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SUGGESTED SOLUTION

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SUBJECT- SCM and PE

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BRANCH - () (Date :)

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Answer 1:

DMAIC is a methodology of Six Sigma used to improve existing business process. It is advisable to Managing Partner to execute following phases of DMAIC–

Define the process

This phase emphases exactly what customer's requirements are? In this case focus is precisely on why bags are returned. The objective of the process needs to be clear as in this case to reduce the number of customer returns. Customers expect certain minimum requirements from the manufacturing and packaging process, for example, that the bags are properly packed in boxes. They also expect the goods be delivered undamaged within a reasonable time and delivered at the time and date when committed. Further, customer's perceptions of quality should coincide with the price paid, though different customers may have different expectations.

Measure the existing process

This phase measure the process to determine existing performance. In this case, the sales returns figures do not show complete picture as to why customers return bags, which of the class belong to 'poor packing', which one belong to 'defective item', which one belong to 'activities of other sub divisions' etc. The ambiguity of the data and classification of definitions will need to be addressed as to enable the process to be measured effectively.

Analyze

This phase detects the root cause of the problems. Possible root cause of sales return are as follows:

- Difficult to assemble or pieces missing (47%) – Returns could be because the bags were not manufactured or packed properly in the 'Mx' division, but could also be due to poor design, customers losing pieces or simply being unable to assemble bag.
- Bags were not as demanded and of poor quality (43%) – Returns could be due to defective manufacture or if the customer had merely changed their minds and no longer required the bag. In 'bags were not as demanded', the identification of 'defective items' are too vast.
- Arrived damaged (9%) – It may be that customers wrongly classified defective bags as damaged. Though bags may become damaged by the 'Çosta Cruise', only a small number of returns relate directly to them.
- Arrived late (1%) – Reasons of arrived late could be either 'Costa Cruise' could not make delivery on time or 'Mx' division could not complete order on time and this causes only 1% of returns, is relatively insignificant.

Further, information could be analyzed, like country wise sales returns, product wise sale, or with more clear definition of 'defective items' from customer's perspective. By doing so, firm may easily get information related to areas of the business where sales returns are high and hence be able to focus on.

Improve

In this phase, recommendations are made to minimize or eliminate the root cause of the problem and then those recommendations are implemented to improve the process in a systematic manner. Derby Grey is required to consider aspects of production or packaging which could be improved, for example, timely repair and maintenance of equipment or training to existing staff etc. Further, availability of resources and likely costs of making the improvements need to be carefully considered.

Control

Here control means maintaining the improved performance and future performance. Derby Grey would be required to monitor the performance ongoing basis. If sales return reach above particular level, it should be reported to responsible person and he should act immediately.

In addition, Derby Grey need to redesign IT system in such a way so that it can provide required detail. Since this is continuous monitoring so it may also require revisiting of some phases in DMAIC.

Answer 2:

(i) Customer Wise Profitability Statement and Overall Profitability Statement

SN.	Particulars	P	M	W	Total Rs.
A	Sales (net proceeds) –Table 1	241,288	237,500	272,812	751,600
B	Variable Cost of Goods Sold	1,50,000	1,42,500	1,87,500	4,80,000
C	*Assignable- Marketing and Administration Cost* - Table 2				
	• Order Taking and Processing	1,200	600	4,500	6,300
	• Sale Return Processing	150	-	1,200	1,350
	• Billing Cost	200	100	750	1,050
	• Customer Visit	800	-	4,000	4,800
	Total Assignable Marketing and Administration Cost	2,350	700	10,450	13,500
D	*Assignable- Distribution Cost* - Table 2				
	• Expedited / Rush Orders	250	-	1,250	1,500
	• Delivery Costs	8,000	4,000	-	12,000
	• Inventory Carrying Cost	10,000	9,500	12,500	32,000
	Total Assignable Distribution Cost	18,250	13,500	13,750	45,500
E	*Non- Assignable Fixed Cost*	-	-	-	100,000
F	Total Costs (B+C+D+E)	170,600	156,700	211,700	639,000
G	Net Profit (Step A - F)	70,688	80,800	61,112	112,600
H	Profit % of Sales (G / A)	29%	34%	22%	15%

Workings

Table 1: Customer Sales Analysis - Revenue Analysis

All figures in Rs.

