras which are listed herein below :

(i) The results often don't have any noticeable impact on company financial statements. Thus, Six Sigma success doesn't assure you the higher stock values. This is true for 90 percent of companies that implement Six Sigma.

(ii) Only early adopters can benefit from the implementation of Six Sigma.

(iii) Six Sigma focuses on defects which are subjective to determine for service business.

(iv) Six Sigma can't assure that your product will have market.

(v) Substantial infrastructure investment is required.

How would you RESPOND to these statements? **(5 Marks)**

**Answer 4(b) :**

**(i)** **Response to first criticism** – Six Sigma is a part of lean system hence require commitment of top-management, implementation with high motivation among employees and continuous efforts with reasonable patience for reasonable duration. In absence of these, despite implementing Six Sigma; many companies do not witness the expected impact on the financial statements of the company.

In short run it may possible that a company who successfully implemented Six Sigma may not be getting directly visible financial advantage, **but in long run it will.**

Moreover, stock value is not the sole feature of the quality of product manufactured; it is impacted by other factors too. **Hence, I disagree with the author.**

**(ii)** **Response to second criticism** - No doubt early adopter has more benefit from implementation of Six Sigma, on the principle of first mover advantage. But more important is not when organisation started, it is **how long and efficiently it practice** the Six Sigma, longer the duration – larger the benefit. **Hence, I disagree with the author.**

**(iii)** **Response to third criticism** – Due to inherent nature of service business, subjectivity is high and it is hard to objectively determine the defect. But this problem is not only with Six Sigma, it is with all performance measurement methods for service industry. Further each professional has its own style of working; hence subjectivity also arises in determination and classification among errors and mistakes. But use of certain other tools (value shop model etc.) in association with Six-Sigma may reduce subjectivity to avoid pitfalls. **Hence, partially agree but not completely agree with the author.**

**(iv)** **Response to fourth criticism** – Product comprises two element **features** and **quality** of such feature. No doubt if customer do not like the product due to features then Six Sigma will not help. But if there is an issue with the quality (be it conformance or reliability) of the feature then Six Sigma can be really game-changer for the organisation; and capable to build the market for product, by attracting the customer (value chain analysis may be great help). Six Sigma or Lean Six Sigma is customer-oriented and intended to deliver value to the customer. If a customer is satisfied, then the product will surely have a place in the market. **Hence, completely disagree with the author.**

**(v) Response to fifth criticism** – No doubt substantial infrastructure investment is required both of monetary and non-monetary in nature. But Six Sigma is capable to yield the corresponding significant benefits. Why one company is able to create value, whereas another could not, is an issue with implementation and not with the technique. Hence, Six Sigma is **capable to pay-off the substantial investment.** An extensive cost benefit analysis can be useful prior to decision of six sigma implementation. **Statement in itself is true, but not a valid argument to safely ignore Six Sigma.**

**Student Notes :**

- Conceptually correct and **brief explanation** is sufficient for each point.
- Alternative reasoning is also possible.

**Question 4(c) : [ 5 Marks ]**

Bharat Heavy Machinery Ltd produces engines for the cars. Variable cost per engine is ₹ 4,200. Market research has indicated that at a selling price of ₹ 7,400, no order will be received, but the demand for the engines will be increased by two units for every ₹ 400 reduction in the unit selling price below 7,400.

You are required to DETERMINE the unit selling price per engine that will maximize the profit of the company.

**OR**

DISCUSS the connection between the Total Quality Management and Total Productive Maintenance. **(5 Marks)**

**Answer 4(c) :**

| | |
|---|---|
| P | = a – bQ |
| | = 7,400 – (400/2) x Q = 7,400 - 200Q |
| Marginal Revenue (MR) | = a – 2bQ |
| | = 7,400 – 2 x (400/2) x Q |
| | = 7,400 – 400 Q |
| Marginal Cost (MC) | = 4,200 |

Profit is Maximum where Marginal Revenue (MR) equals to Marginal Cost (MC)

| | |
|---|---|
| 7,400 – 400 Q | = 4,200 |
| Q | = **8 units** |

By Putting the Value of 'Q' in Price Equation, Value of 'P' is obtained.

| | |
|---|---|
| P | = 7,400 – 200Q |
| | = 7,400 – (200 x 8 units) |
| | **= ₹ 5,800** |

At Selling Price of ₹ 5,800 Profit will be Maximum.

**OR**

**Discussion -** The aim of both TQM and TPM are to improve the efficiency of resources (man / machine) which can only be attained by minimising waste through total employee involvement and providing quality service to customers. **TPM is maintenance approach** while TQM is total **quality control.** Employee empowerment is a tool used in TQM implementation, while TPM uses optimisation. The connection between TQM and TPM are summarized below :

- TQM and TPM make company more competitive by reducing costs, improving customer satisfactions and slashing lead times.
- Involvement of the workers into all phases of TQM and TPM is necessary.
- Both processes need fundamental training and education of participants.
- TPM and TQM take long time to notice sustained tangible benefits.
- Commitment from top managements is necessary for success of the implementation of TQM & TPM.

**Question 5(a) : [ 10 Marks ]**

(i) Based on the following data CALCULATE 'Overall Equipment Effectiveness :

| **Particulars** | **Data** |
|---|---|
| Shift length | 9 hours |
| Short breaks | 3 of 10 minutes each |
| Meals break | 45 min. |
| Equipment down time | 30 min. |
| No. of parts produced (Standard) | 30 per min. |
| Total units produced per shift | 12,240 |
| Rejected units out of the above | 240 |

**(5 Marks)**

(ii) (A) Based on the answer derived from the above can you DEMONSTRATE that the machine is working at world class performance as suggested by 'Nakajima' ideal values for the 'OEE'. **(2 Marks)**

(B) 'OEE is an aggregate measure. Its components will compensate for each other or, on the contrary, will aggravate a falling situation and attract further attention to it". EXPLAIN **(3 Marks)**

**Answer 5(a) :**

(i) Seiichi Nakajima led the introduction of TPM, OEE and the Six Big Losses in the early 1970s while at the Japanese Institute of Plant Maintenance. OEE is a quantitative metric for measuring productivity of individual equipment in a manufacturing plant. OEE identifies and measures losses of crucial parts in a manufacturing process namely availability rate, performance rate and quality rate.

**OEE = Availability x Performance x Quality**

**OEE Factors are calculated as follows –**

**Calculation of Available time, Production time and Actual operating time per shift :**

| Particulars | Minutes/shift |
|---|---|
| Total available time per shift ( 9 hours x 60 min. ) | 540 |
| Less : Planned Downtime :<br>Short breaks ( 3 x 10 min. )<br>Meals break | <br>30<br>45 |
| ∴ Planned production time per shift | 465 |
| Less : Unplanned Downtime :<br>Equipment downtime | <br>30 |
| ∴ Actual operating time available per shift | 435 |
| Standard time for actual output ( 12,240 units / 30 unit per min.) | 408 |

**Availability Ratio :**

= Actual operating time available x 100
Planned production time

= 435 min. x 100
465 min.

= 93.55%

**Performance Ratio (i.e. Efficiency Ratio) :**

= Standard time required for actual output x 100
Actual time taken for actual output

= 408 min. x 100
435 min.

= 93.79%

**Quality Ratio :**

= Number of units accepted x 100
Total No. of units produced

$$= \left\{ \frac{12{,}240 \text{ units} - 240 \text{ units}}{12{,}240 \text{ units}} \times 100 \right\}$$

= 98.04%

**OEE = 93.55% x 93.79% x 98.04% = 86.02%**

**(ii)** **(A)** The suggested ideal values for the OEE component measures are :

| | |
|---|---|
| Availability | > 90% |
| Performance | > 95% |
| Quality | > 99% |

Accordingly, OEE at World Class Performance would be approximately 85%.

In the instant case OEE is **86.02%**, which is beyond the ideal rate of 85% suggested by Seiichi Nakajima. Availability, Performance, and Quality rate is 93.55%, 93.79%, and 98.04% respectively against the ideal rate of 90%, 95% and 99% respectively. Hence, considering OEE only (rather its individual components) it can be said that machine demonstrates the world class performance. Both performance and quality rate are **slightly lower** than the ideal rate (world class performance), whereas availability rate is beyond the ideal rate to help the OEE to stand beyond ideal rate of 85%.

**(iii)** **(B)** Yes, OEE is an aggregate measure of productivity; comprising the sub-metrics (components) of Availability, Performance and Quality.

When the sub-metrics (components) are multiplied by each other, the resulting OEE number may end up hiding the areas that have the most problems, because these sub-metrics (components) compensate for each other. For example, low quality may be compensated by high availability and performance**.** OEE has another limitation being aggregate measure, it assumes that each of the sub-metrics have equal importance.

OEE can be directly calculated as = Std. time for good units / Planned production time
= ( 12,000 units / 30 ) / 465 min. x 100
= 400 min. / 465 min. x 100 = 86.02%

Here is worth noting that calculation of OEE involves multiplication of sub-metrics of Availability. Performance and Quality, which aggravate a falling situation and attract further attention to it.

For example, if all the sub-metrics has rate of 85% then OEE will be only 61.41%, and if all the sub-metrics has rate of 90% then OEE will be 72.90%.

As an aggregate quantitative metric OEE can mislead by hiding underlying issues, instead of clarifying areas for improvement, hence in-depth study of each sub-metrics is essential.

**Question 5(b) : [ 10 Marks ]**

Mr. Benn, oversees the diverse operations of Bennsys, a large multinational company by using a much decentralized management structure. According to its 2019 annual report, Bennsys had 1,25,000 employees and earned over $100 billion in revenue. Mr. Benn managed this empire from his headquarters in London, that consists of 20 employees and occupies only 10,000 square feet, although the company's vice-chairman, Simon, who works out of London, occupies another 600 square feet.

The total payroll, including benefits of both locations was only just above $2 million in 2019. Mr. Benn was invited as the chief guest in a business summit organized at New Delhi during March, 2020. Asked about how an organization of that magnitude could be managed with such a small

resources as to space and manpower. Mr. Benn's own description about his and Mr. Simon's management style is, "we delegate almost to the point of abdication (renouncing everything)." An exaggeration perhaps, but clearly a decentralized style and he and his deputy are the stable believers of FOUR recognized levels of decentralization.

In the context of responsibility accounting, DISCUSS the levels of decentralization which Mr. Benn was referring to and do you concede to the view that Mr. Benn is exaggerating the success of his Divisional organization structure.

**Answer 5(b) :**

In a business context, d**ecentralisation** is the delegation of decision-making authority to smaller local units at lower levels of the organisation. This takes some control away from the hub and will often result in an upward flow of information – the opposite of what happens in a centralised organisation. An organisation with divisional structure has various divisions operating autonomously as business under a broad corporate framework according to geographical areas, markets or products and services. Thereby limiting the centralized monitoring and scrutinizing of each and every element of functioning. This would spare the top management from deploying time and efforts by sitting on the top at gigantic corporate offices. 'Bennsys' is a good example of decentralised business. Mr. Benn is managing a staff of over 1,25,000 persons which is earning revenue over $100 billion in revenue with small resources.

**Responsibility accounting** is apt where top management has a willingness to delegate the authority to make decisions. The idea behind the responsibility accounting is that each manager's performance should be judged by how well he or she manages those items under his or her control. There are four recognised levels of decentralisation in the context of responsibility accounting which Mr. Benn was referring to and are detailed below :

**Revenue Centre** managers are having control over the generation of revenue from operation with no responsibility for costs.

**Cost Centre** managers exercise control over costs but not revenue and investments. Their responsibility is to minimize the cost of producing a specified level of output or the cost of providing a specified level of service. The objective of cost centre managers is to improve the efficiency of operations by finding ways to cut costs and minimize waste.

**Profit Centre** managers are having focus on profit. Their goal is to both maximize revenues and to minimize costs.

Managers of **Investment Centre** make decisions that influence costs, revenues, and investments. Their responsibility is to maximize the returns from invested capital, or to put the capital invested by owners and shareholders of their organizations to the best profitable use.

Organizations vary considerably in the **extent to which they decentralize** because decisions about whether and how much to decentralize involve numerous costs and benefits. Moreover, the scale of these costs and benefits depends on specific facts. A major chunk of top management's responsibility is to find out how to maximize the benefits and minimize the costs associated with decentralization. An organisation can increase benefits by carefully identifying the decisions under each manager's purview, matching the scope of decisions with the manager's skills and knowledge. It can also help lower-level managers in understanding the firm's values, goals, and strategy. Mr. Benn clearly expressed the management style that has focus on abdication. Abdication, like delegation, involves allocating duties and responsibilities to a team – but without the measuring and managing part. It sounds reasonable to believe that Mr. Benn's style of functioning leads to the decentralization of decision-making process wherein the divisional heads are free to set selling prices, choose which markets to tap in, make product mix and output decisions and select suppliers.

If decentralized business model is ideally crafted to suit the desired style of functioning, how voluminous the organisation be, could be well managed by the top management by occupying reasonably small space with very minimum number of employees and act on the basis of management by exception.

**Question 6(a) : [ 10 Marks ]**

Modem Packaging Corporation specialised in the manufacturing of one litre plastic bottles. The firm has four moulding machines, each capable of producing 100 bottles per hour. The firm estimates that the variable cost of producing a plastic bottle is ₹ 20. The bottles are sold ₹ 50 each.

Management has been approached by a local toy company that would like the firm to produce a moulded plastic toy for them. The toy company is willing to pay ₹ 300 per unit for the toy. The variable cost to manufacture the toy will be ₹ 240. In addition, Modem Packaging Corporation would have to incur a cost of ₹ 20,00,000 to construct the needed mould exclusively for this order. Because of more intricate shape of the toy, a moulding machine can produce only 40 units per hour. The customer wants 1,00,000 units. Assume that total capacity of all the four machines combined is 10,000 machine hours available during the period in which the toy company wants the delivery of toys.

The firm's fixed cost, excluding the cost-to-construct the toy mould, during the same period will be ₹ 2,00,00,000.

**Required :**

(i) If the management predicts that the demand for its bottles will require the use of 7,500 machine hours or less during the period, should be special order be accepted? Give reasons. **(3 Marks)**

(ii) If the management predicts that the demand for its bottles will be higher than its ability to produce bottles, should the order be accepted? Why? **(2 Marks)**

(iii) If the management has located a firm that has just entered the moulded plastic business. This firm has considerable excess capacity and more efficient moulding machines and is willing to subcontract the toy job, or any portion of it for ₹ 280 per unit. It will construct its own toy mould.

DETERMINE Modem Packaging Corporation's minimum expected excess machine hour capacity needed to justify producing any portion of the order itself rather than subcontracting it entirely. **(5 Marks)**

**Answer 6(a) :**

**Workings : Statement showing "Contribution / Machine Hour"**

| **Particulars** | **'Bottle'** | **'Toy'** |
|---|---|---|
| Sales price (₹ /unit) | 50 | 300 |
| Less: Variable Cost (₹ /unit) | 20 | 240 |
| Less: Specific cost of mould (₹ /unit) | - | *20 |
| **∴ Contribution (₹ /unit)** | **30** | **40** |
| Output per machine hour | 100 units | 40 units |
| **∴ Contribution / Machine Hour** | **3,000** | **1,600** |

***** ( ₹ 20,00,000 / 1,00,000 units ) = ₹ 20 per unit

**(i)** To produce 1,00,000 toys, we will need 2,500 hours (i.e. 1,00,000 / 40). Modem Packaging Corporation can accept plastic moulded toy's order as sufficient number of hrs. i.e. 2,500 hrs. (10,000 hrs. – 7,500 hrs.) are available and would be able to generate additional benefit of ₹ 40 per unit on 1,00,000 units of toys i.e. ₹ 40,00,000.

**(ii)** If the demand for bottle is higher, then more hrs. will be required to produce the additional bottles. Modem Packaging has to decide whether to utilize 2,500 hrs. for bottles or for toy Order.

Machine time becomes a limiting factor. Therefore, contribution per machine hour from both the activities (i.e. bottles and toys) should be calculated to decide whether the order should be accepted or not. Contribution per machine hour is higher in case of bottles (refer workings). Therefore, Modem Packaging should utilize the remaining 2,500 hours for manufacturing bottles rather than to fulfil the order for supply of toys.

**(iii)** To compare own manufacture versus subcontract the manufacture of toys, we need to compare incremental cost of both the options. Let's assume the no. of toys as 'X' at which the incremental cost of manufacture and subcontract will be same.

Incremental cost of manufacture = Incremental cost of subcontract

240X + 20,00,000 = 280X

20,00,000 = 280X - 240X

Hence, X = 50,000 toys

Thus as long as company has excess capacity available to manufacture more than **50,000 toys** it is cheaper **to produce** than to buy from subcontractor.

Minimum Excess Machine Hour Capacity needed to justify production = $\left[\begin{array}{c} 50{,}000 \text{ toys} \\ \hline 40 \text{ toys/hr.} \end{array}\right]$

**= 1,250 hours**

**Question 6(b) : [ 10 Marks ]**

(i) "Correct balance must be established when budgeted performance is evaluated otherwise it may lead to a feeling that performance appraisal was unjust".

In furtherance of the above object, three distinct styles, namely Budget Constrained Style, Profit Conscious Style and Non-Accounting Style have been observed for using budget and actual cost information in performance evaluation of a manufacturing division. EXPLAIN each of these styles. **(3 Marks)**

(ii) In K Automotive Ltd., an automobile manufacturer, there is a sudden breakdown of one important machine which would delay the shipment of an important order and required to spend more than the repair budget allocation. ANALYZE the likely behavioural aspects of respective departmental heads in this situation under -

(A) Budget Constrained Style

(B) Profit Conscious Style **(2 Marks)**

(iii) Summarize the effects of the given three styles of management in the below matrix in Table B by putting a suitably coined word given in Table A for each of the specified activity.

**Table A**

| | | | | | | |
|---|---|---|---|---|---|---|
| High | Medium | Low | Extensive | Little | Good | Poor |

**Table B**

| Activity | Style of Evaluation | | |
|---|---|---|---|
| | Budget Constrained | Profit Conscious | Non-Accounting |
| Involvement with Costs | | | |
| Job related tension | | | |
| Manipulation of Accounting information | | | |
| Relation with superiors | | | |
| Relation with Colleagues | | | |

**(5 Marks)**

**Answer 6(b) :**

**(i)** Yes, correct balance must be established when budgeted performance is evaluated otherwise it may lead to a feeling that performance appraisal was unjust; due to behavioural aspects of budgeting. Hofstede (1968) found that stress on the actual results in performance evaluation led to more extensive use of budgetary information, and this made the budget more relevant. However, this stress was associated with a feeling that the performance appraisal was unjust. To overcome this problem, the correct balance must be established when the budgeted performance is evaluated.

Anthony George Hopwood carried out research into the manufacturing division of a US steelworks, wherein he studied more than 200 managers with cost centre responsibility in year 1973. A G Hopwood identified three distinct styles of using budgetary information to evaluate management performance, which he expressed in a book 'An Accounting System and Managerial Behaviour'.

**Budget constrained style –** under this style, performance of manager who is responsible for cost centre shall be evaluated **based on ability to achieve budget in the short term.** Hence behaviour problems like short-term decision making at the expense of long-term gain, manipulation of data, and poor working relations with colleagues etc. may emerge.

**Profit conscious style** – under this style, performance of manager who is responsible for cost centre is evaluated **based upon their ability to increase the long-term effectiveness of their division**. Here budget is considered as guidelines rather a strict target hence one cannot say budgets are ignored but can say budgets are interpreted flexibly. This style led to better working relations and little manipulation of accounting information due to less or moderate job-related pressure.

**Non Accounting style** – under this style, performance of a manager is evaluated mainly on non-accounting performance indicators such as quality and customer satisfaction. Hence, budget and budgetary information does not play a substantial or important role in evaluation.

**(ii)** Behavioural problems are often linked to different management styles; budgeting is not an exception.

(A) Under **budget constrained style,** since the performance of a manager of cost centre shall be evaluated on ability to achieve budget in the short term, hence manager will be criticised in case if spending exceeds the set limit. In such case, managerial behaviour is oriented towards short-term decision making at the expense of long-term gain. Hence, in order to keep expenses within the budgeted limits, departmental head is likely to take a decision of **'not spending more than the repair budget allocated'**.

(B) Under **profit conscious style,** since the performance of a manager of cost centre shall be evaluated based upon their ability to increase the long-term effectiveness of their division, hence a manager will be prepared to exceed the budgetary limit in the short term if this will result in an increase in long term profit. In such case, managerial behaviour is oriented towards long term effectiveness. Hence, departmental head is not hesitated to spend beyond the set budgeted limit to enable the organisation to meet customer requirements. Here manager is likely to take decision of **'spending more than the repair budget allocated'** so that delay of shipment of an important order can be avoided.

**(iii) Table-B :**

| **Activity** | **Style of Evaluation** | | |
|---|---|---|---|
| | **Budget Constrained** | **Profit Conscious** | **Non-Accounting** |
| Involvement with Costs | High | High | Low |
| Job related tension | High | Medium | Medium |
| Manipulation of Accounting information | Extensive | Little | Little |
| Relation with Superiors | Poor | Good | Good |
| Relation with Colleagues | Poor | Good | Good |

* * * * *

## Mock Test Papers (MTP)

During 1st May, 2020 to 30th April, 2021, ICAI uploaded only Two Mock Test Paper with Solutions on its website. It is titled as May, 2020 Test Series and October, 2020 Test Series.

However, after going through all the questions in the above mock test paper, I noticed that - most of the questions were borrowed either from Module or RTP or Exam Papers. There were only few new questions in it. Hence, to avoid the duplication of work, I have excluded the repeat questions and included only new questions with answers here.

My general observation based on past experience is that the Mock Test Papers contain repeat questions and not the new questions. It is also observed that ICAI withdraws these Mock Test Papers from website, after some time.

### Summary of May, 2020 Mock Test Paper

| MTP Q. No. | Reference of similar Question from our classroom notes |
|---|---|
| 1 | Q.8 - Page 84 - Chapter 3 - Volume I - Version 3 Notes<br>[ Earlier Name : ASPL ] |
| 2 | Q.6 - Page 113 - Chapter 4 - Volume I - Version 3 Notes<br>[ Earlier Name : Storewell Industries Ltd. ] |
| 3 | Q.2 - Page 6 - Chapter 8 - Volume II - Version 3 Notes<br>[ Earlier Name : BYD Alloy Ltd. ] |
| 4(a) | Q.56 - Page 195 - Chapter 6 - Volume I - Version 3 Notes<br>[ Earlier Name : Same] |
| 4(b) | Q.4(b)–Nov. 2019 Exam – Amendment Batch 3 Notes – Page 41<br>[ Earlier Name : Automation Ltd. ] |
| 4(c) | Q.8 - Page 118 - Chapter 10 - Volume II - Version 3 Notes<br>[ Earlier Name : XYZ Electronics Ltd. ] |
| 5(a) | Q.17 - Page 157 - Chapter 6 - Volume I - Version 3 Notes<br>[ Earlier Name : ABC Ltd. ] – Similar with figures changed |
| 5(b) | Q.7–RTP Nov. 2020 Exam.<br>[ Earlier Name : Same Name i.e. ZM Inc. ] |
| 6(a) | It is a New Question –It is covered below with answer |
| 6(b) | Q.1 - Page 132 - Chapter 11 - Volume III - Version 3 Notes<br>[ Earlier Name : SPM ] |

**Question 6(a) :**

**[ Topic : Cost of Quality – Chapter 2 ]**

The CEO of P Limited is concerned with the amounts of resources currently spent on customers warranty claims. Each box of its product is printed with the logo : "satisfaction guaranteed or your money back". P is having difficulty competing with X Limited because it does not have the reputation for high quality that X Limited enjoys. Since the warranty claims are so high, the CEO of P Limited would like to assess what costs are being incurred to ensure the quality of the product. Following information is collected from various departments within the company relating to 2018-19 :

| **Particulars** | **Rs.** |
|---|---|
| Warranty claims | 4,25,000 |
| Employee training costs | 1,20,000 |
| Rework | 3,00,000 |
| Lost profits from lost customers due to impaired reputation | 8,10,000 |
| Cost of rejected units | 50,000 |
| Sales return processing | 1,75,000 |
| Testing | 1,70,000 |

For the year 2019-20, the CEO is considering spending the following amounts on a new quality programme :

| **Particulars** | **Rs.** |
|---|---|
| Inspect raw material | 1,20,000 |
| Reengineer the production process to improve product quality | 7,50,000 |
| Supplier screening and certification | 30,000 |
| Preventive maintenance on plant equipment | 70,000 |

P expects the new quality programme to save costs by the following amounts :

| **Particulars** | **Rs.** |
|---|---|
| Reduction in lost profits from lost sales due to impaired reputation | 8,00,000 |
| Reduction in rework costs | 2,50,000 |
| Reduction in warranty costs | 3,25,000 |
| Reduction in sales return processing | 1,50,000 |

**Required :**

(i) Prepare a Cost of Quality Statement for the year 2018-19 showing the percentage of the total costs of quality incurred in each cost category. [ 3 Marks ]

(ii) Prepare a cost benefit analysis of the new quality programme showing how the quality initiative will affect each cost category. [ 3 Marks ]

(iii) State how the manager trade-off among the four categories of quality costs. [ 4 Marks ]

**Solution 6(a) :**

**(i) Cost of Quality Statement for 2018-19 :**

| Particulars | Rs. | % of total cost |
|---|---|---|
| **Prevention Cost :** | | |
| Employee training costs | 1,20,000 | 5.85% |
| **Appraisal Cost :** | | |
| Testing | 1,70,000 | 8.29% |
| **Internal Failure Cost :** | | |
| Rework | 3,00,000 | |
| Cost of rejected units | 50,000 | |
| Sub-total | 3,50,000 | 17.08% |
| **External Failure Cost :** | | |
| Warranty claims | 4,25,000 | |
| Lost profits from lost customers due to impaired reputation | 8,10,000 | |
| Sales return processing | 1,75,000 | |
| Sub-total | 14,10,000 | 68.78% |
| **Total Cost of Quality** | **20,50,000** | **100%** |

**(ii) Cost Benefit Analysis for 2019-20 :**

| Particulars | Addl. (Cost) / Savings | Net Effect (₹) |
|---|---|---|
| **Prevention Cost :** | | |
| Reengineer the production process to improve product quality | (7,50,000) | |
| Supplier screening and certification | (30,000) | |
| Preventive maintenance on plant equipment | (70,000) | (8,50,000) |
| **Appraisal Cost :** | | |
| Inspect raw material | (1,20,000) | (1,20,000) |
| **Internal Failure Cost :** | | |
| Reduction in rework costs | 2,50,000 | 2,50,000 |
| **External Failure Cost :** | | |
| Reduction in lost profits from lost sales due to impaired reputation | 8,00,000 | |
| Reduction in warranty costs | 3,25,000 | |
| Reduction in sales return processing | 1,50,000 | 12,75,000 |
| **Net Savings from new quality programme** | | **5,55,000** |

**(iii) Managers Trade off :**

Investment in prevention costs and appraisal costs (also known as costs of good quality), reduces internal and external failure costs (also known as cost of poor quality).

