Industrial Psychology Consultants
Maximising Returns on Human Capital

Productivity Issues in the Mining Sector

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What is Productivity

- Productivity is concerned with producing output efficiently, and it specifically addresses the relationship of output and the inputs used to produce the outputs.
- Productivity is the relationship between what comes out of the organizational system, in terms of quality products and services that satisfy human needs, and what goes into the organizational system, in terms of the resources consumed to generate those products and services.
- Although there are other external influences that determine, for **example, whether the organization is financially successful, there is** no doubt that productivity has the most profound influence on long term organizational performance

Productivity

- Profitability in organisations can change for reasons that have little to do with productivity; external conditions like price inflation or cost may bear no relationship to the efficient use of resources (Stainer, 1997).
- On the other hand, productivity is strongly connected to the creation of value.
- Furthermore, measurement is part of the diagnosis and analysis process of identifying where improvement activity should be prioritised.
- It is important to measure as a basis for analysis, and also to track change and progress during an improvement program

Implications

- Increased production does not necessarily mean increased productivity.
- Productivity is a relative concept: it cannot be said to increase or decrease unless a comparison is made, either of variations from a “standard” at a certain point in time (which can be based on, for example, a competitor or another department) or of time.

Labour and Capital Productivity

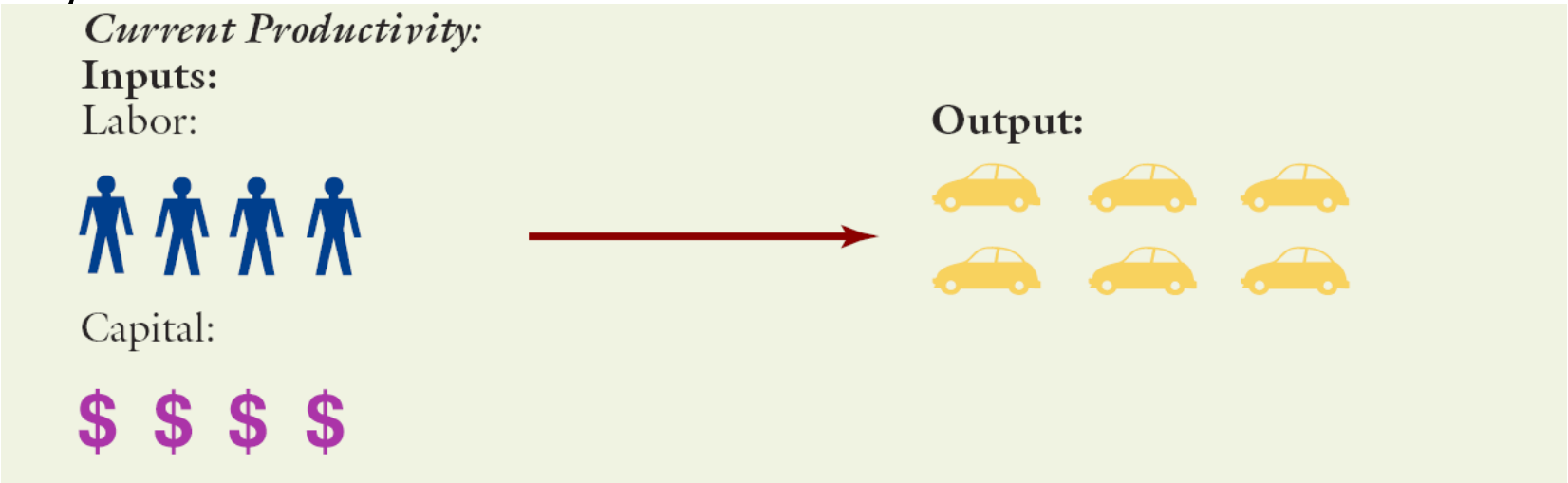
- Productivity is often measured in terms of change (i.e., improvement or deterioration), rather than as an absolute figure.
- Hence, we can say that an improvement in the labour productivity of a company is simply the increase in the output (such as, number of products or amount of services provided) produced as a result of the efforts of the employees of a company.
- This may be due to employees working harder or probably smarter as a result of training, more congenial environment, better attitudes, etc.
- On the other hand, an improvement in capital productivity is the increase in output as a result of changes in capital resources of the company, such as increased investments, technological improvements, etc.
- We should also be clear about one common interpretation of labour productivity. The ratio, output per employee has commonly been used to measure labour productivity.
- Hence, an increase in this measure is often misinterpreted to mean an improvement due to the efforts of labour alone. However, output per employee is only a rough indicator, and it also partly reflects improvement due to capital changes.