Particulars	P	M	W	Total Rs.
Sales {Sale Units × Sale Price (gross)}	2,50,000	2,37,500	3,12,500	8,00,000
Less: Sale Return (Step 1 × Return%)	1,250	-	31,250	32,500
Net Sales	2,48,750	2,37,500	2,81,250	7,67,500
Less: Cash Discount	7,462	-	8,438	15,900
Net Proceeds	2,41,288	2,37,500	2,72,812	7,51,600
Final Collections vs Original Sale	97%	100%	87%	94%

Table 2: Assignable Marketing, Administrative and Distribution Costs

All figures in Rs.

Particulars	P	M	W	Total
Order Taking and Processing (# of orders × cost per order)	1,200	600	4,500	6,300
Expedited / Rush Orders (# of orders × cost per order)	250	-	1,250	1,500
Delivery Costs	8,000	4,000	-	12,000

(Distance in km. × cost per km)				
Sale Return Processing (# of returns × cost per return)	150	-	1,200	1,350
Billing Cost (# of invoices × cost per invoice)	200	100	750	1,050
Customer Visit (#of customer visits × cost per visit)	800	-	4,000	4,800
Inventory Carrying Cost (# of units × inventory carrying cost p.u.)	10,000	9,500	12,500	32,000

(ii) Customer strategy: It can be seen that Pamphlet LLP has an overall profit of Rs.112,600 or 15% of sales. While the performance is good, the firm's management has to analyze customer wise profitability.

(a) W is the largest customer in terms of units sold. However, Table 1 above shows that sale returns at 10%, which is unusually large compared to other customers. Pamphlet LLP has to investigate why the returns are of such large quantity. Possibly, there could be communication gap between the firm and W. Possible non-conformity in goods delivered has resulted in returns. Only 87% of the original sale value is being collected. The root cause of the problem has to be identified and rectified. This will also reduce the sale return processing costs.

(b) W has placed many rush orders, which requires Pamphlet LLP to ship these orders immediately, using costlier means of transportation. Currently, there is no charge for shipping rush orders. In order to deter W from repeatedly placing rush orders, Pamphlet LLP can charge the customer for shipping such orders beyond a threshold number of orders. Say rush orders beyond 2 orders will be charged to the customer.

(c) W has placed 15 orders for 1,250 units. Comparatively, P and M placed 4 and 2 orders for approximately 1,000 units each. W can be requested to place fewer orders with larger quantity per order, in order to optimize ordering cost.

(d) Being the largest customer, W has 5 sale visits from Pamphlet LLP, which is more than the other 2 customers. Priced at Rs.800 per visit, this very costly. At the same time, W is yielding the least profit. Therefore, Pamphlet LLP should reassess if resources can be reallocated to the other two more profitable customers. That may encourage more sales from higher yielding customers.

(e) Since W seems to need more hand-holding in terms of more sales visits as well as higher rush orders, Pamphlet LLP may assess if it wants to discontinue or reduce business. Alternatively, it may reassign these resources towards existing or newer customers to get better profitability. However, if W can be migrated to a higher profitabi lity, Pamphlet LLP need not lose out its market share.

(f) Customer M is the most profitable yielding 34% return over sales, although in terms of 'Advanced Learner's Dictionary' ordered, it is the smallest of the three. Pamphlet LLP can assess if it can extend some discount, in order to encourage more sales. Currently, Customer M does not get any discount.

(g) Pamphlet LLP can assign more sales visits to Customer P and M to encourage them purchase more as well as provide high quality customer service.

Answer 3:

(A)

(i)

Range of Transfer Price

As explained above, the company gets a net benefit of Rs. 150,000 per month by procuring the lenses internally. Therefore, the divisional managers should accept the transfer pricing model. At the same time, neither division should be at a loss due to this arrangement. When the transfer price is Rs. 120 per lens, Division 'A' bears the loss, which will impact assessment of the division's performance. Therefore, an acceptable range for transfer price should be worked out. This can be done as below:

When the supplying division operates at full capacity, the range for transfer pricing would be-

(a) Minimum transfer price = marginal cost p.u. + opportunity cost p.u.