Costs incurred before actual production begins, to prevent defects and other product quality issues, are known as preventive costs. In the given example, reengineering production process, screening and certification of suppliers and preventive maintenance of equipment are prevention cots. Likewise, appraisal costs are incurred to ensure that activities conform to desired quality requirements. They are incurred in all stages of production. In the given example, inspection of raw material is an appraisal cost.

Trade off means cost-benefit analysis. A manager has to see how much extra cost he has to incur on Prevention and Appraisal and the resultant savings in Internal and External Failure costs. If the incremental benefit is more than the incremental costs, then it is advisable to implement the new proposal.

In the above example, the extra cost incurred on Prevention is Rs. 8,50,000 and extra cost incurred on Appraisal is Rs. 1,20,000. However, it has resulted in a saving of Rs. 2,50,000 in Internal Failure cost and a savings of Rs. 12,75,000 in the External Failure cost. Thus the net saving due to new quality programme is Rs. 5,55,000.

Hence, it is advisable to implement the new quality programme.



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## Summary of October, 2020 Mock Test Paper

| MTP Q. No. | Reference of similar / same Question from our classroom notes |
|---|---|
| 1 | Q.7 - Page 11 - Chapter 2 - Volume III - Version 3 Notes<br>[ Earlier Name : Sun Electronics ] |
| 2 | Q.2 - Page 113 - Amendment Batch 3 Notes<br>[ Earlier Name : X Technologies Ltd. ] |
| 3 | It is a New Question. It is covered below with answer |
| 4(a)(i) | It is a New Question. It is covered below with answer |
| 4(a)(ii) | Q.56 - Page 195 - Chapter 6 - Volume I - Version 3 Notes<br>[ Earlier Name : 'S' manages school canteen ]<br>Optional Question<br>Q.9. - Covered in RTP - Nov. 2020 - Olderhelp India |
| 4(b) | Q.21 - Page 103 - Chapter 2 - Volume I - Version 3 Notes<br>[ Earlier Name : ABC miners ] |
| 5(a) | Q.10 - Page 36 - Chapter 6 - Volume I - Version 3 Notes<br>[ Earlier Name : Livewell Ltd. ] |
| 5(b) | Q.4 - Page 137 - Chapter 11 - Volume III - Version 3 Notes<br>[ Earlier Name : Excellent Woodcraft ] |
| 6(a) | Q.15 - Page 234 - Chapter 7 - Volume I - Version 3 Notes<br>[ Earlier Name : Sun Chemical Co. ] |
| 6(b) | Q.49 - Page 225 - Chapter 12 - Volume II - Version 3 Notes<br>[ Earlier Name : Kony Ltd. ] |

**Question 3 :**

**[ Topic : Building Block Model – Chapter 8 ]**

The Soup Ltd. offers a range of beauty parlor services like hair care, body care, manicures / pedicures, skincare, etc. It has 150 centre/s across the country. The business of beauty parlor is extremely competitive in all region. Each centre operates autonomously and managers are able to offer customize services.

Soup's mission statement is "to inspire and enhance beauty by using knowledge and experience". To establish long term relationship of trust and commitment with clients, Soup wants to provide their client highest level of satisfaction with emphasis on :

- Service Customization
- Professionalism, Work, and Clinical Responsibility
- Client's Feedback

Company has developed a website where it creates blogs, post high quality content related to beauty tips. Website is also connected to social media to reach customers. If a customer searches Soup's services on search engine, it automatically redirects to the place of nearest service center. Soup's all services are presently booked through online channel.

Results for one of the center, "Roop", are given below. The column headed "Centre" shows the average figures for all Centre/s :

| Particulars | Roop (Oct. 20) | Centre (Oct. 20) |
|---|---|---|
| Revenue (₹) | 91,26,000 | 1,08,66,900 |
| Gross Profit (₹) | 48,50,400 | 51,37,740 |
| Number of senior Beauticians | 90 | 110 |
| Number of junior Beauticians | 60 | 55 |
| Number of website hits | 15,010 | 19,260 |
| Total number of services booked online and completed | 9,915 | 12,270 |
| Number of services taken by repeat customers | 1,510 | 1,605 |
| Total time spent on completing jobs (hours) | 24,120 | 25,880 |
| Number of new service packages offered | 3 | 2 |
| Customer % in terms of feedback forms showing score of 9 or 10 | 86% | 77% |

**Notes :**

(1) Beauticians are categorized as 'senior' if they have been qualified for more than three years.

(2) 'Junior' Beauticians includes both trainee beauticians and beauticians who have been qualified for less than three years.

(3) The Roop launched three new service packs during the year :

- free coupon of worth ₹ 600 for services over and above ₹ 1,200
- a head massage costing only ₹ 240, instead of the usual ₹ 480, for 10 days advanced booking.

- for a haircut ₹ 120 will be charged, which usually costs ₹ 360, for all customers booking hair spa.

These three new service packs produced revenues of ₹ 7,92,000; ₹ 6,96,000 and ₹ 6,48,000 respectively. Two comparable new service packs developed by other centre/s produced revenues of ₹ 5,28,000 and ₹ 5,04,000.

(4) Customers to rate the particular centre from 1 to 10 in an online feedback form with 10 being the best.

The Chief Executive Officer (CEO) of Soup has recently attended a webinar and heard about Building Block Model of Performance Management. The CEO is interested to know how the dimensions block could be applied at Soup Ltd.

**Required :**

(i) Analyse Roop's performance relative to the other Centre/s. (12 Marks)

(ii) Explain how the Standards and Rewards blocks support the Dimensions block in case of Building Block Model. (8 Marks)

**Solution 3 :**

**(i) Analysis :**

**Competitiveness**

| Particulars | Roop | Centre Average |
|---|---|---|
| Website hits converted into orders ( in percentage ) | 66.06% (9,915/15,010) | 63.71% (12,270/19,260) |

This ratio shows whether Roop's services are attractive compared to its competitors, which is essential if it is going to persist in such a competitive market.

It has performed considerably better than Centre average, having converted 66.06% of website hits into jobs, compared to the 63.71% converted by other Centres. This is a good outcome.

**Financial Performance**

| Particulars | Roop | Centre Average |
|---|---|---|
| Gross profit ratio ( in percentage ) | 53.15% (48,50,400/91,26,000) | 47.28% (51,37,740/1,08,66,900) |

Gross profit ratio is a measure of financial performance. It indicates the percentage of revenue which exceeds the cost of goods sold.

Roop's gross profit ratio is 5.87% higher than the average, which is a good result. This could be because of new service pack sales. It is also likely to be because of ratio of senior beauticians to junior beauticians (1.5 times), which is lower than the average (2 times) and junior beauticians will invariably be paid less than senior ones.

**Quality of Service**

| Particulars | Roop | Centre Average |
|---|---|---|
| Jobs from repeat customers ( in percentage ) | 15.23% (1,510 / 9,915) | 13.08% (1,605 / 12,270) |

Quality is a key aspect of Roop's service to customers and if it is poor, customers will not return.

Again, Roop has surpassed the other centres on average by 2.15% points. Though, it has a lower ratio of senior beauticians to junior beauticians (1.5 times), than the average (2 times), it might be possible that Roop has a portfolio of enthusiastic staff. So, the quality of work is probably better, thus higher level of repeat customers.

**Flexibility**

| Particulars | Roop | Centre Average |
|---|---|---|
| Time taken per job ( in hours ) | 2.43 ( 24,120 / 9,915 ) | 2.11 ( 25,880 / 12,270 ) |

The comparison shows that Roop takes longer time to complete a job than the other center average, which is not really good and is probably because of they have slightly less experienced staff on the whole. However, it could also be that they do a more comprehensive job than other centers. Given the fact that they have a higher % of repeat customers than the other centers and they are also graded 9 or 10 by most of the customers (86%). Therefore, this cannot be viewed as too adversely.

**Resource Utilisation**

| Particulars | Roop | Centre Average |
|---|---|---|
| Revenue per beautician ( in rupees ) | 60,840 ( 91,26,000 / 150 ) | 65,860 ( 1,08,66,900 / 165 ) |

The crucial resource in a service company is its staff and so these indicators measure how this resource is being utilised.

Roop's utilisation of its staff is lower than that of the other centers by ₹ 5,020 per beautician. This clearly links in with the point that the average time to complete a job is longer at Roop than other centers. However, given that Roop uses a slightly less experienced staff than other centers and the fact that its gross margin is higher than the average, this should not be viewed too adversely.

**Innovation**

| Particulars | Roop | Centre Average |
|---|---|---|
| Revenue generated from new service packs (in percentage) | 23.4% [ (7,92,000 + 6,96,000 + 6,48,000) / 91,26,000 ] | 9.5% [ (5,28,000 + 5,04,000) / 1,08,66,900 ] |

Roop is offering a wide variety of service packs to its customers. The ratio of 23.4% indicates that Roop has really outperformed other centers on this front, generating a far larger part of its revenue by the introduction of new service packs, which must have attracted customers. This is a really good performance.

**(ii)** The **Standards** block fixes the target for the performance indicators chosen for each of the dimensions. The targets must meet three criteria i.e. they must be achievable, fair and encourage employees to take ownership. The performance of the organisation could suffer if the targets set do not meet these criteria.

The **rewards** block makes sure that employees are motivated to attain the standards. It also examines the properties of good reward schemes which are that they should be clear, motivating and based on controllable factors.

If standards and rewards are set appropriately, the staff will be engaged and motivated and it is then more likely that the goals, i.e. **dimensions** of the organisation will be achieved.

**Question 4(a)(i) :**

**[ Topic : JIT System – Chapter 3 ]**

'M' is a leading manufacturing company. Under increasing pressure to reduce costs, to contain inventory and to improve service, M's Costing Department has recently undertaken a decision to implement a JIT system.

The management of 'M' is convinced of the benefits of their changes. But Supplies Manager Mr. Bee fears with the Costing Department's decision.

He said : "We've been driven by suppliers for years .... they would insist that we could only purchase in thousands, that we would have to wait weeks, or that they would only deliver on Mondays !"

Required :

Is Mr. Bee's view point correct? Comment. ( 5 Marks )

**Solution 4(a)(i) :**

JIT Inventory System

For successful operation of JIT inventory system, the suppliers chosen must be willing to make frequent deliveries in small lots. Rather than deliver a week's or a month's material at one time, suppliers must be willing to make deliveries several times a day and in the exact quantities specified by the buyer.

It is described in the problem that suppliers are not willing to make frequent deliveries and make supplies in the exact quantities as required.

Accordingly, Mr Bee's doubt is correct on successful implementation of JIT system.

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# RTP - November 2020

## PAPER 5 : STRATEGIC COST MANAGEMENT AND PERFORMANCE EVALUATION

**Question 1 : [ Case Study ]**

**Topic :Competitive Advantage**

BA is the second largest airline in the Country "X". Aviation industry in the Country "X" is growing fast. In 2011, 45 million people travelled to/ from/ or within the Country "X". By 2020 that doubled to 100 million. This number is expected to treble to 300 million by 2030. Also, by 2025, Country "X" is expected to be the third largest air transport market in the world, behind the US and China.

Government is trying to meet the significant growth potential of aviation Industry. However, it will create challenges also for the airline industry and its industry partners.

Government also wants to ensure that broader business and policy environment should not place hurdles which inhibit growth and reduce the level of benefits that aviation can deliver to the nation. The industry, its supply chain partners, and the government and policy makers have a clear mandate to work in collaboration towards the common goal of ensuring that aviation's economic and social benefits are fulfilled.

Despite of operating in World's fastest growing market BA struggles for passengers. Also, BA is facing following problems :

- Aviation Turbine Fuel (ATF) prices constitute about 40% of operational costs in Country "X" and are taxed higher here than anywhere else in the World. The Central government charges 14% duty on ATF. While the state government pile on their own local tax that can go as high as 29%.

- The currency depreciation is hitting Airline harder. About 25% to 30% of their costs, excluding ATF, are dollar denominated, from aircraft lease rents, maintenance costs to ground handling and parking charges abroad etc.

- With the entry of Low Budget Carriers, full-service carrier like BA that have higher overhead costs have been forced to offer discount to passengers looking for great bargain.

- Continuous improvements in tourism infrastructure, tourism policies, human resource development, airport infrastructure density are among the areas that could further enhance Country X's competitiveness. Ease of doing business over the last five years has risen.

- The intense competition among domestic airlines carriers, the need to capture a slice of the ever-expanding market and passenger price sensitivity makes the airlines difficult to raise ticket prices.

Together, these factors have now plunged Country X's aviation industry to its most precarious phase in the last three years or so.

BA is facing huge competition as a "year of sharp U-turns" for X's aviation industry from record profit in Financial Year 2019-20 to mega losses, resulting in direct need of recapitalisation. BA has been appealing to the government for a decade for reduction in taxes on fuel, but all in vain. ATF is 35-40% more expensive in Country "X" than in the rest of the world, because of relatively high tax rates.

**Required :**

ADVISE the strategy that BA should follow in order to gain superior performance and competitive advantage over its competitors.

**Answer 1 :**

In consideration to Michael Porter's theory about creating a superior performance and competitive advantage, a firm's overall competitive advantage derives from the difference between the value it offers to customer and its cost of creating that customer value. In order to survive and prosper in industry, firm must meet two criteria – they must supply what customers want to buy and they must survive competition.

To attain superior performance and attain competitive advantage, firm must have distinctive competencies. Distinctive competencies can take any of the following two forms:

**Relative low-cost advantage-** under which customers gain when a firm's total costs undercut those of its average competitor.

**An offering or differentiation advantage-** If customer perceive a product or service as superior, they become more willing to pay a premium price relative to the price they will have to pay for competing offerings.

**Low Cost Advantage (Cost Leadership)**

BA can enjoy relative cost advantage if its total costs are lower than those of its competitors. This relative cost advantage enables a business to do one of the following:

- Charge a lower price than its competitors for its services to gain market share and still maintain current profitability; or

- Match with the price of competing services and increase its profitability.

Cost reductions in BA can be achieved through yield management with variable pricing depending on capacity utilization with careful monitoring; application of computer and communication technology in cost effective way i.e. selling seats via the internet rather than through travel agents; trimming overhead costs by using lower cost out-of-town airports, no printed tickets, seat allocations, or free meals and drinks; efficient operations i.e. fast turnaround times for aircraft to improve utilization; and no exceptions policies to reduce the cost of handling exceptions (e.g. no flexibility for passengers who arrive late). Cost economies can also be realized from large scale operations. However, it is important to note that as soon as more firms strive to become the cost leader, rivalry become so fierce that the consequences for the profitability in the industry are disastrous.

**Differentiation Advantage**

It occurs when customers perceive that a business service offering is of higher quality, involves fewer risks and/or outperform services offered by competitors. In other words, customers perceive the service offered by a business to be superior. For example, differentiation may include a firm's ability to deliver services, and other factors that provide unique customer value. BA is a multinational passenger airline. It can adopt a differentiation approach by offering passengers a higher-quality experience than many of its rivals. This allows it to charge a premium for its flights compared to many other airlines.

A differentiation advantage can be achieved by offering enhanced features such as prime landing slots can be obtained at major airports around the world; using superior and advantage technology; well-maintained, clean, and comfortable aircraft; training in customer care and the recruitment of high-quality staff; providing complementary services such as in-flight

entertainment, high-quality food, and drink. Customer value can also be increased by subjective features such as brand image, advertising based on quality of service provided. However, differentiator cannot ignore its cost position. If costs are too high the premium price are nullified.

On successfully differentiated its offering, management of BA may exploit the advantage in one of two ways viz., either increase price until it just offsets the cost of improvement in customer benefits, thus maintaining current market share; or price below the "full premium" level to build market share.

Alternatively, BA may focus on geographical region and short point to point flights to reduce costs. Michael Porter enlightens focus on attaining low cost or product differentiation for a particular buyer group, segment of product line, or geographic market rather than for the industry as a whole. The focuser can attain competitive advantage within a niche, because large firms are either not attracted to niche or have ignored the potential. The narrow focus in itself though is not adequate for a competitive advantage. The firms need to optimize the strategy on two variants; cost focus and differentiation focus. One risk of a 'focus strategy' is that broadly targeted competitors devastate the segment once it becomes economically attractive.

In addition, the currency depreciation is hitting Airlines harder and international overhead costs have risen. BA should attempt to increase the number of internal domestic flights. Moreover, ATF cost can also be lowered by investment in fuel saving modern Airbuses. However, the reduction in operating costs may outweigh the capital equipment costs.

To gain competitive advantage, BA may also assess Value Shop Model. Value Shop generates value by organizing resources (e.g. people, knowledge, and skills) and deploying them to solve specific problems. For example, delivering airline services to the passengers or delivering a solution to the business problem. Shops are organized around making executive decisions – identifying and assessing problems or opportunities, developing alternative solutions or approaches, choosing one, executing it and evaluating results.

In this way, the above discussed strategies may be more appropriate for helping BA in achieving superior performance and competitive advantage over its competitors.

**Concept in Practice (As an example)**

Southwest Airlines (SA) targeted on a geographic region and short point-to-point flights to reduce costs. Even though it offered no-frills service (no frills service is one for which the non-essential features like food, entertainment, printing of boarding pass etc. have been removed to keep the price low) and was based in secondary airports. SA improved quality relative to the limited set of competing alternatives by offering direct flights rather than connecting flights requiring changing planes at large hub airports. The SA also offered better on-time performance and friendly amenities.

**Question 2 : [ Case Study ]**

**Topic :Supply Chain Management**

An apparel manufacturing company has a factory in Ahmedabad, making denim clothing for customers of all ages. It sells its clothing from its factory outlet store located within the city. Until 6 months back, the company had a business model wherein the products manufactured as its factory would be sent to its factory outlet store. Customers would visit the store and choose apparel suiting their tastes. Production was based on prediction of customer demand. This "made to stock" model has been placed for many years.

Few months back, the store manager noticed many customers exiting without making any purchases. Tracking this and after obtaining feedback from customers over sometime, it was found that many products were unacceptable to the customers' tastes – either the shade or design of denim was not what they wanted or that the apparel was not of the correct fit for them. The management then decided to provide customers a choice of either choosing from their standard apparel range that has already been made ("made to stock" model) or to offer them a "made to order" option.

The company now displays its range of denim material at the factory outlet. Customers can go through the samples and choose the material of their choice. Company certified tailors would then take measurements based on the customers' preferences. A detailed order customized to the customers' needs would then be drawn up. The factory has set up a separate tailoring division that would stitch the apparel specifically for these "made to order" sales. For this new machines and production line resources have been put in place.

Customized products are manufactured and made available to the customer within 3 working days' time from the date of placing the order. The customer comes to the store and picks up the apparel ordered. For delays beyond this timeline, the customer gets to pay 5% less on the order value. This is done to attract and maintain customers, who would otherwise choose to purchase apparel offered by rival competitors. Therefore, speed of delivery of the customized product is critical for the company. This is the main selling point for the company to operate the "made to order" business model.

If further modifications are needed due to errors on part of the company (quality / finishing issues), the apparel would need to be modified / re-stitched once again. The company will bear the cost of modification or replacement of garment.

This new "made-to-order" has been in place for the past 6 months. At the stage of project proposal, the management found it a lucrative option for the company because:

(i) Customers are willing to pay a higher price to have customized clothing as compared to the standard fitting.

(ii) It would attract more customers to the store.

(iii) If the model works well, the dependence on the "made to stock" model can reduce. Savings in inventory cost, obsolescence and warehousing costs will benefit the company's bottom-line.

Customers have been very enthusiastic in availing this customization facility offered by the company. Sales have increased manifold in the last few months. Therefore, the management is interested to understand the metrics related to their "made to order" business mode to assess its success and risks. Some of the non-financial metrics are:

| Metrics | Month | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Orders needing modification on account of errors in order taking or manufacturing process (% of sales orders made under "made to order" model) | 15% | 12% | 10% | 8% | 5% | 4% |
| Orders delivered beyond the 3 working days timeline (% of sales orders made under "made to order" mode) | 5% | 4% | 3% | 6% | 7% | 5% |
| Production downtime (hours) | 44 | 88 | 22 | 141 | 132 | 123 |
| Labor idle time due to unavailability of material (hours) | 25 | 22 | 17 | 13 | 24 | 22 |
| Ratio of "made to order" to total sales from the factory outlet (Ratio of sales value) | 16% | 22% | 25% | 32% | 34% | 38% |
| Repeat orders by customers availing this facility (% of customers giving repeat order/ total customers availing "made to order" facility) | 4% | 21% | 33% | 54% | 60% | 63% |

**Required :**

ANALYZE the non-financial measures of quality of the division over the six-month period. Focus on the production performance, delivery cycle performance and customer satisfaction.

**Answer 2 :**

**Workings :**

| Metric | Month | | | | | | Monthly Average |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| **Production Performance :** | | | | | | | |
| Orders needing modification on account of errors in order taking or manufacturing process (% of sales orders made under "made to order" model) | 15% | 12% | 10% | 8% | 5% | 4% | 9% |
| Production downtime (hours) | 44 | 88 | 22 | 141 | 132 | 123 | 91.67 |
| Labor idle time due to unavailability of material (hours) | 25 | 22 | 17 | 13 | 24 | 22 | 20.50 |
| **Delivery cycle time :** | | | | | | | |
| Orders delivered beyond the 3 working days timeline (% of sales orders made under "made to order" model) | 5% | 4% | 3% | 6% | 7% | 5% | 5% |
| **Customer satisfaction :** | | | | | | | |
| Repeat orders by customers availing this facility (% of customers giving repeat order/total customers availing "made to order" facility) | 4% | 21% | 33% | 54% | 60% | 63% | 39.17% |
| Ratio of "made to order" to total sales from the factory outlet (Ratio of sales value) | 16% | 22% | 25% | 32% | 34% | 38% | 28% |

**Analysis of the operating data of the "made to order" at the business store revealed the following:**

**Production Performance:**

(i) Modifications to orders: Company has to bear the cost of modifications / replacement of the garment incurred on account of error in its order taking or manufacturing process. Therefore, orders needing such modification should be kept at the minimum. Such instances were higher than 10% in the first three months. With experience, either in the order taking process or manufacturing process, these errors have reduced substantially in the later months. The managers of the order taking and manufacturing department need to understand and constantly keep track of these errors in order to keep them at the bare minimum. Management may want to set a benchmark, financially in terms of the cost of modification and non-financially in terms of the acceptable threshold for such instances. Monthly tracking of this metric will help detection of errors earlier.