Productive Efficiency

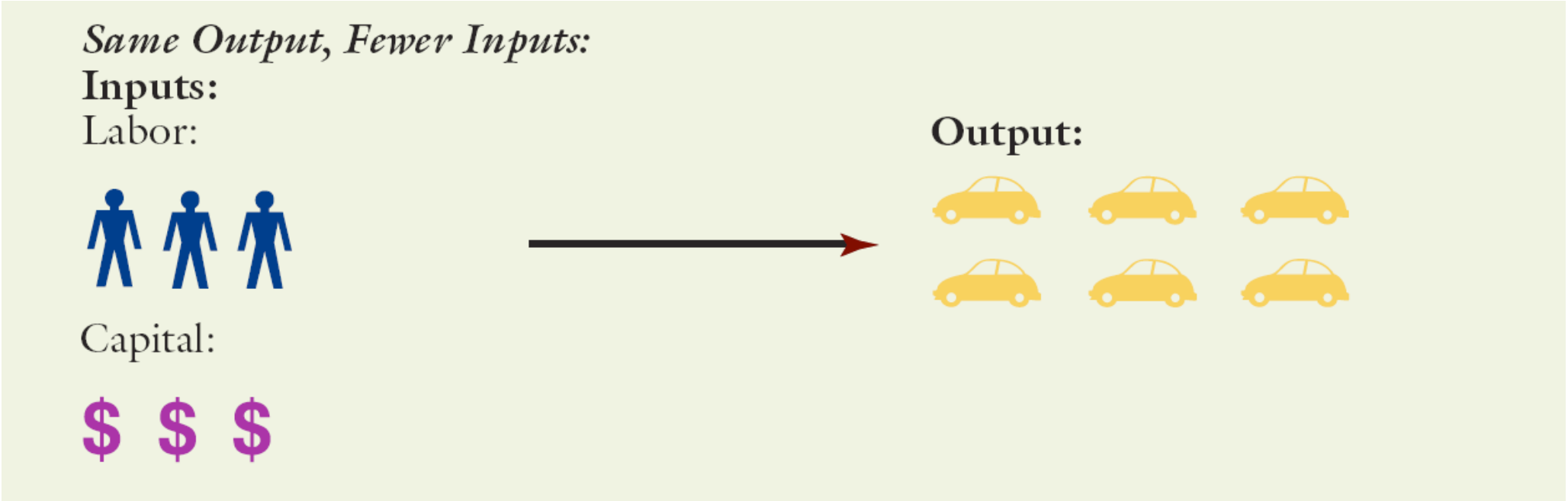
Technical Efficiency

the condition where no more of any one input is used than necessary to produce a given output.