Since the supplying division is operating at full capacity, it has no incentive to sell the goods to the purchasing division at a price lower than the market price. If the internal order is accepted, capacity is diverted towards this sale. Hence the supplying division would additionally charge the lost contribution from external sales that had to be curtailed. By doing so, the division will be indifferent whether the sale is an external or internal one.

(b) Maximum transfer price = Lower of net marginal revenue and the external buy- in price.

Therefore, the minimum transfer price (which would be set by Division 'A', the supplier) = marginal cost per lens + opportunity cost per lens = Rs. 110 + Rs. 30 per lens = Rs. 140 per lens. In other words, the minimum transfer price would be the external sale price of each lens.

The maximum transfer price (which would be determined by Division 'B', the procurer) = lower of net marginal revenue and the external buy-in price.

Net marginal revenue would be the revenue per one additional sale. Net marginal revenue per camera = marginal revenue – marginal cost (i.e. variable cost excluding the cost of the lens) to Division 'B' = Rs. 410 - Rs. (150+30) = Rs. 410 - Rs. 180 = Rs. 230 per camera. This is the maximum price that Division 'B' can pay for the lens, without incurring any loss. As mentioned before, fixed cost is ignored for this analysis.

The current external procurement price is Rs. 170 per lens.

Therefore, the maximum price that Division 'B' would be willing to pay = lower of net marginal revenue (Rs. 230 per camera) or external procurement cost (Rs. 170 per lens). Therefore, Division 'B' would pay a maximum price, equivalent to the current external price of Rs. 170 per lens. It will not pay Division 'A', price more than the external market price for a lens.

Therefore, the acceptable range for transfer price would range from a minimum of Rs. 140 per lens and maximum of Rs. 170 per lens. The managers may be given autonomy to negotiate a mutually acceptable transfer price between this range.

(ii)

Advise on Alternative to Current Transfer Pricing System

Other alternative transfer pricing models that can be considered are:

Dual Pricing

The supplying division, Division 'A', records transfer price by including a normal profit margin thereby showing reasonable revenue. At the current market price per lens, transfer price for Division A would be Rs. 140 per lens. The purchasing division, Division 'B', records transfer price at marginal cost thereby recording purchases at minimum cost. As per the current production cost, the transfer price for Division 'B' would the variable cost incurred by Division 'A' to manufacture one lens, that is Rs. 110 per lens. 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.

Drawbacks of dual pricing include:

(a) It can complicate the records, thereby may result in errors in the company's overall records.

(b) Profits shown by the divisions are artificial and need to be used only for internal evaluations.

Two Part Pricing System

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 a lower rate compared to the market price.

The proposed transfer price of Rs. 120, is a two-part price that enables Division 'A' to recover the marginal cost of production of a lens as well as portion of the fixed cost. However, as explained in part (i) above, this price is insufficient to provide a reasonable return to Division 'A'. Therefore, the management of Great vision along with the divisional managers have to negotiate a price that is reasonable to Division 'A' while not exceeding the current procurement price of Rs. 170 per lens for Division 'B'. As explained in part (i) of the solution, in the given case, the range of Rs. 140 to Rs. 170 per lens, would help resolve this conflict.

(B)

(i) Identification of Bottleneck: Installation of cameras is the bottleneck in the operation cycle. The annual capacity for manufacturing and installation are given to be 750 camera units and 500 camera units respectively. Actual capacity utilization is 500 camera units, which is the maximum capacity for the installation process. Although, ZPS can additionally manufacture 250 camera units, it is constrained by the maximum units that can be installed. Therefore, the number of units manufactured is limited to 500 camera units, subordinating to the bottleneck installation operation. Therefore, ZPS should focus on improving the installation process.