(ii) Production downtime: Production downtime normally occurs either due to break down of machinery or plant maintenance. It is unproductive time, reducing the machine's capacity. It must be kept minimum. Downtime hours have been steadily increasing in the last 3 months, the overall monthly average being 91.67 hours. The production manager has to analyze and take corrective action at the earliest. Urgency of the issue can be compounded by the fact that sales orders under the "make to order" model have been increasing steadily over the last few months. In the latest month, 38% of the overall sales was from this model. Therefore, the production capacity should be utilized optimally to ensure ability to meet delivery deadlines.

(iii) Labour idle time: Labour idle time due to unavailability of material is another unproductive waste of resource. The procurement department can address unavailability of material. On an average 20.5 hours of labor time is idle due to unavailability of the appropriate material. Appropriate steps with suppliers can lead to agreements to ensure seamless supply of material when required. This will enable the company to meet delivery deadlines given to customers.

**Delivery Cycle Performance:**

(i) On-time delivery: The orders need to be delivered to the store within 3 working days of placing order. The customer picks up the order from the store. Speed of delivery is critical to the company. For any delay beyond this timeline, the customer benefits by a 5% reduced price on the order as compensation for delay. Prompt delivery is also the company's selling point to attract customers, who would otherwise patronize its rivals. On an average 5% of the orders are not delivered within time. Therefore, average delivery success rate is only 95%. The management has to take steps that this is kept to the minimum in order to reduce loss of revenue and also to build brand loyalty with the customer base.

**Customer Satisfaction:**

(i) Repeat orders by customers: Prompt and quality delivery of the customized order would ensure that customers return in future with further orders. Statistics shows that repeat orders have steadily increased, which is a very positive signal to the management. Initially, only 4% of the customer under this model placed repeat orders. This increased substantially. Now almost 63% of the customers who purchase under this model come back with more orders.

(ii) Sales mix: Popularity among customers for customized services is further validated by the steady increase in the ratio of such sales to the overall sales of the company from the factory outlet. Now, this model generates an average of 28% of the total sales from the outlet, with a likely projection of having a higher share in the overall sales mix. Therefore, the "make to order" model can be termed as success.

**Question 3 : [ Case Study ]**

**Topic :Value Chain Analysis**

X is a leading toy manufacturing firm. Having commenced its commercial operations in the year 1990, the firm has a state-of-the-art manufacturing facility in India. It sells toys through retail outlets and the firm's website. X has been pioneering the concepts of quality and safety in toys and has been instrumental in raising the quality standards of toys in the Indian Market.

X's mission is to influence parents to spend on toys that enable every child to grow with quality toys that contributes to his / her wholesome development.

X procures the materials from a number of different suppliers. All of the purchased material are dispatched to its warehouse located at its factory and are held there unless they are moved to production. After production is completed, finished toys are moved to X's retail outlets by its own vehicles. Each week, the vehicles follow the same time schedule regardless of the weight they are carrying. Finished toys that are sold through the X's website are dispatched to its distribution centre.

X has recently got the contract to manufacture a new toy that is 'Ty-Z', a mini cartoon based on a character from a famous international animated film. X has not been given any target price, hence is free to set the selling price of 'Ty-Z'. However, it must pay a royalty of 10% of the selling price to the film director. X is also planning to sell 'Ty-Z' through its retail outlets.

X has decided to follow a target costing technique for 'Ty-Z'. Marketing manager has determined the selling price to be around ₹ 1,750 per 'Ty-Z'. X needs a margin of 26% of the selling price of 'Ty-Z'.

For the estimated costs per 'Ty-Z' refer Annexure given below.

**Required :**

DISCUSS three primary activities of value chain through which X can minimise cost gap if any.

**Annexure**

Estimated Costs per 'Ty-Z'

| **Particulars** | **₹** |
|---|---|
| Material C | 150.50 |
| Material D | 122.50 |
| Other Material | See note below |
| Labour (0.4 hours at ₹ 1,050 per hour) | 420.00 |
| 'Ty-Z'- specific production overhead cost | 132.30 |
| 'Ty-Z' - specific selling and distribution cost | 166.60 |
| **Note :**Each 'Ty-Z' requires 0.70 kg. of 'other materials'. These 'other materials' are procured from a supplier at a cost of ₹ 280 per kg and around 5% of all purchased materials are found to be downgraded. | |

**Answer 3 :**

**Workings :**

**Statement Showing Computation of Cost GAP**

| **Particulars** | **₹** |
|---|---|
| Sales Price | 1,750.00 |
| Less: Royalty @ 10% of sales price | 175.00 |
| Less: Profit @ 26% of sales price | 455.00 |
| **Target Cost 'Ty-Z'** | **1,120.00** |
| Material C | 150.50 |
| Material D | 122.50 |
| Labour (0.40 hours at ₹1,050 per hour) | 420.00 |
| Other Material (0.70 kg x ₹280 per kg) / 0.95 | 206.32 |
| Production Overheads Cost | 132.30 |
| Distribution and Sales Cost | 166.60 |
| **Estimated Cost 'Ty-Z'** | **1,198.22** |
| **Cost Gap ( 1198.22 – 1120 )** | **78.22** |

In this case, there is a cost gap of Rs.78.22. Where a gap exists between the current estimated cost levels and the target cost, it is essential that this gap be closed. Cost gap can be removed by reducing the cost over all the Value Chain through the development of the spirit co-operation and understanding among all members of organizations associated with the product from suppliers, producers, agents and service providers.

In X's Value Chain, three primary activities are:-

**Inbound logistics:**
These are activities concerned with receiving, storing and distributing the inputs (raw material) to the production process. The relationship with supplier is a key component in this process. Currently, X procures materials from multiple suppliers and stores these materials in its store. Shifting to a just-in-time (JIT) system technique in procurement of materials could possibly save substantial storage cost, provided the JIT supplier must agree to take the responsibility for the good quality and timely delivery of materials supplied. This will also become a source of savings because downgraded items will be removed. However, X might have to pay additional charges to supplier for JIT purchasing to work.

**Outbound logistics:**
These activities involve collecting, storing and distributing the products to the customers. At X, scheduled transportation of toys to retail outlets is outbound logistics activity. Potentially, the scheduled transportation of toys to retail outlets every week is not an efficient way. Such deliveries do not consider whether toy is required at retail outlets or not, hence X may possibly deliver toys to those retail outlets that do not need toys and suffer unnecessary transportation costs.

X should plan to implement EDI system(i.e. Electronic Data Interchange) that will help it to improve warehousing and logistics by automatically tracking inbound shipments as well as outbound products. Adopting EDI, X can not only improve processes but also streamline inventory management across many channels. However, it will require setup cost of EDI system and employee training to implement the same.

**Marketing and Sales:**
Marketing and sales provide the means by which the customers are made aware of the product. At X, the sales of toys via its retail outlets and website are marketing and sales activities.

X is planning to sell 'Ty-Z' via retail outlets. If X sales 'Ty-Z' through its website rather than through retail outlet, significant cost could easily be avoided. Simultaneously, X will be able to expose itself to attract international customers to buy 'Ty-Z' as product is based on character from a famous international animated film.

**Overall,** X may create a cost advantage by **reconfiguring** the Value Chain. Reconfiguration means structural changes such a new production process, new distribution channels or a different sales approach as discussed above.

**Question 4 : [ Practical Question ]**

**Topic :Theory of Constraints**

ZED produces two types of products Z and D at its manufacturing plant. Both the products are produced using the same materials, machinery, and skilled labour. Machine hours available for the year is 4,000 hours. Information relating to products is as follows:

| **Particulars** | **Z** | **D** |
|---|---|---|
| Selling Price per unit | ₹ 16,000 | ₹ 4,000 |
| Material Costs per unit | ₹ 7,000 | ₹ 1,200 |
| Machine Hours per unit | 1.6 hrs. | 0.8 hrs. |
| Maximum Annual Demand | 2,000 units | 1,600 units |
| Online Booking (already accepted for) | 400 units | 1,200 units |

Due to poor productivity levels, late order and declining profits over recent years, the CEO has suggested the introduction of throughput accounting in the company.

The total of all factory costs is ₹ 1,42,60,000 excluding material.

**Required :**

(i) Using throughput accounting, PREPARE statement to determine the optimum production mix and maximum profit for the next year.

(ii) CALCULATE the amount of profit lost due to acceptance of online booking of the products.

(iii) RECOMMEND the options to be followed in order to avoid any loss of profit.

(iv) LIST various ways through which price customization could be done.

(v) Given that products Z and D are respectively in 'maturity stage' and 'introduction stage' of their life cycle. STATE the most appropriate pricing policy that could be followed by the ZED for Z and D as per their life cycle.

**Answer 4 :**

**(i) Statement Showing Machine Hours :**

| Product | Maximum Demand | Machine Hours / Unit | Total Machine Hours |
|---|---|---|---|
| Z | 2,000 units | 1.6 | 3,200 |
| D | 1,600 units | 0.8 | 1,280 |
| Total machine hours required to meet maximum demand | | | 4,480 |
| Less : Machine hours available | | | 4,000 |
| Shortage of machine hours | | | 480 |

Conclusion :'Machine hours' is the bottleneck activity.

Student Note : In my personal opinion, the above working was not needed.

**Statement of Ranking :**

| Particulars | Z | D |
|---|---|---|
| Selling Price per unit | ₹16,000 | ₹4,000 |
| Less: Material Costs per unit | ₹7,000 | ₹1,200 |
| Throughput contribution per unit | ₹9,000 | ₹2,800 |
| Machine Hour Required per unit | 1.6 | 0.8 |
| Throughput contribution per hour | (₹9,000/1.6) = ₹5,625 | (₹2,800/0.8) = ₹3,500 |
| Throughput Accounting (TA) Ratio (throughput contribution per hour/ factory cost per hour) | 5,625/3,565 = 1.58 | 3,500/3,565 = 0.98 |
| Ranking | I | II |

Factory cost per hour = ₹1,42,60,000/ 4,000 hrs. = ₹3,565

Student Note : In my personal opinion, calculation of TA ratio was not needed. The ranking can be assigned on the basis of 'Contribution per hour' itself.

**Optimum Production Plan :**

| Product | No. of units | Machine hr. per unit | Total M/C hrs. | T/P per hr.₹ | Total T/P ₹ |
|---|---|---|---|---|---|
| Z (online orders) | 400 | 1.6 | 640 | 5,625 | 36,00,000 |
| D (online orders) | 1,200 | 0.8 | 960 | 3,500 | 33,60,000 |
| Z | 2,400/1.6 = 1,500 | 1.6 | 2,400 (Bal. fig.) | 5,625 | 1,35,00,000 |
| Total T/P Contribution | | | | | 2,04,60,000 |
| Less: Total Factory Cost (it is like fixed cost) | | | | | 1,42,60,000 |
| Profit | | | | | 62,00,000 |

**(ii)** Had there been no online booking, we would first fulfill entire demand of Z for 2,000 units using 3,200 machine hours (2,000 x 1.6). Because of online booking already accepted for 1,200 units of product D, unfulfilled demand of product Z = 2,000 – 1,900 = 100 units.

| | |
|---|---|
| Machine Hrs. Required for 100 units of Z (100 x 1.6) | 160 hrs. |
| Throughput Lost for Product Z (160 hrs. x 5,625) | ₹9,00,000 |
| Throughput Return Earned from Product D (160 hrs. x 3,500) | ₹5,60,000 |
| Throughput lost | ₹3,40,000 |

Student Note : The above calculation of loss of profit can also be calculated using differential approach as :
160 hours x ( 5,625 – 3,500 ) = ₹3,40,000

**(iii) Recommendation :**

**Option-1**
Throughput accounting ratio is the throughput return earned in an hour divided by the factory cost (labour and overheads) incurred by the factory in one hour. Factory cost is generally fixed in nature. A ratio above 1 signifies that the throughput return is greater than the factory cost and therefore the product is profitable. Product Z has a throughput accounting ratio of 1.58 while Product D has a throughput accounting ratio of 0.98.This indicates that hourly return from Product Z can cover the hourly factory cost and thus it is profitable. Product D does not yield enough hourly return to cover the hourly factory cost, hence it is not profitable. Therefore, ZED should consider ways of improving throughput accounting ratio of Product D (i.e. above 1.0). TA ratio could be improved by:

- Increasing the selling price of the Product D but the demand may fall.
- Reducing the material cost per unit as well as operating costs. However, there may be quality issues.
- Improving efficiency e.g. increase in number of units that are made in each bottleneck hour.
- Increasing the bottleneck so that more hours are available of bottleneck resource.

**Option-2**
ZED has to prioritize production of Product Z since it is more profitable than Product D. As per the throughput accounting ratio, Product D does not yield sufficient return per hour to cover the hourly overhead cost therefore, gets second priority over Product Z.

Since machine hours are the bottleneck, if production for entire 4,000 hours is focused on Product Z, return yielded would be sufficient to cover the factory overheads. However, Product Z has a maximum demand of only 2,000 units, which requires 3,200 machine hours (2,000 units x 1.6 hours). Remaining 800 machine hours can be devoted to Product D, during which 1,000 units can be produced (800 machine hours / 0.8 hours per unit). Maximum demand for Product D is 1,600 units. Therefore, the balance demand of 600 units of Product D will remain unsatisfied.

However, to meet unsatisfied demand of Product D, ZED may consider the option of sub-contracting either in part or whole of the production of Product D. This way it can meet the entire demand for Product D for 1,600 units. If it subcontracts the entire production of Product D, it can also scale down its in-house capacity. Sub-contracting decision requires suitable cost benefit analysis. Moreover, the risk associated with outsourcing like unsatisfactory quality and service or failure of supplier cannot be ignored.

**Overall,** to enhance profitability or avoid any type of loss of profit, ZED may consider the options recommended above with a long term perspective.

**(iv)** Pricing of a product is sometimes customized keeping taste, preference and perceived value of a customer into consideration. Price customization is done in the following ways:

- Based on product line: When products are customized as per the customer's requirements, pricing can be adapted based on the customer's specifications. Standard products can have a base price, to which the company can top-up charges to any additional customization.

- Based on customer's past behavior: Customers with good payment record have established their credit-worthiness. To sustain business, they may be extended additional discounts as compared to other customers.

- Based on demographics: Different pricing strategies may be adopted based on age or social status. For example, railway fare discounts for senior citizens or concessional price tickets for military personnel.

- Based on time differential: Different price for different time periods. If a customer extends a long-term contract, an additional discount may be extended since business is contracted for a longer period of time. Example, discounted price for data usage provided by a broadband service provider if subscription is paid for six months or more.

**(v)** The life-cycle of a product has 4 stages namely : Introductory stage, Growth stage, Maturity stage and Decline stage.

**Product Z** is given to be in the maturity stage. The third stage of product life cycle is characterized by an established market for the product. After rapid growth in sale volume in the previous stages, growth of sales for the product will saturate. Competition would be high due to large number of rivals in the market, this may lead to decreasing market share. Unit selling price may remain constant since the market is well established. Occasional offers may be used to tempt customers, otherwise this stage will mark consolidation of the market.

**Product D** is in the introduction stage, the first stage of product life cycle. Penetration pricing is adopted to charge a low price in the initial stage for penetrating the market as quickly as possible. For a new product this low price strategy will popularize the product. Once the market is established, the price may be increased. Penetration pricing will be suitable when:

(i) Demand for the product is elastic, i.e. more demand when prices are low.
(ii) Large scale production of the product yields economies of scale.
(iii) Threat of competition requires prices to be set low. It serves as an entry barrier to prospective competitors as well.

However, if Product D is a highly innovative product, it may adopt Skimming pricing policy. The product with unique features will differentiate it from other products leading to a revolutionary impact on market and customer behavior. Customers may not mind paying a premium for the unique product offering. Focus may be on promoting the product to gain market share. Skimming pricing policy may work when :

(i) There seem to be no competitors providing similar products.
(ii) Demand is inelastic.

Over a period of time, competitors can do reverse engineering and offer similar products. Therefore, the price may be lowered in the long run to retain market share.

**Question 5 : [ Case Scenario ]**

**Topic :Ethical and Non-Financial Considerations**

ABC Limited specializes in the manufacture of chemical intermediaries in a very competitive business environment. ABC is a public listed company, with majority of its shareholders being institutional investors like mutual funds, banks and insurance companies.
It is located in a water scarce zone in Tamil Nadu. There are restrictions on the tapping and usage of groundwater under the relevant laws. Penal provisions of the law will apply in case of violations. The production process requires water and the amount of water that the company can draw is limited to 19,000 kilo-litres (1 kilo-litre is 1,000 litres). Purchase of water is not an option as availability is highly erratic and exorbitant on cost.

The company manufactures two types of chemicals “A” and “B” and these are sold in kilograms. The company is in the process of making the business plan for the year 2021.
Based on the actual operating data for 2020 and taking into consideration the inflation and possible price increases that it can obtain from the market, the following product costing details have been arrived at:

| **Particulars** | **A** | **B** |
|---|---|---|
| Capacity Volume kg. (not inter-changeable) | 8,25,000 | 9,30,000 |
| Selling Price per kg. | ₹ 2,000 | ₹ 1,000 |
| Variable Cost per kg. | ₹ 1,500 | ₹ 650 |
| Water (litre/ kg.) | 12.5 | 10 |

Under the relevant income tax laws prevalent, companies with a turnover of ₹ 250 Cr. (Crores) or less are taxed at a lower rate of 25% as against the normal 30%. The company intends to keep its sales for 2021 equal to ₹ 250 Cr. or slightly lesser to avail this concessional income tax benefit.
With capacity constraints, the company has calculated that it would be still beneficial for the company to stick to ₹ 250 Cr. as only a marginal increase in turnover is possible over ₹ 250 Cr. If we cross 250 cr. Then due to higher tax @ 30%, the PAT would be still lower than the PAT arrived at after doing just ₹ 250 Cr. and availing the lower income tax rate.

CFO asked management consultant to work out the volumes in kg. of products “A” and “B” which would give an optimal (maximum) contribution given the constraints on capacity, water usage and turnover to avail the concessional income tax benefit.
Consultant works out the following product mix using Linear Programming. She also proposes another mix which does not meet the constraint on water usage where the company could end up drawing excess water than permitted by 113 kilo-litres but would result in an increase of ₹ 30 lakhs in contribution. She says that it is easily possible to do this by managing reporting to the water authorities.

| **Product** | | **Optimal** | **Suggested** |
|---|---|---|---|
| A (Volume in kg.) | | 8,00,000 | 7,85,000 |
| B (Volume in kg.) | | 9,00,000 | 9,30,000 |
| Contribution in ₹ Cr. | | 71.5 | 71.8 |
| | **Constraints** | | |
| Sales | <= 250 Cr. | 250 | 250 |
| Volume of “A” in kg. | <= 8,25,000 | 8,00,000 | 7,85,000 |
| Volume of “B” in kg. | <= 9,30,000 | 9,00,000 | 9,30,000 |
| Water usage (in KL) | <= 19,000 | 19,000 | 19,113 |

**Required :**
The CFO is not satisfied with the calculations. He wants you (Sr. Finance Manager) to come up with a proper DISCUSSION.

**Answer 5 :**

Primary goal of investor owned firms is shareholders wealth maximisation, which translate to stock price maximisation. Management Consultant's plan is looking good for the ABC as there is a positive impact on the profitability (₹30 lacs) of the company. Also, ABC operates in a competitive environment so for its survival, it has to work on plans like above.

There is another side of the coin that cannot be ignored i.e. **business ethics**. It is easily possible to manage drawing of excess water, but it is not an ethical practice as the company has responsibilities towards use of natural resources like water and protecting the environment.

Besides, a whistle-blower complaint to the water authorities can land the company into trouble in terms of penalties. If will have adverse financial impact and also such penalties are disallowed for income tax purposes. It is possible that such a violation may be reported in the media causing disrepute to the name of the company. It can also make investors in the share market stay away from the company as it has ethical governance issues. The company will face challenges in obtaining other government approvals when it will plan expansion as this violation may have to be reported on the applications seeking approvals.

**Overall**
May be ABC would be able to earn higher profit due to this plan in short run but it will tarnish the image of the ABC which would hurt profitability in long run. Therefore, before taking any decision on this plan, ABC should analyse both qualitative and qualitative factors.

**Question 6 : [ Case Study ]**

**Topic :Direct Product Profitability (DPP)**

**Student Note:** This question was exactly same as Q.16/131 from Volume II of Version 3 of our classroom notes of Chapter 10.

In our classroom notes, the name of the company is : XYZ Ornamental Co.

The new name in RTP was : Quebec Ornamental Company

As the entire question with all the figures was exactly same, it is dropped here to avoid duplication of work.

**Question 7 : [ Practical Question ]**

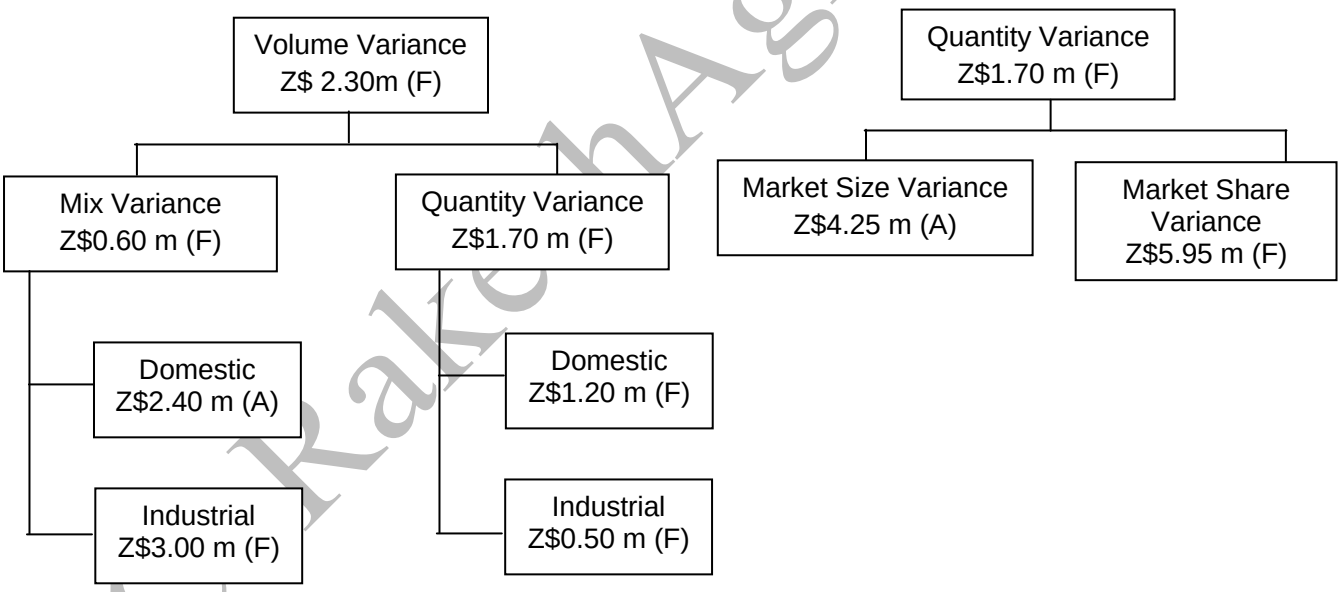
**Topic :Standard Costing**

ZM Inc. is a family run business based in Country Z. It is a manufacturer of two types of flooring rolls, one for industrial usage and the other for domestic residential use, throughout mainland of Country Z. The company started with the production of residential domestic flooring. It is now an established player in this market. In the recent years, the company pioneered into making flooring rolls for industrial usage. The management has the following information about the budgeted and actual data for 2020 –

| Particulars | Static Budget | | | Actual Result | | |
|---|---|---|---|---|---|---|
| | Industrial | Domestic | Total | Industrial | Domestic | Total |
| Unit Sales in Rolls ('000) | 200 | 600 | 800 | 270 | 570 | 840 |
| Contribution Margin (Z$ in millions) | 10.00 | 24.00 | 34.00 | 12.825 | 15.390 | 28.215 |

In late 2019, a marketing research estimated market volume for industrial and domestic flooring at 8 million Rolls. Actual market volume for 2020 was 7 million Rolls. Actual sales trend of ZM Inc. is indicative of the sales trends for individual products in the future years, it is likely that they might continue to sell on a similar sales trajectory.