(ii) Improving Capacity of Installation Technique: Every camera sold increases the through put contribution by Rs.1,500 per camera unit (sale price Rs.2,500 per camera unit less direct material cost Rs.1,000 per camera unit). By improving the current installation technique an additional 50 camera units can be sold and installed. This would involve total additional expenditure of Rs.40,000. Hence, the incremental benefit would be:

Particulars	**Amount (Rs.)**
Increase in throughput contribution (additional 50 camera units Rs.1,500 per camera unit)	75,000
Less: Increase in total expenditure	40,000
Incremental benefit	35,000

Since the annual incremental benefit is Rs.35,000 per annum, ZPS should implement this improvement to installation technique, the current bottleneck operation.

Answer 4:

(A)

BPR is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical contemporary measures of performance, such as cost, quality, service and speed. In other words, BPR is concerned with the result of the process (i.e., with those activities that add value to the process). To implement BPR, firstly, each business process of SB needs to be divided into a series of processes. Then each business process requires to be documented and analysed to find out whether it is essential, whether it provides support to other valuable processes and whether it is adding value. Any process which does not add value or does not provide essential support to the value adding activities must be removed. Those processes that remain require to be re-engineered/re-structured so that can be *as efficient as possible*. For SB, new technology should be introduced to improve these processes. However, SB must ensure that the statutory compliances regarding these processes are not undermined.

SB is facing a hyper-competitive marketplace where customers expect a superior experience. BPR activities would help SB in understanding those processes which SB's customers value the most and remove those that are not valued. Foreign banks are offering diverse range of services such as direct access to executive management, a single point of contact to coordinate all banking needs, appointment banking to save time, free online banking services 24/7, free unlimited ATM access etc. Clearly these are valuable business processes valued by the customer. SB should incorporate all these facilities in their banking processes to enhance customer satisfaction and service level.

Opening of new accounts in SB is complex processes since it requires multiple forms to be complied with. Through BPR, SB would analyse the whole process and identify the need for only one form that contain all of the necessary customer information. Further, it is also possible to initiate opening of new account through the development of an online application form on SB's website. Online entry would remove the possibility of forms being lost or incorrect, again enhancing customer satisfaction since customers need not to visit SB's branch to open account. There should also be online processing authentications/ validations as to ensure that data fields are correctly filled by customers that would result in error reduction. This would also remove unnecessary staff activities in checking and re-processing forms.

It is likely that BPR may increase costs in short-term as investment in technology. However, this would also reduce substantial levels of manual activities and processes thereby providing speedy services to customers. In long term, this would result in high levels of efficiency, profitability and better levels of customer satisfaction and retention.

(B)

The budgetary control system appears to have several very important shortcomings which reduce its effectiveness and may in fact cause it to interfere with good performance. Some of the shortcomings are explained below.

Lack of Coordinated Goals: Mr. Singh had been led to believe high quality output is the goal; it now appears low cost is the goal. He does not know what the goals are and thus cannot make decisions which lead toward reaching the goals.

Influences of Uncontrollable Factors: The actual performance relative to budget is greatly influenced by uncontrollable factors i.e. rush orders. Thus, the variance reports serve little purpose for evaluation of performance.

The Short-Run Perspectives: The monthly evaluation and the budget tightening on a monthly

basis result in a very short-run perspective. This will result in inappropriate decisions.

The improvements in the budgetary control system must correct the deficiencies described above. Accordingly:

- Budgetary control system must more clearly define the company's objectives.
- Budgetary control system must develop an accounting reporting system which better matches controllable factors with supervisor responsibility and authority.
- Establish budget values for appropriate time periods which do not change monthly simply as a result of a change in the prior month's performance.

The entire company from top management down must be educated in sound budgetary procedures so that all parties will understand the total process and recognize the benefit to be gained.

Answer 5:

(A)

(i) ROI

Division 'Y'

Controllable Profit = Rs. 5,290K

Net Assets = Rs. 19,520k + Rs. 4,960K – Rs. 5,920K = Rs. 18,560K

ROI = 28.5%

Division 'D'

Controllable profit = Rs. 3,940K

Net Assets = Rs. 29,960K + Rs. 6,520K – Rs. 2,800K = Rs.

33,680K ROI = 11.7%

In computation of ROI of both division, controllable profit has been taken into consideration. The reason behind this is that the Head Office costs are not controllable and responsibility accounting considers that managers should only be held responsible for costs over which they have control. The assets figures being used also depend on the same principal. Figures of current assets and the current liabilities have been taken into consideration as they are such items over which managers have complete control.

(ii) Bonus

Bonus to be paid for each percentage point = Rs. 7,20,000 × 3% = Rs. 21,600

Maximum Bonus = Rs. 7,20,000 × 20% = Rs. 1,44,000

Division 'Y'

ROI = 28.5% (16 whole percentage points above minimum ROI) 16 ×

Rs. 21,600 = Rs.3,45,600

Therefore, manager will be paid the bonus of Rs. 1,44,000 (max.)

Division 'D'

ROI = 11.7% (Zero, percentage point above minimum)

Therefore Bonus = NIL

(iii) Discussion

FAI will not receive any bonus since he has not earned any point above minimum percentage. This is due to the large asset base on which the ROI figure has been computed. Total assets of Division 'D' are almost double the total assets of Division 'Y'. The major reason behind this is that Division 'D' invested Rs. 13.6 million in new equipment during the year. If this investment were not made, net assets would have been only Rs. 20.08 million and the ROI for Division 'D' would have been 19.62% resulting in payment of a bonus Rs.1,44,000 (7 × Rs. 21, 600 = Rs. 1,51,200; subject to maximum of Rs. 1,44,000) rather than the nothing. FAI is being penalized for making decisions which are in the best interests of his division. It is very surprising that he decided to invest where he knew that he would receive lesser bonus subsequently. He acted in the best interests of the BYD altogether. On the other hand, HAI has taken benefit from the fact that he has not invested anything even though it was needed for computer system updation. This is an example of sub-optimal decision making.

Further, Division 'Y''s trade payables are over double those of Division 'D'. In part, one would expect this due to higher sales (almost 66% more than Division 'D') and low cash levels at Division 'Y'. Higher trade payable leads to reduction in net assets figures. The fact that BYD is rewarding HAI with bonus, even though relationships with suppliers may be badly affected, is again a case of sub-optimal decision making.

If the profit margin (excluding head office cost) as percentage of sales is calculated, it comes to 18.24% for Division 'Y' and 22.64% for Division 'D'. Therefore it can be seen that Division 'D' is performing better if capital employed is ignored. ROI is simply making the division 'D''s performance worse.

FAI might feel extremely disappointed by getting nothing and in the future, he may opt to postpone the investment to increase the bonus. Non- investing in new technology and equipment will mean that the BYD will not be kept updated with industry changes and its overall future competitiveness will be affected.

Briefly, the use of ROI is resulting in sub-optimal decision making and a lack of goal congruence i.e. what is good for the managers is not good for the company and vice versa. Fortunately, Division 'D''s manager still seems to be acting for the benefit of the BYD but the other manager is not. The fact that one manager is receiving a much bigger bonus than the other is not justifiable here and may result in conflict in long run. This is disappointing for the company especially in the situation when the divisions need to work in unison.

(B)

S.No.	Recommendations to Implement JIT	Valid or Invalid with Reason
(i)	Introduction of piece rate system of payment of wages to workers.	**Invalid** A JIT system focuses on producing only what is needed. So, an employee who has incentive to create vast piles of stock is contrary to rules of system. Thus, any piece rate system must be eliminated and replaced with measures that

		focus on quality of output.
(ii)	It has been decided to introduce Kanban Card and Machine cells together in order to reduce the defective products	**Valid** Both kanbans and machine cells should be used together—they are not mutually exclusive. By doing so a company can achieve extremely low product defect rates, as well as vanishingly small investments in work-in-process inventory
(iii)	Use of highly automated and costly machines to the full capacity.	**Invalid** Use of highly automated and costly machines to the full capacity, can result in large amount of inventory piling up in the warehouse. This is generally done in traditional system but not a desirable end result in a JIT environment, where producing only what is actually needed is the underlying rule.
(iv)	Employ those workers who can operate and maintain single machine so that work can be done effectively.	**Invalid** In JIT environment each worker should have responsibility for a number of machines. Company must organise training classes to teach employees how to operate a multitude of different machines, perform maintenance on machines without having call maintenance staff, spot product errors and when to halt production process to fix problems.