A newly appointed accountant has computed following variances from the above data:




'Z$' is the currency of Country Z and
'm' refers to million; assume figures in this chart are correct.

**Required :**
Assuming yourself as a performance management expert of ZM, the CEO has asked you to:

(i) ANALYSE the variances computed by the accountant;

(ii) ADVISE strategic inputs on 'two types of flooring rolls' to help out her in strategic decision making.

**Answer 7 :**

**Student Note :**Please note that the variances given in the question are not Sales Variances, but these are Contribution Variances. The common multiplier in calculation of these variances is 'Standard Contribution Per Unit'.

**(i) Analysis of Variances :**

It can be seen that total number of units sold have increased by 40,000 rolls, which resulted in a favourable volume variance. Therefore, a potential increase of Z$2.3m in contribution margin was achieved as a result of change in sales volume compared with budgeted volume.

The volume variance is further divided into a mix and quantity variance. In the case of ZM, mix variance came out to be Z$0.60m favourable and the quantity variance came out to be favourable Z$1.70m. Favourable mix variance Z$0.60m indicates that the sales mix shifts toward the industrial flooring rolls i.e. high contribution product. ZM sold 40,000 more rolls than were budgeted, resulting in Z$1.70m favourable quantity variance. Therefore, it is necessary to identify the reasons behind the increase in sales.

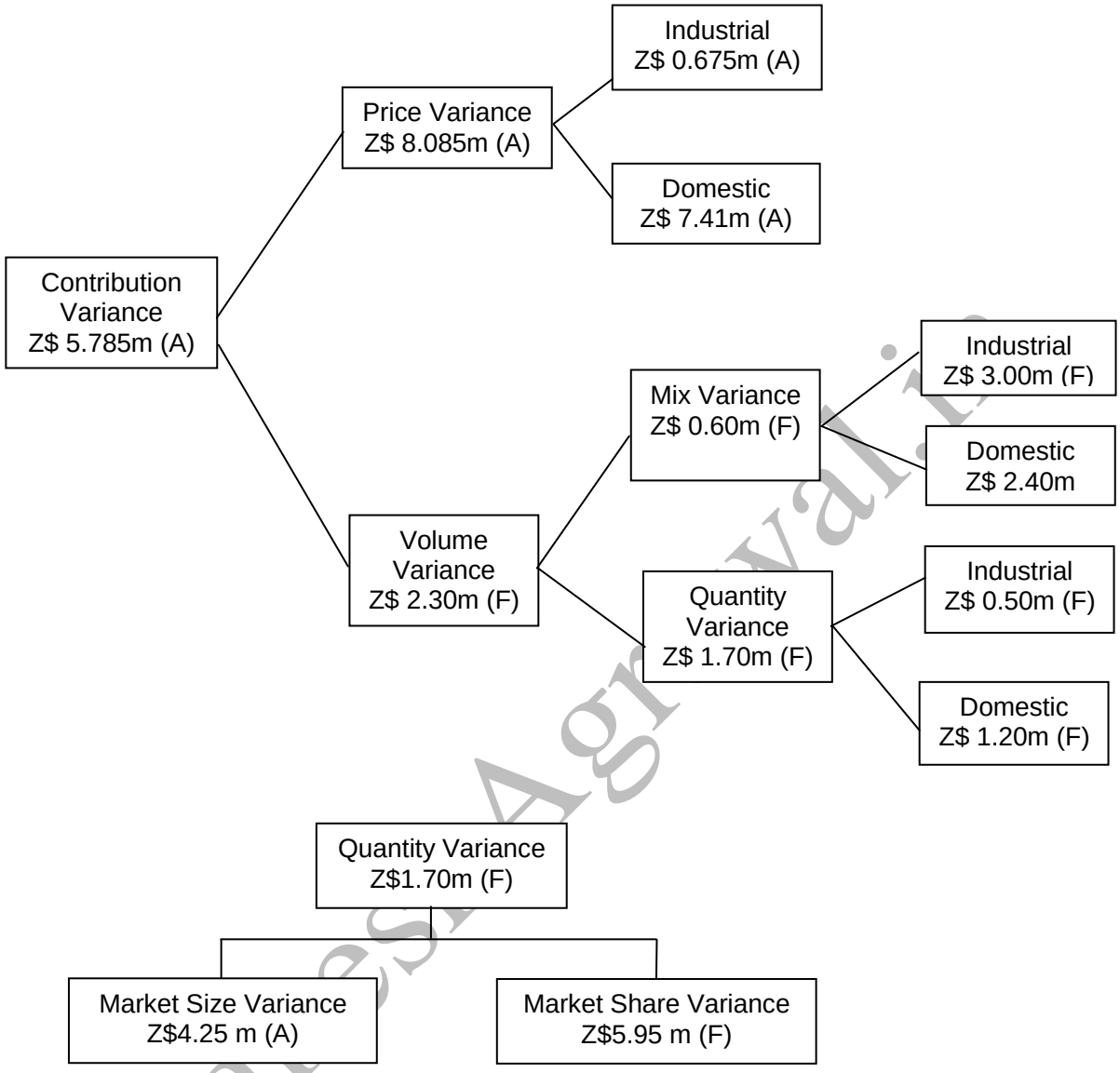
The reasons may be competitor's distribution issues, better customer services or growth in overall market. Further insight into reasons of quantity variance can be gained by analyzing market share and market size variances. ZM has gained 2% extra market share from 10% budgeted share to the actual share of 12%. The Z$ 5.95m favourable market share variance may be due to the effect of the decline in contribution margin per unit.

The impact of changing market size on contribution can be traced through market size variance. Market size variance is Z$ 4.25m adverse as actual market size decreased by 12.5% compared to budgeted market size.

Further, it appears that accountant has missed to compute the contribution price variance, which is a substantial part of the analysis. If we look closely at the data given, the contribution price variance for domestic as well as industrial roll can be computed without difficulty. The price variance for domestic flooring rolls as well as industrial flooring rolls is Z$ 8.085 m unfavourable. This indicates that the both varieties were sold at a lower contribution margin than standard. It can be seen from the working below.

Total contribution margin variance is Z$ 5.785 m adverse. The analysis shows that this negative impact on total contribution margin is mainly due to adverse contribution price variance. Revised structure after the computation of price variance is as under :

**Revised Structure :**




**Workings :**

**Contribution Price Variance:**

**= Actual Qty. Sold x ( Std. Cont. p.u. – Actual Cont. p.u. )**

| Product | Actual Qty. (units '000) | Standard Contribution per unit (Z$) | Actual Contribution per unit (Z$) | Variance (Z$) |
|---|---|---|---|---|
| Industrial | 270 | 50.00 | 47.50 | 0.675m(A) |
| Domestic | 570 | 40.00 | 27.00 | 7.41 m(A) |
| Total | 840 | | | 8.085m(A) |

**(ii) Strategic Inputs :**

The actual sale of industrial flooring rolls is 35% higher than projections. However, actual contribution margin of Z$47.5 is marginally lower than standard contribution margin of Z$50 per unit. This indicates that ZM may have cut its selling price to maintain or gain market share. Therefore, industrial flooring rolls is in the Growth Phase of product life cycle. Due to increase in demand, there is a possibility of higher sales and profits to be made in future years.

Similarly, the actual sale of domestic flooring roll is 5% lower than the expectations. However, actual contribution margin isZ$27 per roll i.e. 32.5% lower than the standard contribution margin. This indicates that ZM may have sold these at substantially reduced price to maintain the sales volume. Therefore, the domestic residential flooring rolls might be in the Decline Stage of product life cycle.

The market size for flooring rolls has reduced from an expectation of 80 lakh rolls to 70 lakh rolls. Therefore, the market size has shrunk significantly by 12.5% for the year 2020. This is a threat to profitability of business. The management has to understand the reasons behind this shrinkage. For example, dwindling demand may be on account of cheaper substitutes available for flooring rolls. The management has to take cognizance of this threat to business. A positive for ZM is that its actual market share for flooring rolls was higher than expected at 12%. An increase in market share would have a beneficial impact on the company's profitability. Also, despite the shrinkage in market size, demand for industrial flooring rolls seems to be on the rise. This could be an opportunity for the management to consider.

As explained above, the industrial flooring rolls seem to be in the Growth Stage of product life cycle, while the domestic residential rolls are in the Decline Stage. Industrial flooring rolls have a higher contribution margin per roll as compared to domestic residential rolls. Accordingly, ZM may consider phasing out domestic flooring rolls and concentrate on industrial flooring rolls. In view of shrinking market conditions, it would be more profitable to phase out the weaker product and concentrate on the fast moving and profitable product. At the same time, since domestic flooring roll still has significant demand, the strategy to phase out this product may have to be done in a phased and well-planned manner. In view of the shrinking market size, ZM should not end up losing its market share due to phasing out domestic flooring rolls.

**For Your Conceptual Understanding only (not required to be calculated)**

**"Budgeted Vs Actual Figures"**

| Product | Budgeted Qty. Rolls ('000) | Standard Cont. Per Roll (Z$) | Budgeted Cont. (Z$ in millions) | Actual Qty. Rolls ('000) | Actual Cont. Per Roll (Z$) | Actual Cont. (Z$ in millions) | Revised Actual Qty. ('000) |
|---|---|---|---|---|---|---|---|
| Ind. | 200 | 50 | 10.00 | 270 | 47.5 | 12.825 | 210 (840x25%) |
| Dom. | 600 | 40 | 24.00 | 570 | 27 | 15.390 | 630 (840x75%) |
| | 800 | | 34.00 | 840 | | 28.215 | 840 |

**Contribution Mix Variance :**

| Product | Standard Contribution per unit (Z$) | Actual Qty. (AM) (units '000) | Revised Actual Quantity (SM) (units '000) | Difference ('000) | Variance (Z$) |
|---|---|---|---|---|---|
| Industrial | 50 | 270 | 210 | + 60 | 3.00m (F) |
| Domestic | 40 | 570 | 630 | - 60 | 2.40m (A) |
| Total | | 840 | 840 | | 0.60m (F) |

**Contribution Quantity Variance :**

| Product | Standard Contribution per unit (Z$) | Revised Actual Quantity (SM) (units '000) | Budgeted Quantity (units '000) | Difference ('000) | Variance (Z$) |
|---|---|---|---|---|---|
| Industrial | 50 | 210 | 200 | + 10 | 0.50m (F) |
| Domestic | 40 | 630 | 600 | + 30 | 1.20m (F) |
| Total | | 840 | 800 | | 1.70m (F) |

**Market Size Variance :**

= Average Budgeted Contribution per unit x [ Budgeted Market Share % x (Actual Industry Sales Quantity in units – Budgeted Industry Sales Quantity in units) ]
= Z$ 42.50 x [ 10% x (70,00,000 Rolls – 80,00,000 Rolls) ]
= Z$ 4.25 m (A)

**Market Share Variance :**

= [(Actual Market Share % - Budgeted Market Share %) x Actual Industry Sales Quantity in units ] x (Average Budgeted Contributor per unit)
= [ (12% - 10%) x 70,00,000 Rolls ] x Z$ 42.50
= Z$ 5.95 m (F)

**Question 8 : [ Case Scenario ]**

**Topic : Non-Financial Performance Measures**

Kristin LLP sells wide range of household products. The firm has recently received few negative feedbacks about the product and customer services. CEO is not happy with this. As per the opinion of CEO –

"Nowadays when social medial play such an important role in making decision, its crucial to keep an eye on the quality of customer service you provide. If you don't care about customers' satisfaction, don't expect them to care about your services or products. When customer share their story, they're not just sharing their problems. They are actually teaching you how to make your product, service, and business better."

There has been considerable discussion at the corporate level as to improve 'Customer Satisfaction'. Convinced with this logic, firm has invested heavily in customer satisfaction and adopted the following plan of action –

- Providing helpline 24/7 in order to develop personal relationship with customer;
- Redesign its online platform in order to make it more customer friendly;
- Rewarding loyal customers by giving them experience, they would not forget for life; and
- Ease the return and refund policy, offering no questions asked, as a smart move over competitors.

The CEO was initially delighted to see that their efforts pay off in the form of higher customer satisfaction score index, however he is anxious to see the corresponding financial results. It is shown in the graph below :


**Required :**

After the seeming lack of improvement in financial performance with customer satisfaction, should Kristen LLP stop investing in a superior customer experience? DISCUSS.

**Answer 8 :**

In this case we can see that there are two considerable sides of the question; one is customer satisfaction and another one is profitability. By adopting the proposed plans, firm has managed to get higher customer satisfaction score card and it is expected that with higher customer satisfaction, the firm's financial result will improve i.e. increase in ROA. However, increasing the customer satisfaction is costly. Plans which are used to increase customer satisfaction will increase the cost of the firm. This additional cost will weaken the firm's ROA by lowing profit and increasing the asset base. The optimum level of customer satisfaction is where the incremental benefits are equal to incremental costs of increasing satisfaction.

While observing the pattern of data, the customer satisfaction has increased from 86 points to 91 points in first three quarters of 2019. At this level, the additional benefits seem to more significant than the additional cost. However, in subsequent quarters, additional cost has increased more rapidly than the additional benefits. Therefore, there is decrease in ROA as we move forward on the index. However, toward the end of 2020, we see a marginal increase in ROA. This is due to the **lead-lag relation** between satisfaction and ROA. It means, the increased satisfaction might take some more time, some more quarters to result in higher ROA and the relation might not be linear. However, toward the end of 2020, the customer satisfaction score stabilizes at 96 points levels.

Overall, Kristin should not stop investing in superior customer experience, the lack of apparent pattern in customer satisfaction and profitability could stem from several causes as discussed above. Instead, firm should take decision considering current satisfaction levels, the incremental cost of increased satisfaction, and perception of the increased benefit. Moreover, the firm should also consider the current sales, otherwise it might lose its share to competitor if they do nothing.

**Question 9 : [ Case Scenario ]**

**Topic : Performance Measurement in Not for Profit Sector**

Olderhelp India is a leading charity working with and for the disadvantaged elderly for over 5 decades. Olderhelp advocates for their needs for universal pension, quality healthcare, action against elder abuse and many more. Olderhelp collects donations and funds and utilises them for the welfare of elders. The governing body of Olderhelp has setup four performance objectives for the three months to 30 Sep. 2020:

- To achieve a level of donation of ₹ 30,00,000
- To keep advertisement cost not more than 3% of donation.
- To keep welfare cost more than 85% of donation.
- To achieve 90% of respite care requested from the community

Actual results were as follows:

| Particulars | **July** | **Aug.** | **Sep.** |
|---|---|---|---|
| Donation (₹) | 7,00,000 | 13,00,000 | 11,00,000 |
| Advertisement Costs (₹) | 17,500 | 52,000 | 33,000 |
| Elder's welfare cost (₹) | 5,74,000 | 10,92,000 | 9,79,000 |
| Respite care requests (days) | 1,120 | 1,140 | 1,200 |
| Respite care provided (days) | 896 | 1,003 | 1,104 |

The aim is to serve elder needs in a holistic manner, enabling them to live active, dignified and healthier lives.

**Required :**

PREPARE a statement to assist the manager in evaluation of performance against objectives and COMMENT on the performance.

**Answer 9 :**

**Statement Showing Performance :**

| Particulars | July | Aug. | Sep. |
|---|---|---|---|
| Advertisement cost as a percentage of donation - actual | 2.5% | 4% | 3% |
| Target % of Advertisement cost of donation | 3% | 3% | 3% |
| Welfare cost as a percentage of donation - actual | 82% | 84% | 89% |
| Target % of welfare cost as a percentage of donation | 85% | 85% | 85% |
| Respite care provided - actual | 80% | 87.98% | 92% |
| Target percentage of respite care | 90% | 90% | 90% |

**Comments :**

Total donation received ₹ 31,00,000 (i.e. ₹ 7,00,000 + ₹ 13,00,000 + ₹ 11,00,000) has exceeded the target ₹ 30,00,000. Though there is no fix trend of receiving fund while it is noticeable that there were special fund raising activities in August which generated highest receipt.

Advertisement costs have been within the target of 3% in July and Sept but exceeded the target in August. More information is needed to establish why this occurred.

For the month of July and Aug, the welfare cost are less than the target, while for the month of September, welfare cost as % of donation has been exceeded the target.

There is a steady improvement in the respite care provided by Olderhelp and for the month of September, it has surpassed the target.

**Question 10 : [ Case Scenario ]**

**Topic : Competitive Advantage**

The following are the income statements of two firms in the same industry:

| Particulars | Firm WD (₹) | Firm WG (₹) |
|---|---|---|
| Revenues | 20,00,000 | 40,00,000 |
| Less: Variable costs | 9,00,000 | 24,00,000 |
| Contribution margin | 11,00,000 | 16,00,000 |
| Less: Fixed costs | 7,00,000 | 12,00,000 |
| Profit before taxes | 4,00,000 | 4,00,000 |

**Required :**

IDENTIFY the strategy (cost leadership v/s differentiation) followed by two firms. JUSTIFY your classification.

**Answer 10 :**

**Key Calculations :**

| Particulars | Firm WD | Firm WG |
|---|---|---|
| Contribution margin / Sales | 0.55 | 0.40 |
| Fixed costs / Sales | 0.35 | 0.30 |
| Profit margin / Sales | 0.20 | 0.10 |
| Variable Cost to Sales Ratio | 45% | 60% |
| Total Fixed Cost (₹) | 7,00,000 | 12,00,000 |

**ICAI Answer :**

Higher contribution margin ratio exhibited by firm WD indicates that firm WD is following a **differentiate strategy** while firm WG appears to be more focused on **cost leadership**. This is also substantiated by higher fixed costs i.e. R&D, innovation for each sale ₹ in firm WD.

Innovation allows a firm to command premium prices and earn more contribution per sales ₹. However, innovation is expensive.

**Note :** My views are completely contradictory with ICAI views and hence it is given below.

**My View & Answer :**

- Variable cost to sales ratio is lower for WD. It indicates that this firm is able to produce at a lower cost and thus has a cost advantage.
- Fixed cost remains constant irrespective of sales and hence it is to be seen on total basis, instead of viewing it as a % to sales. Firm WD has a substantially lower fixed cost than WG. It again is an indication of cost advantage.
- However, Firm WG is able to generate much higher sales revenue (i.e. double) as compared to WD. It indicates that WG is able to attract more customers than WD. It is an indication of product differentiation strategy. Product of WG seems to be superior to WD.
- Firm WG has spend more on fixed cost. It might be due to higher R&D and innovation expenditure incurred to create a product differentiation advantage over the competitor. In order to create a superior product, one has to spend more amount of money on research.
- Hence, my conclusion is that : Firm WD is following Cost Leadership strategy and Firm WG is following Product Differentiation strategy.



* * * * *

**PAPER 5 : STRATEGIC COST MANAGEMENT AND PERFORMANCE EVALUATION**

**Question 1 : [ Case Study ]**

**Sale and Wise Advisory Limited (SWAL)** is well established financial planning & risk advisory firm of the country with nation-wide presence.

**It is already covered in Case Study Digest at Q.13 on Page 44 of our notes.**

**Question 2 :**

**Topic : Overall Equipment Effectiveness (OEE)**

**Sheetal Bearing Balls Limited (SBBL)** is the famous name for bearing balls of different sizes. Mr. Syal recently joined as Manager Production and Operations at Unit 3 of Ludhiana (in Punjab) plant of the SBBL, wherein 10mm diameter steel ball bearings for bicycles are manufactured. The plant is largely automated and equipped with the latest technology machines.

From Mr. Singh, Plant Accountant Mr. Syal come to know that since machines are of the latest technology and workers are motivated due to the liberal workman policy of SBBL, hence productivity and quality was never an issue, but availability is. Over lunch, when Mr. Syal greets Mr. Kumar, Plant Head, he also expresses his worry over excessive downtime and optimal use of limiting factors.

Mr. Syal, while navigating the ERP and reviewing the files & other documents handed over to him, which was prepared and maintained by his predecessor; comes across the OEE rate of 93.555% measured during last week for machine '107-10M-Bearing' (which is a limiting factor – caused bottleneck activity) during a normal shift. Since the said machine has a high-performance rate of 105%; hence Mr. Syal decided to dig deep into the composition of OEE.

In the normal shift of 9 hours, workers are allowed to take 2 short breaks of 15 minutes each and a lunch break of 30 minutes. During such a normal shift, out of the total manufactured 27,216 bearing balls by said machine, only 272 balls are found defective.

**Required :**

(i) DETERMINE the unplanned downtime witnessed by machine 107-10M-Bearing and advise Mr. Syal, the best way-out to reduce the same (in brief).

(ii) MEASURE the Ideal Cycle Time to manufacture a single bearing ball.

(iii) APPLY, Goldratt's five steps that can be applied to remove the bottleneck at the Ludhiana plant of SBBL.

**Answer 2 :**

**Approach :** If you read the question very carefully, then you will notice that this question is to be solved in a reverse manner, using the formula of OEE.

We can calculate Quality Ratio using total units produced and defective units produced. OEE Ratio and Performance Ratio is given in the question. We will get Availability Ratio using the equation of OEE.

Using Availability Ratio, we can calculate Actual working time. Planned downtime is given in the question, now we will get unplanned downtime as balancing figure.

**(i) Calculation of Unplanned downtime of Machine 107-10M-Bearing :**

**Working 1 : Planned Production Time**

| Particulars | Minutes/shift |
|---|---|
| Total possible time (9 hours x 60 minutes) | 540 |
| Less : Short breaks (2 breaks x 15 minutes) - planned | 30 |
| Meal break - planned | 30 |
| **Planned production time** | **480** |

**Working 2 : Quality Rate**

| Particulars | Units |
|---|---|
| Total units produced (given) | 27,216 |
| Less : Defective units (given) | 272 |
| Hence, Good units produced | 26,944 |
| **Quality Rate (26,944 units / 27,216 units) = 99.00%** | |

**OEE = Availability Rate x Performance Rate x Quality Rate**

93.555% (given) = Availability Rate x 105% (given) x 99% (as above)

Hence, Availability Rate = 90%

Availability Rate = Net operating time / Planned production time

90% = Net operating time / 480 Min.

Hence, Net operating time = 432 minutes (i.e. actual time)

**Unplanned downtime** = Planned production time - Net operating time

= 480 min. - 432 min = **48 minutes**

**Advise –** In order to reduce the unplanned downtime, preventive maintenance shall be practiced either before or after each shift; and the **shine (out of 5S)** principle shall be adopted by the workman as part of the TPM initiative. It is expected that the time spent on preventive maintenance will be less than the current unplanned downtime of 48 minutes.

**(ii) Ideal Cycle Time to manufacture a single bearing ball :**

Ideal time means, standard time. We need to calculated standard time required to produce each unit.

Performance Rate = Standard time / Actual time

105% = Standard time / 432 Min.

Hence, Standard time = 453.6 minutes (i.e. ideal time)

It means, standard time required to manufacture 27,216 units is 453.6 minutes

Output per minute = 27,216 units / 453.6 min. = 60 units per minute

i.e. 60 units per 60 seconds and hence 1 unit per second.

So, standard time required to manufacture a single bearing ball (i.e. ideal cycle time) is **1 (one) second** (453.6 minutes x 60 / 27,216 units) i.e. 60 bearing balls per minute.

**(iii) Goldratt's five steps to remove the bottleneck at Ludhiana plant of SBBL :**

Goldratt's theory of constraints describes the following mentioned five steps process of identifying and taking steps to remove the bottlenecks that restrict output.

1. **Identifying the System Bottleneck -** at unit 3 of Ludhiana plant of SBBL, 107-10M-Bearing is a limiting factor hence activity performed using this equipment is bottleneck activity.

2. **Exploit the Bottlenecks** – Limiting factor (Bottleneck's activity capacity) must be fully utilized and that too optimally. Currently the overall equipment effectiveness is already 93.555%, attention on the possibility to enhance the same is needed. Like preventive maintenance shall be practiced to avoid unplanned downtime. OEE above 85% is already considered as a world class performance.

3. **Non-bottleneck activities are subordinate –** Bottleneck activity should set up the pace for non-bottleneck activities. Production units shall plan their production keeping respective limiting factors at the centre point, because even if the efficiency of non-bottleneck activity is enhanced, the same may be worthless due to scarcity of bottleneck activity.

4. **Elevate the bottleneck –** Eliminate the bottleneck by enhancing the capacity and efficiency. Major change (business reengineering) or continuous minor change (kaizen) may achieve this goal.

   **Note –** There will always be one bottleneck in the system, if such bottleneck is eliminated then a new constraint emerges as a bottleneck. Hence this process is continuous. Ultimately improvement is a never ending continues process.

5. **Repeat the process** – Apply steps 1 to 4 to new bottleneck activity which emerges at different production units of Ludhiana plant of SBBL and repeat the process.

**Question 3 :**

**Topic : Environmental Management Accounting (EMA)**

**Sheetal Paper Mart (SPM)** is in process of getting ISO 14001:2004 Environmental Management Systems (revised ISO 14001:2015) certification. SPM is selling eco-friendly and wheat straw-based paper of different sizes (A3, A4, and A5) and GSM under the brand 'Prime'. Prime is a famous name among both commercial and household consumers.

For the purpose getting certified, a cross-functional team is constituted, which is responsible **'to improve the environmental impact & image of SPM as eco-friendly enterprise and control environmental cost',** which collects the following particulars relating to the H1 and H2 (first and second half of the relevant fiscal year respectively).

Disposing of the toxic material costs ₹ 1.2 crores to SPM in H2 which is 20% lesser than what was spent during H1. Committee responsible for formulating policy matters on environment-related aspects in SPM has departmental budget of ₹ 6 lakhs p.a., in H1 the utilisation rate was 80% and in H2 it was 110%.

Environmental audits earlier used to be conducted on a half-yearly basis, but management decided to reduce the frequency to quarterly audits, in the mid of such year. Each such audit cost ₹ 8 lakhs to SPM. In the H2 SPM extends the production capacity and installed the new plant & machinery which has put to use cost of ₹ 77.25 crores, this is the premium version of the plant and machine due to its capability to reduce the generation of waste. Erection and other installation costs including dry-run were ₹ 65 lakhs and the same for all versions. The standard version has on-board cost of ₹ 76.20 crores.

SPM is practicing the recycling policy, which was formulated around three years ago; for the scrap, it generates in its plant. The review of the recycling policy is pending for the last 12 months. The cost incurred during the fiscal year was ₹ 2.75 crores, spent in alignment to scrap generated during the year. The policy document also states – 'zero discharge of waste/scrap into the environment, in order to be true-sense eco-friendly enterprise'.

In H2 contamination test was performed which cost ₹ 4 lakhs to SPM. The monitoring cost incurred during the year was ₹ 78 lakhs; in H2 this was double than H1.

**Required :**

(i) PREPARE the environmental cost statement as per the classification suggested by 'Hanson and Mendoza'.

(ii) ANALYSE the elements of environmental cost at SPM.

(iii) EVALUATE whether the cross-functional team is successful in serving their 'terms of reference'.

**Note :- Clearly State the assumption (if any).**

**Annexure**
**Scrap Generated (during the year)**

| Quarter | First | Second | Third | Fourth |
|---|---|---|---|---|
| Scrap generated and recycled | 1,572 MT | 1,428 MT | 1,114 MT | 886 MT |

**Answer 3 :**

**Student Note :** It seems that ICAI wants you to remember the names of all innovators with the method they innovated. In my opinion it is an unreasonable expectation. In my opinion, the subject of SCM&PE should be logic based and not memory based.

A brief explanation of the EMA method suggested by Hanson and Mendoza is given below for easy reference.

Hansen and Mendoza in the year 1999 pointed out that environmental costs are incurred because of poor quality controls. They classified the environmental cost into the following four categories. It is similar to Cost of Quality -

- **Environmental Prevention Costs** – Those costs, which are associated with preventing adverse environmental impacts.
- **Environmental Appraisal Costs** – The costs of activities executed to determine whether products, process and activities are in compliance with environmental standards, policies and laws.
- **Environmental Internal Failure Costs** – Costs incurred from activities that have produced waste but not discharged into the environment.
- **Environmental External Failure Costs** – Costs incurred on activities performed after discharging waste into the environment.

**Hint :** You have to just pick up the environmental costs given in the question and put it under the appropriate category to make a cost statement.

**Sheetal Paper Mart**

**(i) Environmental Cost Statement :**

| Particulars | H1 | | H2 | |
|---|---|---|---|---|
| | Amount (in lakhs) | % to total | Amount (in lakhs) | % to total |
| **Environmental Preventive Costs** | | | | |
| Creating Environment policies [(6L/2) x 80%] & [(6L/2 x 110%] | 2.4 | 0.68 | 3.3 | 0.96 |
| Investment in protective equipment [(7,725 – 65) – 7,620] | - | - | 40 | 11.58 |
| **Sub-Total (a)** | **2.4** | **0.68** | **43.3** | **12.54** |
| **Environmental Appraisal Costs** | | | | |
| Monitoring cost (78L in the ratio of 1 : 2) | 26 | 7.40 | 52 | 15.06 |
| Performing Contamination test | - | - | 4 | 1.16 |
| Environmental Audit [ 1 x 8L ] & [ 2 x 8L ] | 8 | 2.28 | 16 | 4.63 |
| **Sub-Total (b)** | **34** | **9.68** | **72** | **20.85** |
| **Environmental Internal Failure Costs** | | | | |
| Recycling Scrap ( 275L in the ratio of 3 : 2) | 165 | 46.95 | 110 | 31.86 |
| Disposing of Toxic Material | 150 | 42.69 | 120 | 34.75 |
| **Sub-Total (c)** | **315** | **89.64** | **230** | **66.61** |
| **Grand Total (a + b + c)** | **351.4** | **100** | **345.3** | **100** |

**Student Notes :**

**1.** Investment in protective equipment : Since the details regarding useful economic life of the newly erected plant and machine is not given, hence the entire incremental cost recognised in H2 only (when put to use); despite the benefit will arise over the useful economic life in form of a reduction in generation of waste.

It is assumed by ICAI that the cost of 7725L includes erection, installation and dry run cost. It is excluded from total cost of new machine without assigning any reasons. At the same time, cost of standard version of equipment i.e. 7620L is deducted by ICAI from the cost of new machine, to calculate only the incremental cost to save environment.

**2.** Recycling Scrap : This cost is shared between H1 & H2 in the ratio of actual scrap generated and recycled during the year. If you see the Annexure, you will find that scrap recycled is 3,000 MT in H1 and 2,000 MT in H2 i.e. in the ratio of 3 : 2.

**(ii) Analysis :**

The environmental cost incurred in H2 (₹ 345.3 lakhs) is comparatively less than what was was incurred in H1 (₹ 351.4 lakhs). Environmental internal failure costs reduced in H2 (₹ 230 lakhs) in comparison to H1 (₹ 315 lakhs), but still a substantial component of total environmental costs (66.61% in H2 against 89.64% in H1). The reduction of environmental internal failure costs is the outcome of increased environmental prevention costs (12.54% in H2 against 0.68% in H1) and environmental detection i.e. appraisal cost (20.85% in H2 against 9.68% in H1).

**Note –** Since the policy document also states 'zero discharge of waste/scrap into the environment, in order to be true-sense eco-friendly enterprise' hence there are no **environmental external failure costs.**

**(iii) Evaluation :**

Apart from getting the certificate, the cross-functional team has terms of reference **'to improve the environmental impact & image of SPM as eco-friendly enterprise** and **control environmental cost'**

In the context of **controlling environmental cost,** the team attained a reasonable reduction in total environmental cost. Impact in this environmental cost statement (over H1 and H2) seem low because the incremental cost due to purchase of premium version of plant and machine is charged in H2, which will benefit in the form of reduced waste over the useful economic life.

In the context of **improving the image of SPM as an eco-friendly enterprise,** the policy document which in practice also states – 'zero discharge of waste / scrap into the environment, in order to be true-sense eco-friendly' and same is also visible through environmental cost statement as there are no environmental external failure costs.

In the context of **improving the environmental impact,** SPM is able to generate low waste in H2 (2,000 MT) in comparison of H1 (3,000 MT) just by installing new plant and machine which produce less waste, increased monitoring, and audits.

**Hence, it can be concluded that the team is successfully serving the terms of reference.**

**Question 4 :**

**Topic : Cellular Manufacturing**

It has been resolved that cellular manufacturing shall be adopted in order to improve productivity, in the recent board meeting of **Raptor Bearing and Shaft Limited.** In favour of the resolution, Mr. Nayak (the executive director) who is responsible for production and operation function gave a briefing over different layouts of cells. The Managing Director, Mr. Syal believes that each possible cell formation and layout need to be studied in advance by a cross functional team.

Chief HR officer Mr. Mishra shows his concern over the utility of cellular manufacturing to enhance productivity. In response to him, Mr. Nayak mentioned 'Although scientific management is quite an old theory of management pronounced by Frederick Winslow Taylor, which analyses and synthesizes workflows with the objective of improving economic efficiency, especially labour productivity; but still has relevance. This relevance multi-folds when Time and Motion studies are considered in nexus with cellular manufacturing'.

Mr. Nayak constituted a cross-functional team with the term of reference stated in said board resolution. You are also a part of team as a representative of Management Accounting Division. The team started with the study of different possible layouts and machine cell designs. While analysing the production flow, it is observed that 5 different parts / components (P101, P104, P105, P107, and P108) are complexly involved in processing at 5 different machines (M2, M7, M13, M13A, and M15).

Part-Machine Incident Matrix for Production Flow Analysis for the said product is given below -

| | **P101** | **P104** | **P105** | **P107** | **P108** |
|---|---|---|---|---|---|
| **M2** | 1* | | | | |
| **M7** | | 1# | | | 1 |
| **M13** | 1* | | | 1 | |
| **M13A** | | 1# | 1 | | |
| **M15** | | | | 1 | |

Interpretation :

(*) P101 requires processing at M2 and M13, whereas

(#) P104 requires processing at M7 and M13A and so on for remaining parts also.

**Required :**

**(i)** DISCUSS the concern expressed by Mr. Mishra over the utility of cellular manufacturing.

**(ii)** EXPLAIN on utility of at-least three machine cell design, which can be used.

**(iii)** FIND logical part families and machine groups based upon Part-Machine Incident Matrix to showcase Machine-Part grouping using Rank Order Clustering Algorithm.

**Answer 4 :**

**Student Note :** The above question is more a **technical** in nature and seems to be picked up from the Engineering syllabus. ICAI wants a future CA to be expert in Production Planning & Engineering as well. Moreover, the concept of **'Rank Order Clustering**' is not available in ICAI module anywhere. It is first time used in this RTP only. In students language, it is out of the syllabus question.

Anyway, I have recorded a YouTube video for you to understand this concept. I request you to **first watch that video** and then read this answer, so that you can understand it better. Please search for 'Rank Order Clustering' on my YouTube channel : CA Rakesh Agrawal, Pune, India. Else, you may use this url link : **https://youtu.be/TTA8YZhjFk8**

**ICAI answer is given below -**

**(i)** Cellular manufacturing is a lean way to enhance productivity by improving (i.e. reducing) the performance in the context of time and motion involved in the production.

Cellular manufacturing is an application of group technology in manufacturing, in which all or a portion of a firm's manufacturing system has been converted into manufacturing cells.

Here it is important to note that a manufacturing cell is a cluster of machines or processes located in close proximity and dedicated to the manufacturing of a family of parts.

Cellular Manufacturing results in the following benefits to improve productivity –

(a) Reduce setup time by using part family tooling and sequencing.

(b) Reduce flow time by reducing material handling and transit time and using smaller batch sizes (even single piece flow – this also results in the requirement of less floor space).

(c) Reduce lead time.

(d) Reduced work-in-process inventory.

(e) Better use of human resources. Hence, reduced direct labour but heightened sense of employee participation.

(f) Better scheduling, easier to control, and automate.

(g) Increased use of equipment & machinery, hence reduced investment on machinery & equipment.

Hence, concern expressed by Mr. Mishra, regarding the utility of cellular manufacturing to enhance productivity is not tenable.

**(ii)** The Machine Cell Design can be classified based on the number of machines and the degree to which the material flow is mechanized between the machines. The most common designs are -

**(a)** **Single Machine Cell** consists of a machine plus supporting fixtures and tooling to make one or more part families. This can be applied **(useful)** to work parts that are made by one type of process such as turning or milling.

**(b)** **Group Machine Cell with manual handling** consists of more than one machine used collectively to one or more part families and no provision for mechanical part movement between machines. In this, human operators run the cell and perform material handling.

**Note -** If the size of the part is huge or there is a large number of machines in the cell, then regular handling crew may be required.

Preferable cell shape is **U-shaped** (single/few workers). U shape is useful in the movement of multi-functional workers.

Since the design simply includes certain machines in the group and restrict their use for specified part family, hence often achieved without rearranging the process type layout. So, it brings the cost-saving (on rearranging) but lock-in material handling benefits of group technology.

**(c)** **Group Machine Cell with Semi-integrated handling** consists of more than one machine used collectively to one or more-part families and uses a mechanical handling system, such as conveyor, to move parts between machines in the cell.

**Note –** There may be **in-line layout** (identical or similar routing – machines are laid along a conveyor to match the processing sequence) and **loop layout** (allows parts to circulate in the handling system and permits different processing steps on the different parts in the system).

**(d)** **Flexible Manufacturing System** is a highly automated machine cell in group technology that combines automated processing stations with a fully integrated material handling system.

**(iii) Rank Order Clustering Algorithm** to form machine-part groups –

Assign **Binary Weight** (BW = $2^{n-1}$) to each column j of the matrix, when n = 5 (the number types of components). Calculate the **Decimal Equivalent** (DE) of the binary values of each row using the formula :

$$DE = \sum_{j=1}^{n} (BW_j)\ (a_{ij})$$

**Rank** the rows in decreasing order of their DE values (i.e. the largest value is ranked as 1).

| i \ j | P101 | P104 | P105 | P107 | P108 | $DE_i$ | Rank |
|---|---|---|---|---|---|---|---|
| M2 | 1 | | | | | 16 | 2 |
| M7 | | 1 | | | 1 | 9 | 4 |
| M13 | 1 | | | 1 | | 18 | 1 |
| M13A | | 1 | 1 | | | 12 | 3 |
| M15 | | | | 1 | | 2 | 5 |
| $BW_j$ | $2^{5-1}$ | $2^{5-2}$ | $2^{5-3}$ | $2^{5-4}$ | $2^{5-5}$ | | |
| | 16 | 8 | 4 | 2 | 1 | | |

Now, **Re-arrange** the rows in the running order of the rankings.

Since further rearrangement is necessary, assign **Binary Weight** (BW = $2^{m-1}$) to each row i of the matrix, where m = 5 (the number of machines). Calculate the **Decimal Equivalent** (DE) of the binary values of each column j using the formula -

$$DE_j = \sum_{i=1}^{m} (BW_i)\ (a_{ij})$$

**Rank** the columns in decreasing order of their DE values i.e. the largest value is ranked 1.

| i \ j | P101 | P104 | P105 | P107 | P108 | $BW_i$ | |
|---|---|---|---|---|---|---|---|
| M13 | 1 | | | 1 | | $2^{5-1}$ = | 16 |
| M2 | 1 | | | | | $2^{5-2}$ = | 8 |
| M13A | | 1 | 1 | | | $2^{5-3}$ = | 4 |
| M7 | | 1 | | | 1 | $2^{5-4}$ = | 2 |
| M15 | | | | 1 | | $2^{5-5}$ = | 1 |
| $DE_j$ | 24 | 6 | 4 | 17 | 2 | | |
| Rank | 1 | 3 | 4 | 2 | 5 | | |

Now, **Re-arrange** the columns in the running order of the rankings.

Since further rearrangement is necessary, assign **Binary Weight** to each column j of the matrix, where n=5. Calculate the **Decimal Equivalent** (DE) of the binary values of each row i using the formula.

$$DE_j = \sum_{j=1}^{n} (BW_j)\,(a_{ij})$$

**Rank** the rows in decreasing order of their $DE_i$ values

| i \ j | P101 | P107 | P104 | P105 | P108 | $DE_i$ | Rank |
|---|---|---|---|---|---|---|---|
| M13 | 1 | 1 | | | | 24 | 1 |
| M2 | 1 | | | | | 16 | 2 |
| M13A | | | 1 | 1 | | 6 | 4 |
| M7 | | | 1 | | 1 | 5 | 5 |
| M15 | | 1 | | | | 8 | 3 |
| $BW_j$ | $2^{5-1}$ | $2^{5-2}$ | $2^{5-3}$ | $2^{5-4}$ | $2^{5-5}$ | | |
| | 16 | 8 | 4 | 2 | 1 | | |

Now, **Re-arrange** the rows in the running order of the rankings.

Since further rearrangement is necessary, assign **Binary Weight** to each row i of the matrix, where m = 5. Calculate the **Decimal Equivalent** of the binary values of each column j using the formula :

$$DE_j = \sum_{i=1}^{m} (BW_j)\,(a_{ij})$$

**Rank** the columns in decreasing order of their $DE_j$ values.

| i \ j | P101 | P107 | P104 | P105 | P108 | $BW_i$ | |
|---|---|---|---|---|---|---|---|
| M13 | 1 | 1 | | | | $2^{5-1}$= | 16 |
| M2 | 1 | | | | | $2^{5-2}$= | 8 |
| M15 | | 1 | | | | $2^{5-3}$= | 4 |
| M13A | | | 1 | 1 | | $2^{5-4}$= | 2 |
| M7 | | | 1 | | 1 | $2^{5-5}$= | 1 |
| $DE_j$ | 24 | 20 | 3 | 2 | 1 | | |
| Rank | 1 | 2 | 3 | 4 | 5 | | |

**Since the ranking is now nearty arranged in order,** stop the process. We can now identify the groupings.

**Part Families and Machine Groups**

| Cluster/Cell | Parts | Machines |
|---|---|---|
| I | P101 and P107 | M13, M2, and M15 |
| II | P104, P105, and P108 | M13A and M7 |

**Question 5 :**

**Topic : Cellular Manufacturing**

You are a newly appointed management consultant with experience in Lean System. During discussion at a meeting, managing partner (Mr. Gupta) explain the assembly line workflow process at **RIO** along with the machine part incident matrix. You quoted about your past experience of implementing Cellular Manufacturing system. Mr. Gupta asks you to :

**(i)** FIND appropriate cells using suitable method.

**(ii)** COMMENT on the results, if any.

**Note - Use "Rank Order Clustering method".**

**Machine Shop RIO-042**
Machine Part Incident Matrix

| Part / Machine | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | $P_6$ |
|---|---|---|---|---|---|---|
| $M_b$ | | | 1 | | 1 | |
| $M_c$ | | | | 1 | 1 | 1 |
| $M_d$ | 1 | 1 | | | | |
| $M_e$ | | | 1 | | 1 | 1 |
| $M_f$ | 1 | 1 | | 1 | | |

**Answer 5 :**

**Student Note :** It is very similar to the above question, hence only the matrix after every trial is given below. Steps for calculation of BW and DE are not repeated again. You may solve it on your own first and then check it with the answer below.

Just remember that in the above question there are 6 parts (i.e. 6 columns) and 5 machines (i.e. 5 rows). While calculating Binary Weight (BW) for columns, you will start with $2^{6-1}$ and while calculating BW for rows, you will start with $2^{5-1}$.

**Step 1 :**

| j / i | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | $P_6$ | $DE_i$ | Rank |
|---|---|---|---|---|---|---|---|---|
| $M_b$ | | | 1 | | 1 | | 10 | 4 |
| $M_c$ | | | | 1 | 1 | 1 | 7 | 5 |
| $M_d$ | 1 | 1 | | | | | 48 | 2 |
| $M_e$ | | | 1 | | 1 | 1 | 11 | 3 |
| $M_f$ | 1 | 1 | | 1 | | | 52 | 1 |
| $BW_j$ | $2^{6-1}$= | $2^{6-2}$= | $2^{6-3}$= | $2^{6-4}$= | $2^{6-5}$ | $2^{6-6}$ | | |
| | 32 | 16 | 8 | 4 | 2 | 1 | | |

Now, **Re-arrange** the rows in the running order of the rankings.

**Step 2 :**

| j / i | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | $P_6$ | $BW_i$ | |
|---|---|---|---|---|---|---|---|---|
| $M_f$ | 1 | 1 | | 1 | | | $2^{5-1}$= | 16 |
| $M_d$ | 1 | 1 | | | | | $2^{5-2}$= | 8 |
| $M_e$ | | | 1 | | 1 | 1 | $2^{5-3}$= | 4 |
| $M_b$ | | | 1 | | 1 | | $2^{5-4}$= | 2 |
| $M_c$ | | | | 1 | 1 | 1 | $2^{5-5}$= | 1 |
| $DE_j$ | 24 | 24 | 6 | 17 | 7 | 5 | | |
| Rank | 1 | 2 | 5 | 3 | 4 | 6 | | |

**Note :** In case of a tie at Decimal Equivalent (DE), give the rank arbitrarily.

Now, **Re-arrange** the columns in the running order of the rankings. We have to continue this process, until all the ranks are in a normal sequence.

**Step 3 :**

| j / i | $P_1$ | $P_2$ | $P_4$ | $P_5$ | $P_3$ | $P_6$ | $DE_i$ | Rank |
|---|---|---|---|---|---|---|---|---|
| $M_f$ | 1 | 1 | 1 | | | | 56 | 1 |
| $M_d$ | 1 | 1 | | | | | 48 | 2 |
| $M_e$ | | | | 1 | 1 | 1 | 7 | 4 |
| $M_b$ | | | | 1 | 1 | | 6 | 5 |
| $M_c$ | | | 1 | 1 | | 1 | 13 | 3 |
| $BW_j$ | $2^{6-1}$ | $2^{6-2}$ | $2^{6-3}$ | $2^{6-4}$ | $2^{6-5}$ | $2^{6-6}$ | | |
| | 32 | 16 | 8 | 4 | 2 | 1 | | |

Now, **Re-arrange** the **rows** in the running order of the rankings.

**Step 4 :**

| j / i | $P_1$ | $P_2$ | $P_4$ | $P_5$ | $P_3$ | $P_6$ | $BW_i$ | |
|---|---|---|---|---|---|---|---|---|
| $M_f$ | 1 | 1 | 1 | | | | $2^{5-1}$ | 16 |
| $M_d$ | 1 | 1 | | | | | $2^{5-2}$ | 8 |
| $M_c$ | | | 1 | 1 | | 1 | $2^{5-3}$ | 4 |
| $M_e$ | | | | 1 | 1 | 1 | $2^{5-4}$ | 2 |
| $M_b$ | | | | 1 | 1 | | $2^{5-5}$ | 1 |
| $DE_j$ | 24 | 24 | 20 | 7 | 3 | 6 | | |
| Rank | 1 | 2 | 3 | 4 | 6 | 5 | | |

**Note :** In case of a tie at Decimal Equivalent (DE), give the rank arbitrarily.

Now, **Re-arrange** the columns in the running order of the rankings.

**Step 5 :**

| j / i | $P_1$ | $P_2$ | $P_4$ | $P_5$ | $P_6$ | $P_3$ | $DE_i$ | Rank |
|---|---|---|---|---|---|---|---|---|
| $M_f$ | 1 | 1 | 1 | | | | 56 | 1 |
| $M_d$ | 1 | 1 | | | | | 48 | 2 |
| $M_c$ | | | 1 | 1 | 1 | | 14 | 3 |
| $M_e$ | | | | 1 | 1 | 1 | 7 | 4 |
| $M_b$ | | | | 1 | | 1 | 5 | 5 |
| $BW_j$ | $2^{6-1}$ | $2^{6-2}$ | $2^{6-3}$ | $2^{6-4}$ | $2^{6-5}$ | $2^{6-6}$ | | |
| | 32 | 16 | 8 | 4 | 2 | 1 | | |

Since the ranking is now neatly arranged in order, stop the process.

We can now identify the cells.

| | | |
|---|---|---|
| **Cell 1** | $P_1$, $P_2$, $P_4$ | $M_f$, $M_d$ |
| **Cell 2** | $P_5$, $P_6$, $P_3$ | $M_c$, $M_e$, $M_b$ |

The following cells, as derived from the Rank Order Clustering Algorithm, shall be presented to Mr. Gupta for consideration along with the below comments.

| **Cell 1** | | **Cell 2** | |
|---|---|---|---|
| **Part Family 1** | **Machine Group 1** | **Part Family 2** | **Machine Group 2** |
| $P_1$ | $M_f$ | $P_5$ | $M_c$ |
| $P_2$ | $M_d$ | $P_6$ | $M_e$ |
| $P_4$ | | $P_3$ | $M_b$ |

**Comments :**

It is essential to understand that the cells are **not totally independent.** Since part $P_4$ which is a member of cell 1, needs processing on $M_c$, which belongs to cell 2. So, some amount of inter cell movement will take place in this situation. Only Part $P_4$ has to taken from Machine Cell 1 to Machine Cell 2 for processing. Other than this part, all other parts will be processed in their respective machine cells only.