Answer 6:
(A)

COMPUTATION OF VARIANCES

Traditional Variance (Actual Vs Original Budget)

Usage Variance = (Standard Quantity – Actual Quantity) × Standard Price
= (2,500 Kg – 2,700 Kg) × Rs. 1.50
= Rs. 300 (A)

Price Variance = (Standard Price – Actual Price) × Actual Quantity
= (Rs. 1.50 – Rs. 2.40) × 2,700 Kg
= Rs. 2,430 (A)

Total Variance = Rs. 300 (A) + Rs. 2,430 (A) = Rs. 2,730 (A)

Operational Variance (Actual Vs Revised)

Usage Variance = (2,500 Kg – 2,700 Kg) × Rs. 2.25
= Rs. 450 (A)

Price Variance = (Rs. 2.25 – Rs. 2.40) × 2,700 Kg
= Rs. 405 (A)

Total Variance = Rs. 450 (A) + Rs. 405 (A) = Rs. 855 (A)

Planning Variance (Revised Vs Original Budget)

Controllable Variance= (Rs. 2.00 – Rs. 2.25) × 2,500 Kg

= 625 (A)

Uncontrollable Variance

= (Rs. 1.50 – Rs. 2.00) × 2,500 Kg

= 1,250 (A)

Total Variance = Rs. 625 (A) + Rs. 1,250 (A) = Rs. 1,875 (A)

Traditional Variance = Operational Variance + Planning Variance

= 855 (A) + 1,875 (A) = 2,730 (A)

(B)

Office processes often have huge amounts of paperwork and this not only makes processes slower but also allows errors to be introduced. 5S is a method of both cleaning out the working area and maintaining the cleanliness to improve process quality. The 5S process is based on:

Sort *(Seiri)*

This is sorting and removal of unnecessary files, papers, books and documents in the work area. Sorting is designed to make the work area neat, organized and arranged so that relevant items can be found easily. If an item is not relevant for the work, then it should not be in the work area.

Set in Order *(Seiton)*

Set in order means systematic arrangement of things i.e. arrange all necessary items into most efficient and accessible arrangement so that they can be easily be identified for use. It is advisable to have proper indexing of files and proper documentation i.e. proper index should be made and pasted on each file about its contents and in that pattern of contents, documents should be kept inside the files so that specific document can easily be traced and withdrawn on time. Even inside cupboard, paper of indexing about files with its name should be pasted so that specific file can easily be traced. Same can be done w.r.t. folders in computer, right file should be saved in right folder with identifiable name so that anyone can easily find any file. Frequent use items should be close by and infrequent use items can be further away in a central area. All storage areas should be clearly labeled to allow items to be put in the correct place, e.g. where did I leave the office stamp again?

Shine *(Seiso)*

After sorting and simplifying, it is necessary to keep the work area clean and safe. Shining is also an inspection process for the area, i.e. is everything in good condition. It is desirable to involve employees for 15-20 minutes each day to clean the work area so that they can have the habit of cleanness. In the same way, unimportant files either in desktop or any driver should be permanently deleted.

Standardize *(Seiketsu)*

A clean and tidy work area allows the process to be standardized and examined for quality or process improvements. Best practices are documented and rolled out across the work area, standards and process measures are established and displayed in the work area.

For example, red file can be standardized for very important files (can be required anytime), green file for important files and yellow file for unimportant files.

Sustain *(Shitsuke)*

It means to maintain discipline, this can only be achieved by auditing work areas and

processes to make sure that the 5S standards are maintained. It is worthwhile to apply 5S standards continuously i.e. daily basis and check for any upgradation if needed, so that firm can have good management in terms of documentation, cleanness, time saving of partners as well as clients.

Overall, 5S in offices streamlines the work (low to reduce errors as well as improving process times) and employee satisfaction.