In general, these movements may become unavoidable in real life circumstances. There are various alternative ways of eliminating inter cell moves in a cellular manufacturing system like – redesigning the part so that the machine belonging to other cell is no longer required for processing or subcontracting the part or adding an additional machine $M_c$ in cell 1 etc. The cell designer should evaluate the consequences of each of these ways and take suitable measures to minimise these movements.

**Question 6 :**

**Topic : Manufacturing Cycle Efficiency (MCE)**

**Glenn Electronics** manufactures a wide range of electronic heaters and geysers. Glen was a popular name among retailers and customers, but it keeps on losing the market share. The major reason is that the emerging competitors are offering economical products to customers with similar features and quality. The market is price sensitive, hence adding more features and establishing itself as a premium brand is not the option. The only possible choice left with Glen is to reduce prices and for that it needs to reduce the cost to maintain the profit margin.

A cost management committee was constituted to study the scenario and recommend the solution to the board of directors. The committee based upon their study suggested a 3-phase solution. Out of which, phase one is 'stress on enhancing manufacturing cycle efficiency from its current level of 62.50%'. The committee has collected the following data from the office of the Chief Management Accountant –

- Current batch wait time before the order getting processed is 4 days.
- The time spent working on the products (batch processing time) is currently 30 days.
- Total time spent by the products waiting to be processed, moved, inspected, and delivered (batch queue time) is currently 6 days.
- Currently, the time spent on making sure that the products are not defective (batch inspection time) is double that of the time spent in transferring products between workstations (batch move time).

The Board of directors based upon the committee's report decided to apply cellular manufacturing to reduce unnecessary move time. Based upon the decision, tasks are allocated to concerned functional managers.

Managers and workers showed their resistance by stating – "we are not convinced that cellular manufacturing reduces motions on the production floor". Some workers even mentioned that they are not aware of what is current batch inspection time and batch move time.

**Required :**

You are a deputy to management accountant and was part of the committee, hence board approached you to convince the managers and workers to be a part of change management.

(i) CALCULATE current batch inspection time and batch move time.

(ii) CALCULATE manufacturing cycle time, and how much is non-value-added time? (in term of days)

(iii) CALCULATE revised manufacturing cycle efficiency if both batch inspection time and batch move time are cut down to half of the current level and other elements remain constant.

(iv) What makes cellular manufacturing capable to reduce motions on the production floor and how it will benefit the workers? EXPLAIN.

**Answer 6 :**

**Student Note :** MCE is already given in the question but batch inspection time and move time is missing. We need to calculate it by making a mathematical equation with the help of MCE.

Please note that Total manufacturing cycle time includes waiting time that Raw material or WIP spends while waiting for the next operation. However, it doesn't include the waiting time spent **before** starting the manufacturing process.

In the above question, it is mentioned that the current batch wait time **before** the order getting processed is 4 days. This waiting time won't be included in the calculation of MCE. However, it will be included in the calculation of **Customer Response Time** (if asked).

**(i) Calculation of Batch Inspection Time and Batch Move Time**

Let assume that batch move time is 'X' days, then the batch inspection time will be '2X' because currently it is double than the batch move time.

Manufacturing Cycle Efficiency (MCE)

$$= \frac{\text{Processing Time}}{\text{(Processing Time + Inspection Time + Queue Time + Move Time)}}$$

Hence,

$$62.50\% \text{ or } 0.6250 = \frac{20 \text{ days}}{(20 \text{ days} + 2X + 6 \text{ days} + X)}$$

On solving the above linear equation, we will get X = 2 days

Hence, **Batch move time** (X) is 2 days and **Batch Inspection time** (2X) is 4 days.

**(ii) Calculation of Manufacturing Cycle Time and Non-Value-Added Time (in days)**

Total Manufacturing Cycle Time = (Processing + Inspection + Queue + Move Time)
= 20 + 4 + 6 + 2 days = **32 days**

Non value added time = Inspection + Queue + Move Time
= 4 + 6 + 2 days = **12 days**

**(iii) Calculation of Revised Manufacturing Cycle Efficiency** if both batch inspection time and batch move time are cut down to half of the current level.

Revised Move time will be 1 day and Revised Inspection time will be 2 days.

$$MCE_{Revised} = \frac{20 \text{ days}}{(20 \text{ days} + 2 \text{ days} + 6 \text{ days} + 1 \text{ day})}$$

$$MCE_{Revised} = \frac{20 \text{ days}}{29 \text{ days}} = \textbf{0.6897 or 68.97\%}$$

Improvement is recorded from 62.50% to 68.97%, on account of cut down of batch inspection time and batch move time to half of the current level.

**(iv) Cellular manufacturing** is capable of reducing motions on the production floor. Cellular manufacturing is a **lean way** to enhance productivity by improving the performance in the context of time and motion involved in the production.

Cellular manufacturing is an application of **group technology** in manufacturing in which all or a portion of a firm's manufacturing system has been converted into **manufacturing cells** (a cluster of machines or processes located in close proximity and dedicated to the manufacturing of a family of parts). In this manner cellular manufacturing results in the reduction of move time by reducing material handling (through integrated cell) and transit time and using smaller batch sizes (even single unit).

Hence motion (movement of material & product) and movement of workers (efforts) during production is reduced on the production floor. This may also result in reduced queue time because batch size is small even single piece flow in some cases. This is beneficial to the workers as well in the following ways -

Apart from enhancing the productivity for organizations; firstly a worker has to work less, due to reduced motions. Fatigue will also be less to the worker after working in a shift of the same tenure. If he is a piece-rate worker, then he can earn more wages in the same time. Secondly, since he is working on more than one machine or more than on one part, his job becomes more challenging and hence he may feel more empowered. Hence, cellular manufacturing leads to win-win situation wherein organisation and labour both gets benefitted.

**Question 7 :**

**Topic : Decision Making**

Micro-guard Industries Limited (MGIL) is a renowned company for a unique range of thoughtfully engineered products, designed to provide simplified solutions and upscale your home interiors. MGIL is engaged in the manufacturing of Power Systems, Batteries, Wires & Cables, Switch Gears & Modular Switches etc. But MGIL is largely famous for its wide range of Voltage Stabilizers. Each product is manufactured in a separate division.

While planning regarding voltage stabilizers division (VSD) for the first half of the fiscal year 20-21 amid the outbreak of COVID-19, the board gets through a report from internal expert committee pertaining to crystal series of voltage stabilizers which says – 'due to restricted availability of the input factors (on account of lock-down by the government), only 40,000 crystal voltage stabilizers (CVS) are expected to be manufactured and sold during the first half of fiscal year, as against the normal capacity of 75,000 units per quarter, that too at ₹ 1,600/- per CVS'. At normal capacity level, it incurs the following cost to manufacture and sell single unit of CVS –

| **Particulars** | **Amount (₹)** |
|---|---|
| Direct Material | 575 |
| Direct Labour | 215 |
| Variable Overhead | 310 |
| Fixed overhead | 300 |
| Total Cost per unit | **1,400** |

One of the directors suggested – 'since migrant workers moved to their home states and expected to come back in 3 to 5 months' time, hence it is better to temporary discontinue (lock-out) the production for the first half of fiscal'. Another director supports him by stating – 'it will give an opportunity to our retailers to clear the old stock available with them'. On the reference by the board, you (chief management accountant of MGIL) provide an estimate to management that 1/3$^{rd}$ of the fixed overheads at a normal capacity level are unavoidable and additional cost due to discontinue (lock-out) of plant for 6 months and resumption thereafter is ₹ 35 lakhs.

**Required :**

You are required to ADVISE the management on –

(i) Shall they continue the production of CVS or temporary discontinue (lock-out) for the first half of the fiscal year? (consider monetary aspects only)

(ii) The qualitative factors which needs to be considered, while deciding either to discontinue (lock-out) or continue.

(iii) What are the minimum number of CVS that VSD needs to manufacture and sell; in order to economically justify the continuation of the production.

**Answer 7 :**

**Student Note :** It is a question relating to 'Continue or Shut Down' decision. We studied it in Chapter 6 i.e. Decision Making.

If we calculate the 'Shut Down Point', then we can answer part (iii) as well as part (i) of the question together.

**(i) Calculation of Shut Down Point and Decision :**

| | |
|---|---|
| Fixed cost on continuation | = 300 per unit x 75,000 units per quarter |
| | = 225 lakhs per quarter |
| | i.e. ₹ 450 lakhs for the half year |
| Fixed cost of Shut down | = Unavoidable cost + additional cost of resumption |
| | = (1/3 x 450 L) + 35 L = ₹ 185 lakhs for 6 months |
| Contribution per unit | = Sales price - Variable cost |
| | = 1,600 - ( 575 + 215 + 310 ) = ₹ 500 per unit |
| Shut down point | = Difference in Fixed cost / Contribution per unit |
| | = ( 450L - 185 L ) / 500 |
| | = 53,000 units for half year (i.e. 6 months) |

It means, if the expected production & sales is below 53,000 units; then it is advisable to temporarily shut down the business. It is the minimum number of CVS that VSD needs to manufacture and sell; in order to economically justify the continuation of the production.

**Decision :** As we expect to manufacture and sell only 40,000 units during the first half of the fiscal year, it is advisable to lock down / shut down the business for next 6 months.

**(ii) Qualitative factors, while deciding either discontinue (lock-out) or continue :**

**(a) Government advisory regarding lock-down and lock-in** – MGIL is legally bound to observe and comply with government advisories regarding lock-down and lock-in during COVID-19 situation, irrespective of economical impact.

**(b) Customer relations –** Discontinuing the production, even temporary may cause adverse reactions from customers. They may move to another product or brand which capable to substitute CVS. Customers may not return back in future after we open up again.

**(c) Retailers relations –** The trade relation with retailers of VSD may turn bitter if our supply is halted. It may also cause a loss of goodwill. Although the director argued that retailers can sell the old stock available with them, but it is nowhere mentioned that whether all the retailers have a requisite amount of stock in order to cater the needs of their customers.

**(d) Employee/Worker relations** – One of the directors mentioned that migrant workers moved to their home states and expected to come back in 3 to 5 months. It is important to identify how much of the workforce at VSD is migrant and what is the duration of lock-down announced by the Government. Is there any relaxation in the

same (for example working with 1/3 or 1/2 capacity)? VSD also needs to consider guidelines and terms of the agreement with workers, in regard to the compensation they will get, if it is decided to lock-out (temporarily discontinue the production). Apart from this, workers' morale is also an important factor to consider.

**(e) Whether discontinuing a segment have adverse effects on the sale of other products –** CVS is a complementary product to other models sold by VDS and product sold by MGIL. Hence, impact of discontinuing the production of CVS on sale of these related products need to be considered.

**Question 8 :**

**Topic : Pricing Strategy**

**Zutus Ltd.** is a leading Indian Pharmaceutical company which is a fully integrated, global healthcare provider. With in-depth domain expertise in the field of healthcare, it has strong capabilities across the spectrum of the pharmaceutical value chain. Zutus has earned reputation worldwide amongst pharmaceutical companies for providing comprehensive and complete healthcare solutions.

One of the drugs, Rifmn is an antibiotic used to treat contagious disease “Tbis”. Rifmn is a patented medicine. The patent for which is now going to expire, and several other competitors are expected to enter in the market for selling the medicine using the same components of chemicals, under different other names. In order to reposition itself in the market, the company is reviewing its pricing policy considering the market change and other threat.

The market research for Rifmn indicates that for every ₹ 4 decrease in price, demand would be expected to increase by 8,000 batches, with maximum demand for Rifmn being one million batches.

Each batch of Rifmn is currently made of using chemical salts :

Salt X : 367.50 gm at ₹ 0.08 per gm.

Salt Y : 301.50 gm at ₹ 0.40 per gm.

Each batch of Rifmn requires 30 minutes of machine time to make and the variable running costs for machine time are ₹ 40 per hour. The fixed production overhead cost is expected to be ₹ 35 per batch for the period, based on a budgeted production level of 3,00,000 batches.

The skilled workforce who has been working on Rifmn until now are being shifted onto the production of Zutus company’s new antiviral drug (injection) for Viral Disease-19 which costs millions of ₹ to develop. Zutus has obtained patent for this revolutionary drug and it is expected to save millions of lives all across the world. The launch of this drug is excitedly anticipated all over the world, while its demand is unknown and no other similar specific drug exists. The average labour cost (outsourcing) of each batch of Rifmn is ₹ 38.60.

The management of Zutus considers that pricing decision of Rifmn should be based on each batch.

**Required :**

**(i)** CALCULATE the optimum (profit-maximizing) selling price for Rifmn and the resulting annual profit which Zutus will make from charging this price.

**(ii)** RECOMMEND the pricing strategy for launching of new antiviral drug.

**[ Note : If P = a – bQ, then MR = a – 2bQ ]**

**Answer 8 :**

**(i) Calculation of Optimum Selling Price of Rifmn :**

**Marginal cost per batch (i.e. Variable cost) :**

| Particulars | Calculations | ₹ |
|---|---|---|
| Salt X | 367.50 gm x ₹ 0.08 | 29.40 |
| Salt Y | 301.50 gm x ₹ 0.40 | 120.60 |
| Labour (outsourcing) | Given in question | 38.60 |
| Machine running cost | (30/60 x ₹ 40.00) | 20.00 |
| Total marginal cost per batch | | 208.60 |

b = change in price/change in quality

b = ₹ 4 / 8,000 units = 0.0005

The maximum demand for Rifmn is 10,00,000 units. It is interpreted by ICAI as, when P = 0, then Q = 10,00,000. Value of 'a' can be calculated by substituting these values for P and Q into the price function as follows :

P = a – bQ

0 = a – (0.0005 x 10,00,000)

0 = a – 500 Hence, a = 500

Price function is therefore : P = 500 – 0.0005Q

Marginal revenue function : MR = a – 2bQ

**Let's Calculate Optimum Quantity First**

At Optimum Quantity, MC and MR are equal. Let's equate MC = MR

208.60 = 500 – (2 x 0.0005 x Q)

208.60 = 500 – 0.001Q

0.001Q = 291.4

Q = 2,91,400 batches

**Calculation of optimum selling price**

P = 500 – (0.0005 x 2,91,400)

P = ₹ 354.30 per batch

**Calculation of Maximum Profit :**

| Particulars | ₹ |
|---|---|
| Revenue ( 2,91,400 batches x ₹ 354.30 ) | 10,32,43,020 |
| Less: Variable costs ( 2,91,400 batches x ₹ 208.60 ) | 6,07,86,040 |
| Less: Fixed costs ( 3,00,000 batches x ₹ 35 ) | 1,05,00,000 |
| ∴ Profit | 3,19,56,980 |

**(ii) Pricing Strategy for New Drug :** Firms often use different pricing strategies when their products are first launched in to the market. The most common two approaches are : skimming pricing and penetration pricing.

In **penetration pricing**, low price is charged initially. Thought behind this is that low price will make the product accessible to large number of buyers, so high sales will compensate the low price being charged getting the benefits of economies of scale. This approach works best when customers are price sensitive, R & D and marketing expenses are low, or when competitors will quickly enter the market.

In the given case, medicine prices are highly inelastic in nature, so any reduction in price will not increase the demand of the drug, which clearly indicates that market penetration pricing will not help.

**Skimming Pricing** refers to charging high price initially and then lower the prices. High price in the early stage of the product's life cycle is expected to generate high initial cash flows, which will help the company to recover high research & development cost. This would enable the company to take advantage of unique nature of the product. It is mentioned in the question that the product is revolutionary in nature and hence skimming pricing is justified.

In the present case, the unique nature of drug, high entry barrier (since company has taken patent) and huge initial investment suggests that skimming pricing strategy would be more favourable pricing strategy. However, the strategy only works as long as drug is protected by patent.

In addition, a drug firm is required to consider the expected reactions from national price controller who in turn may be influenced by political factors and public opinion. If the price is regulated by Government, then we will have little control over it.

**Question 9 :**

**Topic : Just in Time**

X sells 'mu-50' to its customers. It purchases mu-50 from Y @ ₹ 140 per unit. Y pays all freight to X. No incoming inspection is necessary because Y has a superb reputation for delivery of quality merchandise. Annual demand of X is 13,000 units. X requires 15% annual ROI. The purchase order lead time is 2 weeks.

The purchase order is passed through EDI and it costs ₹ 2 per order. The relevant insurance, material handling etc. is ₹ 3.10 per unit year. X has to decide whether or not to shift to JIT purchasing.

Y agrees to deliver 100 units of mu-50 for 130 times per year (i.e. 5 times in every two weeks) instead of existing delivery system of 1,000 units for 13 times a year, with additional amount of ₹ 0.02 per unit. X incurs no stock out under its current purchasing policy. It is estimated that X will incur stock out cost on 50 units under a JIT purchasing policy. In the event of a stock out, X has to rush order which costs ₹ 4 per unit.

**Required :**

Briefly COMMENT whether X should implement JIT purchasing system.

**Student Note :**

Please refer almost the same question covered in our classroom notes.

Version 3 Notes : Volume I : Q.4 on Page no. 70.

**Answer 9 :**

**Comparative 'Statement of Cost' for**
**Purchasing from Y under 'Current Policy' & 'JIT'**

| **Particulars** | **Current Policy (₹)** | **JIT (₹)** |
|---|---|---|
| Purchasing Cost p.a. | 18,20,000 (13,000 units x ₹ 140) | 18,20,260 (13,000 units x ₹ 140.02) |
| Ordering Cost | 26 (₹ 2 x 13 Orders) | 260 (₹ 2 x 130 Orders) |
| Opportunity / Carrying Cost (Av. inventory x c.c.p.u.p.a.) | 10,500 (1/2 x 1,000 units x ₹ 140 x 15%) | 1,050 (1/2 x 100 units x ₹ 140.02 x 15%) |
| Other Carrying Cost i.e. Insurance, Material Handling etc. | 1,550 (1/2 x 1,000 units x ₹ 3.10) | 155 (1/2 x 100 units x ₹ 3.10) |
| Stock Out Cost | --- | 200 ( 50 units x ₹ 4.00) |
| **Total Relevant Cost** | **18,32,076** | **18,21,925** |

**Comments :**

As may be seen from above, the total relevant cost under JIT purchasing policy is lower than the cost incurred under the existing system. Hence, a JIT purchasing policy should be adopted by the company.

**Question 10 :**

**Topic : Just in Time**

IPL is a leading manufacturing company. Under increasing pressure to reduce cost, to control inventory level and to improve services, IPL's Costing Department has recently undertaken a decision to implement a JIT system.

The management of IPL is convinced of the benefits of their changes. But Supplies Manager "W" has fears with the Costing Department's decision. He said : "We've been driven by suppliers for years...they would insist that we could only purchase in thousands, that we would have to wait weeks, or that they would only deliver on Mondays !"

**Required :** COMMENT on Mr. W's viewpoint.

**Answer 10 :**

"For successful operation of JIT inventory system, the suppliers chosen must be willing to make frequent deliveries in small lots. Rather than deliver a week's or a month's material at one time. Suppliers must be willing to make deliveries several times a day and in the exact quantities specified by the buyer."

It is described in the problem that suppliers are not willing to

- make frequent deliveries and
- make supplies in the exact quantities as required.

Accordingly Mr. W's doubt is correct on successful implementation of JIT system.

**Question 11 :**

**Topic : Budgetary Control**

The following are 2 types of monthly control reports of a CA firm showing gross collection in (₹ 000). The budgeted collection for the year ending on 31 March are ₹ 4,14,00,000 in total.

**Type-X**

**'Gross Collection' Report prepared in July**

| Activity | Budget | Most Recent Forecast for the year | Expected Variance |
|---|---|---|---|
| Accounting | 16,560 | 17,250 | 690 (F) |
| Auditing | 10,350 | 8,280 | 2,070 (A) |
| Taxation | 14,490 | 13,386 | 1,104 (A) |
| Total | 41,400 | 38,916 | 2,484 (A) |

**Type-Y**

**'Gross Collection' Report prepared in July**

| Activity | Monthly | | | Cumulative till date | | |
|---|---|---|---|---|---|---|
| | Budget | Actual | Variance | Budget | Actual | Variance |
| Accounting | 2,415 | 2,622 | 207 (F) | 6,210 | 6,486 | 276 (F) |
| Auditing | 1,380 | 966 | 414 (A) | 3,450 | 2,691 | 759 (A) |
| Taxation | 1,725 | 1,587 | 138 (A) | 3,450 | 3,105 | 345 (A) |
| Total | 5,520 | 5,175 | 345 (A) | 13,110 | 12,282 | 828 (A) |

**Required :**

IDENTIFY the type of control system for both types of report.

**Answer 11 :**

Type-X indicates to a feed forward control system. A feed forward control system operates by comparing budgeted results against a forecast. So that, corrective action can be taken to avoid expected adverse variances.

Type-Y reveals feedback control system. A feedback control system identifies variances that has already taken place, by comparing the actual historical results with the budgeted results.

**Note –** Both Feedback and Feedforward Controls may coexist in the same system, but the two designs function in a very different ways.

* * * * *

# Extra Questions taken from Jan. 2019 Module

**Question 1 : [ Practical Question ]**

**Topic : Just in Time [ ICAI Module Ref. : 3.47 ]**

A manufacturer is considering implementing Just in time inventory system for some of its raw material purchases. As per the current inventory policy, raw materials required for 1 month's production and finished goods equivalent to the level of 1 week's production are kept in stock. This is done to ensure that the company can cater to sudden spurt in consumers' demand. However, the carrying cost of inventory has been increasing recently. Hence, the consideration to move to a more robust just in time purchasing system that can reduce the inventory carrying cost. Details relevant to raw material inventory are given below:

- Average inventory of raw material held by the company throughout the year is ₹ 1 crore. Procurement of raw material for the year is ₹ 12 crore. By moving to just in time procurement system, the company aims at eliminating holding this stock completely in its warehouse. Instead, suppliers of these materials are ready to provide the goods as per its production requirements on an immediate basis. Suppliers will now be responsible for quality check of raw material such that the raw material can be used in the assembly line as soon as it is delivered at the company's factory shop floor.
- Increased quality check service done by the suppliers as well as to compensate them for the risk of holding the inventory to provide just in time service, the company is willing to pay a higher price to procure raw material. Therefore, procurement cost will increase by 30%, total procurement cost will be ₹ 15.6 crore per year. Consequently, quality check and material handling cost for the company would reduce by ₹ 1 crore per year. Similarly, insurance cost on raw material inventory of ₹ 20 lakh per year need not be incurred any longer.
- Raw material is stored in a warehouse that costs the company rent of ₹ 3 crore per annum. On changing to Just in time procurement, this warehouse space would no longer be required.
- Production is 150,000 units per year. The company plans to maintain its finished goods inventory equivalent to 1 week's production. Despite this, in order to have a complete cost benefit analysis, the management is also factoring the possibility of production stoppages due to unavailability of raw material from the suppliers. This could happen due to of delay in delivery or non-conformance of goods to the standard required. Labor works in one 8 hour shift per day and will remain idle if there is no material to work on. Due to stoppage of production for the above reason, it is possible to have stockout of 3,000 units in a year. Stockout represents lost sales opportunity due to unavailability of finished goods, the customer walks away without purchasing any product from the company. Therefore, in order to reduce this opportunity cost and to make up for the lost production hours, labor can work overtime that would cost the company ₹ 10 lakh per annum. This is the maximum capacity in terms of hours that the labor can work. With this overtime, stockout can reduce to 2,000 units.
- Currently, sale price is ₹ 5,000 per unit, variable production cost is ₹ 2,000 per unit while variable selling, general and administration (SG&A) cost is ₹ 750 per unit. Raw material procurement cost is currently ₹ 800 per unit, that will increase by 30% to ₹ 1,040 per unit under Just in time inventory system.
- On an average, the long-term return on investment for the company is 15% per annum.

**Required**

(i) CALCULATE the benefit or loss if the company decides to move from current system to Just in Time procurement system.

(ii) RECOMMEND factors that the management needs to consider before implementing the just in time procurement system.

**Answer 1 : [ It is slightly modified by me ]**

**(i) Calculation of Incremental Profit / Loss due to switching over to JIT System :**

| Particulars | Current Purchasing Policy (₹) | JIT Procurement System (₹) |
|---|---|---|
| Raw material procurement cost per year | 12,00,00,000 | 15,60,00,000 |
| Quality check and material handling cost (No longer required in JIT) | 1,00,00,000 | --- |
| Insurance Cost on raw material inventory (No longer required in JIT) | 20,00,000 | --- |
| Warehouse rental for storing raw material (No longer required in JIT) | 3,00,00,000 | --- |
| Overtime Charges under JIT to reduce Stockouts (WN 1 below) | --- | 10,00,000 |
| Stockout Cost (WN 2 below) | --- | 40,20,000 |
| Total Relevant Cost | 16,20,00,000 | 16,10,20,000 |

Therefore, moving to just in time procurement system results in savings of ₹ 980,000 per year for the company. If reinvested, long term return on investment for the company at 15% would yield a return of ₹ 147,000 per year. Therefore, total benefit for the company would be ₹ 11,27,000 per year.

**Working Notes :**

**Note 1**: Should overtime cost be incurred to reduce Stockouts?

Contribution per unit = Sale price - Variable production cost - Variable SG&A OH

Revised Variable production cost under the just in time system

= ₹ 2,000 + ₹ (1,040 - 800) = ₹ 2,240 per unit

Contribution per unit = ₹ 5,000 - ₹ 2,240 - ₹ 750 per unit = ₹ 2,010 per unit.

Overtime cost can reduce stockouts from 3,000 units to 2,000 units that is customers' demand of 1,000 units more can be met.

Contribution earned from selling these 1,000 units = 1,000 × ₹ 2,010 per unit = ₹ 20,10,000.

Therefore, the contribution earned of ₹ 20,10,000 is more than the related overtime cost of ₹ 10,00,000. Therefore, it is profitable to incur the overtime cost.

**Note 2:** Stockout Cost :

Out of the total shortfall of 3,000 units, by spending on overtime 1,000 units of demand can be met. Therefore, actual stockout units is only 2,000 units. As explained above, contribution per unit is ₹ 2,010 per unit. Hence, stockout cost = 2,000 units × ₹ 2,010 per unit = ₹ 40,20,000.

**Student Note** : ICAI has assumed that there is no stock out at present. It will occur only under JIT system.

**(ii)** The company plans to eliminate its raw material inventory altogether. Raw material will be delivered as per production schedule directly at the factory shop floor, from where production will begin. The management should therefore carefully consider the following points:

(a) The entire production process has to be detailed and integrated sequentially. This is essential to know because it should be known in advance when in the sub-assembly process each raw material is required and in what quantity.

(b) Since production is dependent on delivery and quality of raw material, heavy reliance is being placed on suppliers. They should be able to guarantee timely delivery of raw material of the appropriate quality. The company is paying a premium of 30% of original cost, that is ₹ 240 per unit extra in order to ensure the same. Each unit gives a contribution of ₹ 2,010 per unit, which is 40.2% of the sale price per unit. Lost sales opportunities due to unavailability of raw material or non-conformance of the material can result in substantial losses to the company. While, portion of this has been factored while doing the cost benefit analysis of implementing Just-in-time systems, it needs careful consideration and monitoring even after implementation. Therefore, to hedge its loss, the management and suppliers should agree on penalties for the suppliers for any delay or nonconformance in quality of materials beyond certain thresholds.

(c) Accurate prediction of sales trends is important to determine the production schedule and finished goods planning.

(d) Continuous monitoring of the system even after implementation is essential to ensure smooth operations. Management commitment and leadership support is essential for its successful implementation and working.

**Question 2 : [ Case Scenario ]**

**Topic : Business Process Re-engineering (BPR) [ ICAI Module Ref. : 3.50 ]**

ANA is one of Country 'I''s top footwear companies and other equipment. Since its foundation in 1988, ANA has been one of the all-inclusive footwear brand that is committed to nurturing the youth across the world through sports to contribute to society. Over more than three decades, the company inherits its values and provides own products while capturing the changes in the social environment. It's state-of-the-art production facilities are located strategically across the Country 'I' and produces all kinds of footwear. ANA is best known for its high ethical standards towards its workers, suppliers and the environment and voluntarily publish CSR report every year.

**Organizational Structure and Footwear Market**

ANA is organized into conventional functional departments such as procurement on order basis, sales, and finance, most of which have their non-reliable excel sheet-based systems for planning and reporting. Consequently, it often fails to generate accurate, timely and consistent information to monitor its own performance, thus, company faces failures in achieving the performance and delivery targets set by its retail customers.

In Country 'I', footwear market is competitive and seasonal. Retailers, who are ANA's customers, for footwear, they have two main demands, they want –

(i) footwear at lower prices to pass it on to consumers.

(ii) suppliers to meet performance and delivery targets relating to lead times and quality.

In order to comply with the retailer's demands, ANA's competitors have discontinued all their own manufacturing facilities and outsourced all production to suppliers, who have much larger production lines and lower costs. To reduce the shipment cost over long distances, competitors have invested in advanced procurement software to consolidate orders so that each 40-foot shipping container gets fully loaded. Purchase invoice processing is also automated via the integration of information systems into the supplier's software.

**Proposal of Outsourcing**

In order to mitigate costs, it has been proposed to outsource the manufacture of footwear, to a Chinese Supplier 3,750 km away. A comparison of the average cost of manufacturing and the cost of outsourcing footwear is given below-

| Particulars | Manufacturing | Outsourcing |
|---|---|---|
| Average manufacturing cost per pair | BND 625 | |
| Purchase cost per pair | | CNY 28 |

Notes -
Country 'I''s home currency is the BND.
Exchange Rate 1 CNY = 18 BND.

In addition to the purchase cost from the supplier, ANA will be subject to pay for shipping costs at the rate of BND 40,000 for each large, standard sized shipping container, regardless of the number of units in it. Each container contains 5,000 pairs when fully loaded.

Custom tariffs are expected to change soon, footwear imports into ANI's home country might be subject to 10% basic custom duty (plus 10% social welfare surcharge on duty) on the assessable value of imports excluding shipping costs.

Therefore, to implement the proposal, restructuring of functional departments into multi-disciplinary teams are needed to serve major buyer accounts. Each team is required to perform all activities, related to the buyer account management from order taking (sales order) to procurement to arranging shipping and after sales services. Team members dealing with buyers will work in ANA's corporate office, while those like QC etc. managing quality and supplier audits, will work at the manufacturing site of Chinese Supplier. Teams will be given greater independence to selling prices to reflect market conditions or setting a price based on the value of the product in the perception of the customer. Many support staff will work as helper roles, or be offered new job opportunities overseas after the restructuring.

**Expert Advise :**

Prof. WD, Performance Management Consultant has advised ANA that the proposal has features of re-engineered processes and can be defined as business process re-engineering (BPR). Prof. advised, for evaluating the proposal, ANA should consider software development for full front-end order entry, purchasing, and inventory management solution which may be required along with ethical aspect of the proposed changes.

**Required :**

(i) ADVISE on information system which would be required for the reengineering.
(ii) ASSESS the likely impact of reengineering on the ANA's high ethical standards and accordingly on business performance.
(iii) EVALUATE how the BPR proposal can improve ANA's performance in relation to retail customers.

**Answer 2 :**

**(i) Advise on Information System :**

Combining several jobs into one, permitting workers to make more decision themselves, defining different versions of processes for simple cases v/s complex ones, minimizing situations when one person check someone else's work, and reorganizing jobs to give individuals more understanding and more responsibility are characteristics of re-engineered processes.

In ANA, outlays can be saved by rearranging staff into multidisciplinary teams, for example, reducing number of excess staff at different stages – cutting, preparation, finish etc. These savings can be utilized in additional costs such as investment in new information systems. Hammer and Champy stress the use of information technology as a catalyst for major changes. BPR organizes work around customer processes rather than functional hierarchies.

Presently, ANA's departments have their own excel sheet-based systems for planning and reporting which is unreliable and inconsistent. They are inadequate to provide the accurate, timely and consistent data which ANA needs to meet its own performance and delivery targets. There must a shared database that should be accessible by all parts of the functional teams. This should have real time updation, so that employees in different time zones can use updated data. The database should include financial data and non-financial data, like cost information, data related to lead times and quality. Information systems must be featured with all required reports like performance report, budget report etc.

In addition, ANA is required to invest in special system as advised by Prof. WD for full front-end order entry, purchasing, and inventory management solution to minimize shipping costs by ensuring that the shipping containers get fully loaded and to integrate with supplier's information systems to automate purchase invoicing.

Overall, ANA must analyze that whether the benefits due to information technology are worthy.

**(ii) Assessment of Likely Impact of Re-engineering on Ethical Standards :**

**Workers :**

ANA is famous for its high ethical standards towards workers and staff. Because of adopting BPR proposal, manufacturing staff are likely to be unemployed. Competitors, have already shutdown their factories, these workers may not be able to find similar jobs.
Employees who continue in work may become disappointed if they think the application of BPR is detrimental to their interest. This may reduce productivity, increase staff turnover or difficulties in recruiting new staff. In addition, they may also be demotivated if they are appointed on unfamiliar roles, or may not be willing to learn new skills.
Some of staff members may be motivated by the opportunity to perform new types of work, learn new skills or work outside India. This may enhance their individual performance.

**Suppliers :**

Any association with non-ethical practices, for example, if the Chinese supplier is indulged in using non-acceptable working practices, could seriously spoil ANA's reputation for high ethical standards. This could undermine financial performance because customers may not buy its products, or possible investors might refuse from providing capital. Staff members located at the manufacturing sites are responsible for supplier audits, which may assist to mitigate this risk.

**Environment :**

ANA should consider the environmental impact of importing goods from long distances. The environmental related credentials of the Chinese Supplier are not known. Since, ANA voluntarily publishes a corporate sustainability report, any distortion in its performance on environmental issues might undermine the financial performance.

### (iii) Evaluation of BPR Proposal in relation to Retailer's Demand :

**Lower Prices**

In order to sell footwear at lower prices, there is a proposal to reduce costs by outsourcing production to supplier. The current average production cost of manufacturing is BND 625 per unit. The cost of purchase from an external supplier works out to be BND 512 as landed cost. That is purchase cost + shipping cost.

BND 504 (CNY18 x BND28) purchase cost, *plus* BND 8 (BND 40,000 / 5,000) shipping cost. This 18.08% (113/625) saving is a substantial improvement in financial performance, but not a dramatic one. It may be noted that BPR is a methodology that should be applied only when radical or dramatic change is required. Further, exchange rate movements may also slash the cost saving significantly. In the near future, expected changes to international trade tariffs will increase the unit cost to CNY 31.08 (CNY 28.00 x 111%) i.e. 559.44 in BND and reduce the cost saving to just 10.49% (65.56 / 625).

**Meeting Performance Targets**

**Lead times**

Current lead times for customer orders are not ascertainable. Since the proposed Chinese Supplier is 3,750 km away, consignment will take several weeks to be imported by sea. This may increase lead times substantially, although may be set off by faster production times in supplier's plant. As ANA's sales are seasonal, retailers may order in advance, decreasing the long lead times. In order to decrease shipping costs, shipping containers must be full, meaning that deliveries must be in larger quantities.

**Quality**

ANA is already known for manufacturing high quality footwears. The quality of the new supplier's footwear needs to be checked. Any distortion in the quality of footwear will deteriorate its reputation and decrease long-term business performance since only few customers would order. Quality standards checking is more difficult while using outside suppliers, especially at long distance, than manufacturing in ANA's own factory. In BPR, work is done where it makes most sense to do so. In this aspect, having employees responsible for quality checking and supplier audits (working at the manufacturing site abroad) will assist ANA in sustaining the best supplier relationship management.

**Question 3 : [ Case Scenario ]**

**Topic : Target Costing [ ICAI Module Ref. : 4.21 ]**

Kaveri Ltd. (KL) is a manufacturer of bikes in India and it sells them in India and outside India. KL has just launched the World's smallest and most affordable bike called 'Zingaroo'. The bike is mounted with all-aluminum, single cylinder, air cooled, 99.2 cc engine. The engine makes just over 8 bhp power and 8 Nm in torque, but it stakes claim to be the fuel-efficient bike, with a claimed figure of 88 kmpl. It has been creating competition for two wheelers as none of the Indian companies as well as foreign companies, offer a bike for such a competitive price within the reach of middle class family.

KL has adopted target costing technique in manufacturing this bike. For KL, maintaining target price was difficult. During the designing and production process of bike, inputs costs increased frequently. However, KL designed various components especially for bike to maintain the target price. Though, one curiosity prevails, how this can be done in the future when input costs are bound to increase further.

Many environmentalists have opposed the manufacture of this bike, because they believe that mass production of small bike (about 2.5 lakh bikes every year) will create heavy pollution. Many people believe that this small bike is not up to the safety standards due to lightweight and use of aluminum and plastic frames. The design of this bike is entirely different from that of other bikes. This also causes a doubt that the existing bike mechanics would be able to repair or not.

Durability of bike is another issue in the Indian environment. Further, performance of 'Zingaroo' more or less depends upon the condition of roads and traffic system.

After the launch of 'Zingaroo', many other national and international automobile companies are also planning to manufacture small bike which will create tough competition in near future.

**Required :**

Now you being a strategic performance analyst of KL, answer the following questions :

(i) IDENTIFY strategy which KL has adopted for 'Zingaroo' bike?

(ii) After adopting target costing, IDENTIFY issues and challenges faced by KL and suggest the remedial action to be taken to solve these issues?

**Answer 3 :**

**i)** KL has adopted Low Cost Strategy for `Zingaroo' bike since the main purpose of manufacturing this bike was to make it cheapest and affordable.

**ii)** The issues and challenges faced by KL and their remedial action are as follows :

Maintaining of Target Price :

'Zingaroo' bike is one of the world's cheapest and smallest bike. Maintaining target-price proved to be a big challenge for the KL since input cost of bike are bound to increase further in future. The initial value engineering may not uncover all possible cost savings. Thus, Kaizen Costing may be designed to repeat many of the value engineering steps for as long as a bike is produced, constantly refining the process and thereby stripping out extra costs.

Environmental Issues :

Many Environmentalists have opposed the manufacture of bike as they believe that mass production of small bikes will create heavy pollution since automobile pollution is already a big problem for a country like India. For this issue, 'Zingaroo' bike can be prepared based on BS emission norms. These norms restrict the pollution created by any motor vehicle.

Safety Issues :

Since 'Zingaroo' bike is made of aluminium and plastic frames so this may also create safety issues for the customers. For such issues, KL should meet safety standards. Further, KL should make people aware that 'Safety is Primary' or ' Drive Safely'.

Servicing / Repairing Facilities :

The design of 'Zingaroo' bike is entirely different from that of other bikes. This causes a doubt that the existing bike mechanics would be able to repair or not. For such problem, creation of a good network of service center can be a solution i.e. repair centre should be established at required places.

Durability :

Durability of 'Zingaroo' bike is another issue in the Indian environment. The performance of bike more or less depends upon the condition of roads and traffic system. For such issues, tyre quality and hydraulic brake system should be compatible to the roads and traffic system.

Global Competition :

After the launch of 'Zingaroo' many other national and international automobile companies are also planning to manufacture a small bike, which will be a big challenge for the KL in the near future. To face such competition, it may adopt Kaizen Costing technique. The cost reductions resulting from Kaizen Costing are much smaller than those achieved with Value Engineering but are still worth the effort since competitive pressures are likely to force down the price of 'Zingaroo' over time, and any possible cost savings allow KL to still attain its targeted profit margins while continuing to reduce cost.

**Question 4 : [ Case Scenario ]**

**Topic : Product Life Cycle & Pricing [ ICAI Module Ref. : 7.21 ]**

Netcom Ltd. manufactures and sells a number of products. All of its products have a life cycle of less than one year. Netcom Ltd. uses a four stage life cycle model (Introduction, Growth, Maturity and Decline).

Netcom Ltd. has recently developed an innovative product. It was decided that it would be appropriate to adopt a market skimming pricing policy for the launch of the product.

However, Netcom Ltd. expects that other companies will try to join the market very soon.

This product is currently in the introduction stage of its life cycle and is generating significant unit profits. However, there are concerns that these current unit profits will not continue during the other stages of the product's life cycle.

**Required :**

Explain, with reasons, the changes, if any, to the unit selling price and the unit production cost that could occur when the products move from the previous stage into each of the following stages of its life cycle :

(i) Growth

(ii) Maturity

**Answer 4 :**

**(i) Growth Stage :**

Compared to the introduction stage the likely changes are as follows :

Unit Selling Prices :

These are likely to be reducing for a number of reasons :

- The product will become less unique as competitors use reverse engineering to introduce their versions of the product.
- Netcom may wish to discourage competitors from entering the market by lowering the price and thereby lowering the unit profitability.
- The price needs to be lowered so that the product becomes attractive to different market segments thus increasing demand to achieve the growth in sales volume.

Unit Production Costs :

These are likely to reduce for a number of reasons :

- Direct materials are being bought in larger quantities and therefore Netcom may be able to negotiate better prices from its suppliers thus causing unit material costs to reduce.
- Direct labour costs may be reducing if the product is labour intensive due to the effects of the learning and experience curves.
- Other variable overheads costs may be reducing as larger batch sizes reduce the costs of each unit.
- Fixed production costs are being shared by a greater number of units.

**(ii) Maturity Stage :**

Compared to the growth stage the likely changes are as follows :

Unit Selling Prices :

These are unlikely to be reducing any longer as the product has become established in the market place. This is a time for consolidation and whilst there may be occasional offers to tempt customers to buy the product the selling price is likely to be fairly constant during the period.

Unit production Costs :

Direct material costs are likely to be fairly constant in this phase and may even rise as the quantities required diminish compared to those required in the growth stage with the consequential loss of negotiating power.

Direct labour costs are unlikely to be reducing any longer as the effects of the learning and experience curves have ended. Indeed the workers may have started working on the next product so that their attention towards this product has diminished with the result that these costs may increases.

Overhead costs are likely to be similar to those of the end of the growth phase as optimum batch sizes have been established and are more likely to be used in this maturity stage of the product life cycle where demand is more easily predicted.

**Question 5 : [ Example ]**

**Topic : Transfer Pricing [ ICAI Module Ref. : 9.20 ]**

A Company has two divisions A and B, making products A and B respectively. One unit of A is an input for each unit of B. B has a production capacity of 45,000 units and ready market. Other information available regarding Division A are :

| | |
|---|---|
| Capacity (production units) | 50,000 |
| Maximum External Sales units | 30,000 |
| Fixed costs up to 30,000 units is<br>Beyond 30,000 units; it increases by ₹ 50,000 for every additional 10,000 units | ₹ 4,30,000 |
| Variable Manufacturing Cost p.u. | ₹ 55 |
| Variable Selling Cost p.u. (for external sales) | ₹ 10 |
| Variable Selling Cost p.u. (for special order / transfer to B) | ₹ 5 |
| Selling Price p.u. (for external market) | ₹ 80 |
| Selling Price (for special sales) | ₹ 70 |

B can buy the input A from outside at a slightly incomplete stage at ₹ 45 p.u. and will incur subcontracting charges of ₹ 30 p.u. to match it to the stage at which it receives goods from Division A. Division B is willing to pay a maximum ₹ 75 p.u. if Division A supplies its entire demand of 45,000 units. If Division A supplies lesser quantity, Division B is willing to pay only ₹ 70 p.u.

Division A has also received a special order for 15,000 units which it needs to either accept in full or reject. Division A may choose to avoid variable selling cost of ₹ 5 p.u. on transfer to B or on special order, by incurring a fixed overheads of ₹ 50,000 p.a. instead.

(i) What is the best strategy for Division A? Show the profitability of that option.

(ii) What will be the range of transfer price, if the best strategy is chosen?

**Answer 5 :**

**(i) What is the best strategy for division A?**

With a production capacity of 50,000 units, Division A has to find an optimum mix of sales between external sales, internal transfer to Division B and special order. Division B requires 45,000 units. Division A can supply the entire 45,000 units to Division B for which transfer price is ₹ 75 p.u. or can supply lower quantity for which transfer price is ₹ 70 p.u.

As production increases, certain cost components would also change. Changes to cost of production and selling expenses are discussed below.

**(a) Selling expenses :** It is given that for special orders or internal transfers, Division A can either bear a variable selling cost of ₹ 5 p.u. or choose to incur a fixed cost of ₹ 50,000 p.a.

Working out the indifference point, the selling cost will be the same at 10,000 units (i.e. = ₹ 50,000 / ₹ 5 = 10,000 units). For any internal transfer or special sale below 10,000 units, it makes sense to bear the variable cost of ₹ 5 p.u. Over 10,000 units it makes sense to bear the fixed cost of ₹ 50,000 p.a.

Even if Division A chooses to cater entirely to external sales of 30,000 units, the balance 20,000 units will be used to cater to either the special order or as internal transfer to Division B or can even be both (i.e. special order 15,000 units and internal transfer 5,000 units). Since in any case, total sale will be more than 10,000 units, Division A can opt to bear the fixed cost of ₹ 50,000 p.a.

**(b) Fixed Manufacturing Cost :**

**ICAI View :** Division A is working at full capacity i.e. 50,000 units are produced. Fixed cost shall be ₹ 4,30,000 (for first 30,000 units) and it would increase by ₹ 50,000 for every extra 10,000 units produced over 30,000 units. Hence total fixed cost will be 4,30,000+ 50,000 + 50,000 = ₹ 5,30,000.

**My View :** In the above view, ICAI has assumed that Division A will produce and sell all the 50,000 units and hence will incur a fixed cost of ₹ 5,30,000.

I feel that one should work out whether producing beyond 30,000 units is profitable for Division A or not, and then take a decision. If incremental contribution beyond 30,000 units is more than incremental fixed cost, then only Division A should produce beyond 30,000 units. It can happen if the incremental contribution is more than ₹ 5 per unit to recover the incremental fixed cost of ₹ 50,000 for every extra 10,000 units produced over 30,000 units.

**Note :** As the calculations done below justify the production beyond 30,000 units and hence production of all 50,000 units is profitable for Division A. Hence, the final answer with ICAI view and my view will ultimately remain the same.

To arrive at the optimum mix, Division A will calculate the contribution received per unit under the various options as follows :

| Particulars | External Sale up to 30,000 units | Special Order 15,000 units | Transfer to B, less than 45,000 units | Transfer to B, all 45,000 units |
|---|---|---|---|---|
| (a) Selling Price | 80 | 70 | 70 | 75 |
| (b) Variable Costs : | | | | |
| Manufacturing | 55 | 55 | 55 | 55 |
| Selling & Dist. | 10 | 0 | 0 | 0 |
| (c) Contribution (a) – (b) | 15 | 15 | 15 | 20 |

**Decision :**

The above calculation indicates that, transfer to division B of 45,000 units yields the highest contribution of ₹ 20 per unit. This leaves a balance capacity of 5,000 units with Division A, whose maximum capacity is given as 50,000 units. This is insufficient to meet the special order of 15,000 units. (Please note that the special order has to be accepted in full or to be rejected).

Hence, Division A will utilize the balance 5,000 units to cater to external sales. Therefore, the optimum production mix would be :

Transfer to Division B 45,000 units and external sales 5,000 units.

**Profitability Statement of Division A :**

| Particulars | Figures in ₹ |
|---|---|
| Contribution from - | |
| Transfer to Division B (45,000 units x ₹ 20) | 9,00,000 |
| External Sales (5,000 units x ₹ 15) | 75,000 |
| Total Contribution from Sales | 9,75,000 |
| Less : Manufacturing Fixed Cost (as discussed in point 'b' above) | 5,30,000 |
| Less : Selling Fixed cost (as discussed in point 'a' above) | 50,000 |
| ∴ Profit Earned | 3,95,000 |

**(ii) Range of transfer price under the best strategy :**

As explained above, the best strategy for Division A would be to sell 45,000 units to Division B and 5,000 units externally.

Minimum Transfer price per unit

= Marginal Cost per unit + Additional fixed cost per unit + Opportunity cost per unit

As Discussed above, additional outlay would be the fixed selling cost of ₹ 50,000 that it chooses to incur rather than incur a variable cost of ₹ 5 p.u. If this fixed selling cost is spread over 45,000 units, then the per unit cost would be ₹ 1.11 (₹ 50,000 / 45,000 units)

Had division A not sold 45,000 units to Division B, it would have chosen from any of the other three options viz. (a) selling 30,000 units externally or (b) meeting special order of 15,000 units or (c) transfer of less than 45,000 units to Division B. In all these cases, it would have yielded a contribution of ₹ 15 p.u. This is the opportunity cost for Division A for choosing the best strategy.

Therefore, Minimum Transfer Price that Division A will demand shall be -

= Marginal Cost per unit + Additional fixed cost per unit + Opportunity cost per unit

= ₹ 55 + ₹ 1.11 + ₹ 15 = ₹ 71.11

Maximum Transfer price that Division B is willing to pay is given as = ₹ 75

Hence, the range of transfer price would be between ₹ 71.11 to ₹ 75.

**Question 6 : [ Basic Concepts ]**

**Topic : Transfer Pricing [ ICAI Module Ref. : 9.33 ]**

G is the transferring division and R, the receiving division in a company. R has a demand for 20% of G's production capacity which has to be first met as per the company's policy. State with reasons, which division, G or R enjoys more advantage in each of the following independent situations, assuming no inventory built up.

| Sr. No. | G Transfers to R at Transfer Price equal to | G's Production level | External Demand | Division having more advantage | Reason |
|---|---|---|---|---|---|
| (i) | Full cost : No mark up | 60% | 40% | | |
| (ii) | Market Price | 80% | 60% | | |
| (iii) | Marginal Cost | 100% | 80% | | |
| (iv) | Market Price | 100% | 90% | | |

**Answer 6 :**

| Sr. No. | Division having more Advantage | Reason |
|---|---|---|
| (i) | G | G is utilizing only 40% of production capacity by selling to 'External Market' which implies that G might have not been able to recover its full fixed costs. By transferring 20% of its production capacity to Division R at full cost, G will be able to recover fixed costs component. Transfer price above marginal cost will lead to an incremental contribution for Division G. |
| (ii) | G | G will not be losing any external market demand as it is within its production capacity. By transferring 20% of production capacity to division R at market price, G will earn extra contribution towards the fixed costs and profit. |
| (iii) | R | Here G is operating at 100% Capacity level and external market demand is 80% only i.e. G is not losing any external market demand. But by transferring 20% of production capacity to R at marginal cost i.e. at variable cost, G may not be able to recover fixed cost part of total cost. On the other hand R will be able to get these units at marginal cost only. |
| (iv) | G | To satisfy 20% demand of R, division G will lose an opportunity to sell in the external market for 10% of its capacity. However, it would be earning the same revenue by transferring the goods to division R at market price. Hence, in fact, there is no opportunity cost to G. Moreover, G will be able to utilize additional 10% of its production capacity to earn an incremental profit on it. |



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# Extra Questions taken from Nov. 2020 Module

**Chapter 3 : Lean System & Innovation**

**Topic : Total Productive Maintenance - Calculation of OEE**

There is a slight change in the formula of Availability Ratio for the calculation of OEE.

**Formulae for calculation :**

**(a) Availability Ratio : Changed formula**

= Actual operating time available x 100
*Planned production time

**Important Note** : The above formula is as per the revised module of ICAI released in Nov. 2020. There is a slight modification in the denominator of the above formula. In the earlier module, the denominator was **Gross** available time and in the revised module, it is **Planned** production time.

Planned down time such as preventive maintenance, lunch break, tea break etc. is not regarded as loss of time as per the revised approach. It means, planned down time should be excluded while calculating 'Planned production time'.

**(b) Performance Ratio (i.e. Efficiency Ratio) : No change in this formula**

= Standard time required for actual output x 100
Actual time taken for actual output

**(c) Quality Ratio : No change in this formula**

= Number of units accepted (i.e. good units) x 100
Total number of units produced

**(d) OEE% =** Availability Ratio % × Performance Ratio % × Quality Ratio %

This can be better understood with the following example -

**Question 1 : [ ICAI New Module Ref. : 3.22 to 3.24 ]**

Kiwi Ltd. manufactures automobile spare parts. A 12 hour shift is scheduled to produce a spare part in KIWI Ltd. as shown in the schedule below. The shift has three 15 minute breaks and a 10 minute clean up period.

**Production Schedule for Automated Machine NZ 10 :**

Cycle : 10 (seconds) i.e. standard time for one unit

Spare parts manufactured : 3,360 units

Scrap : 75 units

Unplanned downtime : 36 minutes

**Required :** Calculate 'OEE'.

**Answer 1 :**

**1. Calculation of Available time, Production time and Actual operating time per shift :**

| Particulars | Minutes |
|---|---|
| Total available time per shift ( 12 hours x 60 min. ) | 720 |
| Less : Planned Downtime :<br>Three planned breaks ( 3 x 15 min. )<br>Clean up period | <br>45<br>10 |
| ∴ Planned production time per shift | 665 |
| Less : Unplanned Downtime (given) | 36 |
| ∴ Actual operating time per shift | 629 |

**2. Availability Ratio :**

= Actual operating time available x 100
Planned production time

= ( 629 min.) x 100 = 94.59%
( 665 min.)

Note : If we would have gone by old method, then the availability ratio would be -

= ( 629 min. / 720 min. x 100 ) = 87.36%

It means, under the new method, availability ratio has improved, because we have ignored planned and unavoidable downtime in the calculation of denominator.

**3. Performance Ratio (i.e. Efficiency Ratio) :**

= Standard time required for actual output x 100
Actual time taken for actual output

= ( 3,360 units x 10 seconds ) / 60 x 100
629 minutes (as above)

= ( 560 min. / 629 min. x 100 ) = 89.03%

**4. Quality Ratio :**

= Number of units accepted x 100
No. of units produced

= ( 3,360 - 75 units ) x 100 = 97.77%
3,360 units

**6. OEE Ratio :**

OEE % = Availability × Performance × Quality

= 94.59% x 89.03% x 97.77%

= 0.9459 x 0.8903 x 0.9777

= 0.8234 = 82.34%

**Question 2 : [ Chapter 2 ]**

**Topic : Cost of Quality [ ICAI New Module Ref. : 2.7 ]**

Livewell Ltd. is a manufacturing company that produces a wide range of consumer products for home consumption. Among the popular products are its energy efficient and environment friendly LED lamps. The company has a quality control department that monitors the quality of production.

As per the recent cost of poor quality report, the current rejection rate for LED lamps is 5% of units input. 5,000 units of input go through the process each day. Each unit that is rejected results in a ₹ 200 loss to the company. The quality control department has proposed few changes to the inspection process that would enable early detection of defects. This would reduce the overall rejection rate from 5% to 3% of units input. The improved inspection process would cost the company ₹ 15,000 each day.

**Required :**

(i) Analyse the proposal and suggest if it would be beneficial for the company to implement it.

(ii) After implementation, Analyse the maximum rejection rate beyond which the proposal ceases to be beneficial?

**Solution 2 :**

**(i) Analysis of the new proposal :**

| **Particulars** | **₹ / day** |
|---|---|
| Savings in the loss due to reduction in rejection rate [ ₹ 200 per unit x ( 5% - 3% ) x 5,000 units ] | 20,000 |
| Less : Cost of inspection process improvement | 15,000 |
| ∴ Net benefit to the company | 5,000 |

**Conclusion :** Considering net benefit of ₹ 5,000 per day to the company, it is advisable to implement the proposal.

**(ii) Calculation of maximum rejection rate :**

| **Particulars** | **₹** |
|---|---|
| (a) Cost of implementing proposal | 15,000 |
| (b) Savings in loss per unit | 200 |
| (c) Reduction in rejection of minimum no. of units to recover the above cost [ a / b ] | 75 units |
| (d) Reduction in rejection in % of input [ 75 / 5,000 x 100 ] | 1.5% |
| (e) Maximum allowable rejection in % of input [ 5% - 1.5% ] | 3.5% |

**Question 3 : [ Chapter 5 ]**

**Topic : Power Sector [ ICAI New Module Ref. : 5.11 ]**

**A Study on Proposed Investment in Nuclear Power Project :**

Glare Inc. is a national power generating company in uranium rich Country "G". Its core business is generation and sale of electricity to state-owned power distribution companies and state boards. All power plant of Glare work in same way by taking in fuel and producing electricity, harmful gases and waste products. The output i.e. electricity produced out of the power plants is measured in megawatt hour (MWh). Glare has long-term goal to reduce its carbon-emission rate to less than 500 kilogram per megawatt-hour (kg/MWh) by 2025. Company is following the footstep of many leading countries, those have developed big power sources to feed and satisfy the ever increasing demands for power in many industries and factories. Currently, most of economically successful and industrialized countries are fulfilling their industrial needs through nuclear power. However, limited supplies of fuel for nuclear power plants may thwart the growing interest in nuclear energy.

In Country "G", demand for electricity is expected to grow by an estimated rate of 12 percent per year due to rising populations, growing wealth and escalating demand of goods and services that require more electricity. Moreover, Country "G" is planning to develop network of high speed train which require huge amount of electricity. To boost power sector, the government recommended the change in the licensing process so that a new power plant receives both the construction permit and the operating license prior to the start of construction and created the Committee for 'Electricity Industry Restructuring' to deregulate the market. In addition, government is conscious towards the way Country "G" can reduce its carbon emissions. Therefore, government has decided to reduce the same by 30% from the present level in coming 5 years.

Glare has a proposal to take benefit of growing demand by increasing its power generation capacity through installing a nuclear power plant in City "Y". A nuclear plant takes about five years to build with government permission. It cost about G$1,000 billion to construct. It has work life of 40 years. Current cost for decommissioning a nuclear power plant is G$200 billion. This includes estimated costs to safely dispose of any onsite nuclear waste, any radioactive material, including nuclear fuel as well as irradiated equipment and buildings.

Operating and fuel costs for new nuclear plants are proving to be quite competitive to other fuel sources. The average costs of operations, maintenance and fuel in Country "G" is 80 cent per kilowatt hour (KWh). Data published by the Nuclear Energy Research Institute (NERI) shows that, new nuclear energy plants in the Country 'G' may need to produce electricity at a total cost of below G$ 2.40 per KWh to remain competitive with the fossil fuel options.

Note : Country "G"s local currency is G$. The current exchange rate is 1GD = USD 0.0125

**Annexure - Glare Inc.**

**Power Plant Annual Statistics, 2020**

| Particulars | Plant 1 | Plant 2 | Plant 3 | Plant 4 | Plant 5 | Proposed |
|---|---|---|---|---|---|---|
| Primary Fuel | Coal | Diesel | Oil | Natural Gas | Pet. Coke | Nuclear |
| Capacity (MW) | 1,400 | 12 | 875 | 1,850 | 200 | 2,800 |
| Capacity Factor | 0.795 | 0.750 | 0.798 | 0.80 | 0.735 | 0.82 |
| Electricity Generation (MWh) | 96,16,320 | 77,760 | 60,32,880 | 1,27,87,200 | 12,70,080 | 1,98,37,440 |
| CO2 Emissions (MT) | 91,11,573 | 90,686 | 50,61,615 | 74,13,132 | 8,15,711 | 4,95,936 |

| | | | | | | |
|---|---|---|---|---|---|---|
| CO2 Emissions (kg/MWh) | 948 | 1,166 | 839 | 580 | 642 | 25 |

**Notes :**

1. Carbon Dioxide (CO2) emissions are estimated based on the industry standard.
2. Annual Capacity Factors are averages of the monthly values for 2020. Monthly Capacity Factors are computed as 'the actual monthly generation' divided by 'the maximum possible generation' for that month. 'The maximum possible generation' is the number of hrs. in the month multiplied by the monthly capability.

**Evaluation of Proposal**

**Demand for electricity**

In Country "G", estimates indicate that demand for electricity is expected to grow at 12% per annum. The rising population, growing wealth and escalating demand of goods and services that require even more electricity as well as proposed network of high speed train are a factor behind this. Therefore, demand for electricity in coming five years will be 70% to 80% more than the present levels.

Glare will be able to take benefit of this growing demand by installing a nuclear power plant. Setting up a plant of 2,800 MW capacity in City "X" will increase its annual production to 4,96,21,680 MWh by 2025 The effect would be dynamic i.e. 66.6% increase over existing production level.

**CO2 emission rate**

Glare's strategic planning is to focus on long term goal to reduce its carbon-emission rate. Therefore, It has created a long term performance standard i.e. to reduce *overall* carbon-emission rate less than 500 kilogram per megawatt-hour (kg/MWh) by 2025. Setting up a new nuclear power plant will enable it to reduce overall CO2 emission rate from 755 kg/MWh to 463 kg/MWh i.e. below target level specified. In addition, this will also support government's objective of reducing the carbon emission in coming five years. The effect will be -39% over 5 years.

| Particulars | Current | 2025 | Change |
|---|---|---|---|
| Total CO2 Emission Rate (kg/MWh) | 2,24,92,717/2,97,84,240 = 755 | 2,29,88,653/4,96,21,680 = 463 | - 39% |

**Estimation of the cost of electricity generated from nuclear power plant**

Computations show that, new nuclear energy plant in City "X' will produce electricity at a total cost of below G$ 2.40/KWh, *making it competitive with the fossil fuel options*. This is estimated total cost against the electricity output over the life time of new power plant. This total cost includes the investment cost charges, the present worth of annual fuel and operating expenses. The *investment cost* charges are the present worth of cost for design, construction, refurbishing, decommissioning and expenses scheduled during construction period. The *fuel and operating costs* include the purchasing, convert and enriching uranium, fuel fabrication, spent fuel conditioning, reprocessing, transportation, and disposal of spent fuel; plant operations and maintenance labour cost.

The cost of nuclear power generation works out to G$ **2.31/KWh**. The main cost component is the construction cost, G$ 1.26/KWh. Other components of cost are small in comparison i.e. G$ 0.80/KWh. Decommissioning and waste management costs are G$ 0.25/ KWh. These costs contribute only a few percent to the investment cost of the plant and have an even lower impact on the electricity generation cost as these costs are discounted over the life of the plant; impact of the same is about 10.8% of the cost of electricity produced. These may likely be of a large order of magnitude far into the future due to *uncertainty involved*.

**Note :** Cost includes construction, operation and maintenance, fuel and decommissioning.

[ { 1,200 b / (1,98,37,440 x 40) } / 1,000 + 0.80 ] = **G$ 2.31/KWh**

**Economic viability**

It is important to note that investment cost (i.e. cost of construction etc.) is the most important aspect in determining the *economic competitiveness* of nuclear power project; however, this does not assess a project's *economic viability*. The appropriate measure is the cost of the electricity produced by the nuclear project in comparison to the other sources of electricity and in comparison to market price of electricity at the time the nuclear power plant becomes operational. Country "G" is going to deregulate the market, in this type of market, *there is a risk that subsequent events e.g. new technology etc.* could unpredictably make the plant become uncompetitive before the investment cost is repaid as there will no longer be a direct relationship between the cost to produce electricity and their price that can be charged for it. *Price will be set by competitive market place*, without the opportunity to increase prices to cover unexpected outlay. Therefore, investing substantial amount in a project with a risk may be a *serious concern for the stakeholders*.

One of the primary contributors to the investment cost of nuclear plant is cost of money used to finance nuclear plant construction. The financing cost rises when the time needed to license and construct a plant increases. Country "G" is modifying its licensing process so that a plant receives both the construction permit and the operating license before production starts. Therefore, there will not be any requirement for large capital investment in plant before completion of a specific portion of the licensing process. It is given that estimated time from the start of construction to the start of operation is 5 years. Relaxation in licensing norms will have a *positive impact* on this time period as well as on the investment cost.

**Availability of fuel**

Nuclear power is a feasible option today for generating *additional capacity* with many power generating companies looking at the opportunity of either starting or expanding their fleet. But, limited supplies of uranium, this is being primary fuel that can be used for power generation in nuclear reactors, may thwart the growing interest in nuclear energy. Since the Country "G" is uranium rich country, therefore supply of fuel would not be a big concern. However, *price pressure resulting from ultimate resource constraints* at global level could *affect the uranium prices*.

**Long term source of energy**

Nuclear power plants are likely to operate for at least 40 years, some probably longer. In contrast, gas and coal fired power plants are expected to have a lifetime of around 30 years, though in a few cases this may be extended with a major refurbishment. It is important to note that as the life increases, the *uncertainty about the future costs and benefits* increases.

**Environmental effect**

Nuclear power has been considered as a source of providing net environmental benefits since nuclear power makes negligible contribution to global warming through the emission of carbon dioxide. However, *risk of radiation leakage* resulting from accidents at a power plant or during the

transport of spent fuel cannot be ignored. Operators of nuclear power plants are generally answerable for any damage to third parties caused by an incident at their installation regardless of fault.

**Overall**

Nuclear power has always been recognized by a combination of higher construction and lower operating costs as compared to fossil fuel alternatives. If environmental costs are taken into consideration, the total costs incurred by nuclear power generation may prove to be even more *cost-competitive* because it is a cleaner technology.

Cost competiveness, goal alignment, positive change in the licensing process and a dynamic market growth have made nuclear power an attractive energy choice for Glare. However, the *issues that are unique to nuclear* e.g. regulator's actions, spent fuel disposition, public perception of safety, decommissioning standards etc. should be factored into the decision making process.

**Question 4 : [ Chapter 8 ]**

**Topic : Non Financial Performance Measurement [ ICAI New Module Ref. : 8.19 ]**

Lite automobile limited (LAL) is one of leading automobile assembly part manufactures of the country. In order to manage the performance of LAL, the CMD in latest board meeting shown his willingness to apply non-financial performance indicators (NFPI) in addition to financial performance indicators.

CEO conducts meeting thereafter with functional heads. Some of the functional heads are concerned with the scope of the NFPI as part of performance management system. During the meeting Chief HR Lead of company raise his concern over the utility of NFPI to monitor and control the human resource. Chief Operating Officer also raise his concern on the manner how NFPI can ensure quality in the products and services. Chief Public Relation Officer also concerned how NFPI will improve the brand equity.

**Required :**

Office of CEO hired you as management consultant, for designing and effective implementation of performance management system which also consider NFPI. CEO asked you to briefly EXPLAIN the scope of non-financial performance indicators in regard to only 3 functions whose functional heads raised the concern.

**Solution 4 :**

The performances management system, which also consider non-financial performance indicators in addition to financial performance indicators; capable to ensure sustainable performance in all functional areas; hence its scope is organisation wide. In regard to three functional areas specifically mentioned in the case scope shall be –

**Human resources**

It is the people who actually create the organisation through processes, hence human resources are a significant element of any organisation. If they performance well, the entire organisation automatically performs well; hence measures such as staff turnover, absenteeism, job satisfaction, and offer letter accepted shall be part of.

**Quality of product and service**

What make any business distinct from others, it is largely the value which it's products or services capable to create for the consumers; quality is important determinant of value. Hence, the following performance measures (owning to quality) can be part of performance metrics -

- How much value the product is creating currently?
- Where do product offer in comparison that of competitor?
- Is product capable to generate further superior performance and scope of innovation?

**Brand equity**

Non-financial performance measures consider the brand equity (value of the brand) as one of the significant performance measures. Brand value is largely based upon factors like customer's awareness & loyalty which includes consumer behaviour also perceived quality, stakeholders' expectation and organisation ability to meet them, and factors like patents and trademarks etc.

**Question 5 : [ Chapter 12 ]**

**Topic : Reconciliation of Profit [ ICAI Module Ref. : 12.20 ]**

Well known Footwear (WF) is a shop that focuses on shoes for various sports and activities like jogging, cricket, tennis, and hockey. Budgeted profit for the WF is calculated considering an average selling price of ₹ 500 per pair of shoes and an average cost of ₹ 350 per pair of shoes. The supervisor of the WF has discretion in staffing and in setting prices. Usually, the WF is staffed for total 650 hrs. per month at a budgeted rate of ₹ 125 per hr. In addition to this base wages, sales staff gets a commission equal to 5.5% of sales revenue. Moreover, staffing levels (i.e. working hours) are not expected to change in response to "little" changes in shoe sales. For September 2020, the WF had budgeted sales of 2,250 pairs of shoes and 650 staffing hrs.

Actual results for September, 2020 were as follows :

| | |
|---|---|
| Pairs of shoes sold | 2,500 |
| Revenue | ₹ 12,00,000 |
| Less : Cost of shoes sold | ₹ 8,25,000 |
| Less : Staff - Basic wages @ ₹ 125 per hour | ₹ 78,125 |
| Less : Staff - Commission payment | ₹ 66,000 |
| ∴ Profit | ₹ 2,30,875 |

Note - "little" changes in shoe sales is specified as ± 12%.

**Required :**

(i) PREPARE a reconciliation statement of budgeted profit to actual profit.

(ii) COMMENT on supervisor's performance.

**Solution 5 :**

**Working Notes :**

**1. Key Data, Assumptions & Information :**

- Though it is not mentioned in the question about which approach to follow i.e. Absorption costing or Marginal costing, ICAI has used Marginal costing approach to solve this question.
- Cost of shoes and commission payable to staff is treated as variable cost.
- Base wages of staff is treated as fixed cost, because this cost will remain constant up to ± 12% change in sales revenue.
- Budgeted sales quantity was 2,250 pairs and actual sales quantity is 2,500 pairs i.e. 250 extra pairs are sold. This is 11.11% rise in sales volume ( 250 / 2,250 x 100 ). This change is within 12% and hence, there is no change in fixed labour cost.
- We need to find out some quantitative data, so that calculation of variances becomes easy. This data is shown below. Use balancing figure technique to calculate it.

**2. Budgeted & Actual Data :**

| Particulars | Budgeted Data | | | Actual Data | | |
|---|---|---|---|---|---|---|
| | Qty. | Rate | Amount ₹ | Qty. | Rate | Amount ₹ |
| (a) Sales Revenue | 2,250 | 500 | 11,25,000 | 2,500 | 480 | 12,00,000 |
| (b) Cost of shoes | 2,250 | 350 | 7,87,500 | 2,500 | 330 | 8,25,000 |
| (c) Commission | 2,250 | 27.50 | 61,875 | 2,500 | 26.40 | 66,000 |
| (d) Contribution [a - b - c] | 2,250 | 122.50 | 2,75,625 | 2,500 | 123.60 | 3,09,000 |
| (e) Basic wages | 650 hrs. | 125/hr. | 81,250 | 625 hrs. | 125/hr. | 78,125 |
| (f) Profit [ d - e ] | | | 1,94,375 | | | 2,30,875 |

**3. Calculation of Variances :**

(a) Total Profit Variance = Budgeted Profit - Actual Profit
= ₹ 1,94,375 – ₹ 2,30,875 = ₹ 36,500 (F)

(b) Sales Price Variance = Actual Qty. sold x ( Std. S.P. – Actual S.P. )
= 2,500 x ( 500 – 480 ) = ₹ 50,000 (A)

(c) Contribution Volume Variance = Std. Contribution per unit x ( Bud. Qty. – Actual Qty. )
= 122.50 x ( 2,250 – 2,500 ) = ₹ 30,625 (F)

(d) Shoe Cost Variance (variable) = Standard cost of actual output - Actual cost
= ( ₹ 350 x 2,500 units ) – 8,25,000 = ₹ 50,000 (F)

(e) Commission Cost Variance (variable) = Standard cost of actual output - Actual cost
= (₹ 27.50 x 2,500 units) – ₹ 66,000 = ₹ 2,750 (F)

(f) Labour Cost Variance (fixed) = Budgeted cost – Actual cost
= ₹ 81,250 – ₹ 78,125 = ₹ 3,125 (F)

**Main Answer :**

**(i) Reconciliation Statement of Profit :**

| **Particulars** | **₹** |
|---|---|
| Budgeted profit - WN 1 | 1,94,375 |
| Sales Price Variance (A) - WN 3(b) | (50,000) |
| Contribution Volume Variance (F) - WN 3(c) | 30,625 |
| Shoe Cost Variance (F) - WN 3(d) | 50,000 |
| Commission Cost Variance (F) - WN 3(e) | 2,750 |
| Labour Cost Variance (F) - WN 3(f) | 3,125 |
| ∴ Actual Profit | 2,30,875 |

**Student Note** : My way of calculation and presentation of answer is different from ICAI. However, the final answer is same. I have given above a detailed working with formulae. Comparing my answer with ICAI may lead to confusion, hence you may avoid it.

**(ii) Comment :**

The performance seems to be good. It shows that the supervisor of the WF has passed on the benefit of decrease in shoe cost to customers. It is evident from Shoe cost variance and Sales price variance, i.e. shoe cost decreased by ₹20 per pair, from a standard cost of ₹350 per pair to an actual cost ₹330 per pair. On the other hand, the selling price decreased by ₹20 per pair, from a standard price of ₹500 per pair to an actual price of ₹480 per pair. In turn, the reduction in the selling price appeared to produce a favourable sales volume variance and a reasonable increase in profit also.

Due to reduction in the selling price, staff commissions per unit is lower than budgeted, because the commission is based on sales price. It has led to favourable commission cost variance of ₹2,750.

Lastly, staffing was 25 hours less than budget, leading to a savings of 25 hours x ₹125 per hour = ₹3,125 favourable labour cost variance. It means, the supervisor has attained an increase in sales with lesser staff hours.

**Overall,** it appears that the manager has done a great job of making revenue and controlling costs, which has lead to increase in profits.



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