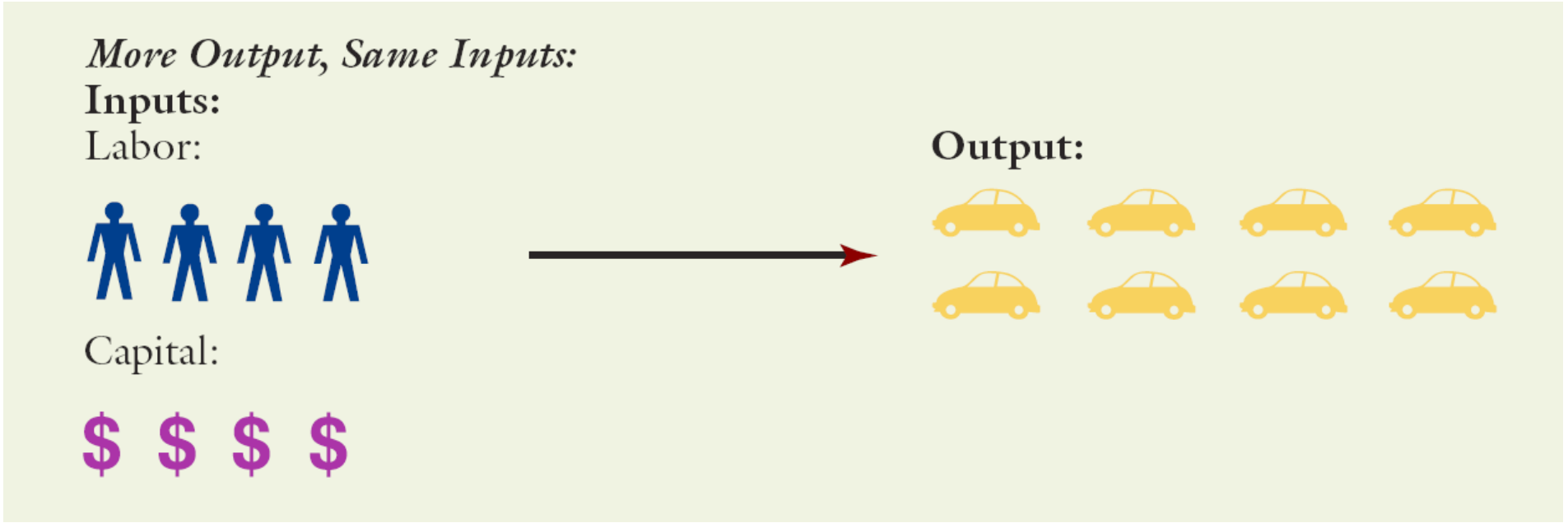
Technical efficiency improvement occurs when less inputs are used to produce the same output or more output are produced using the same input.



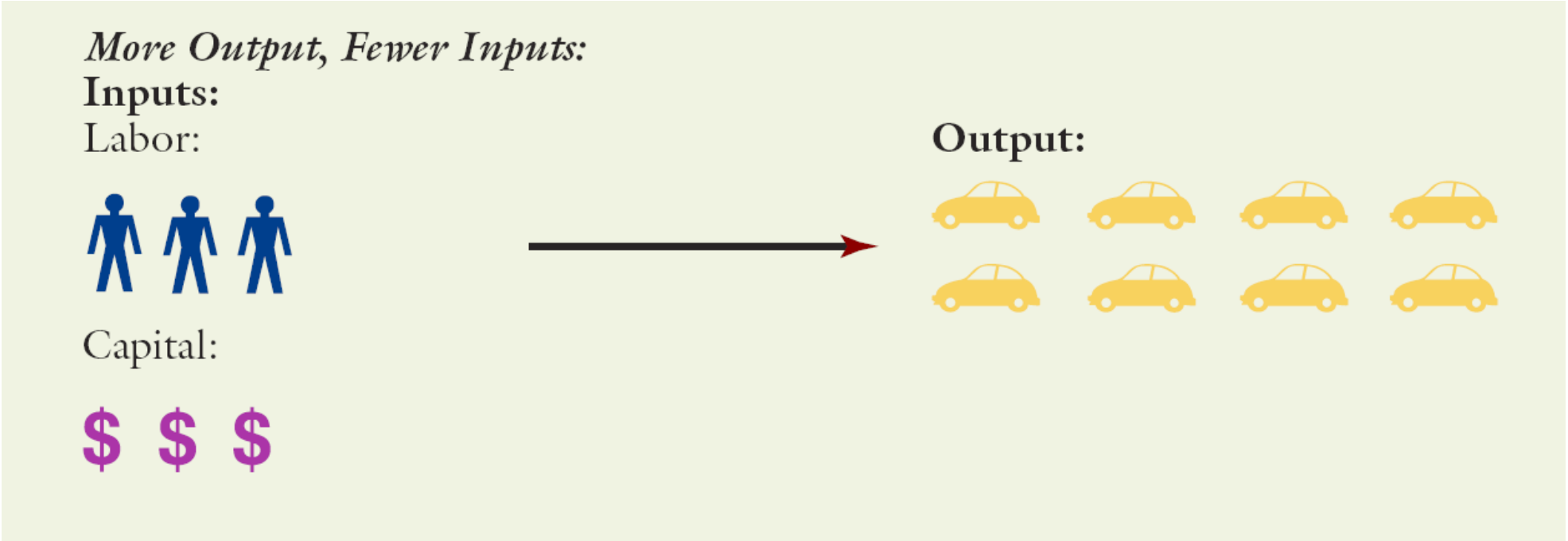
Productive Efficiency



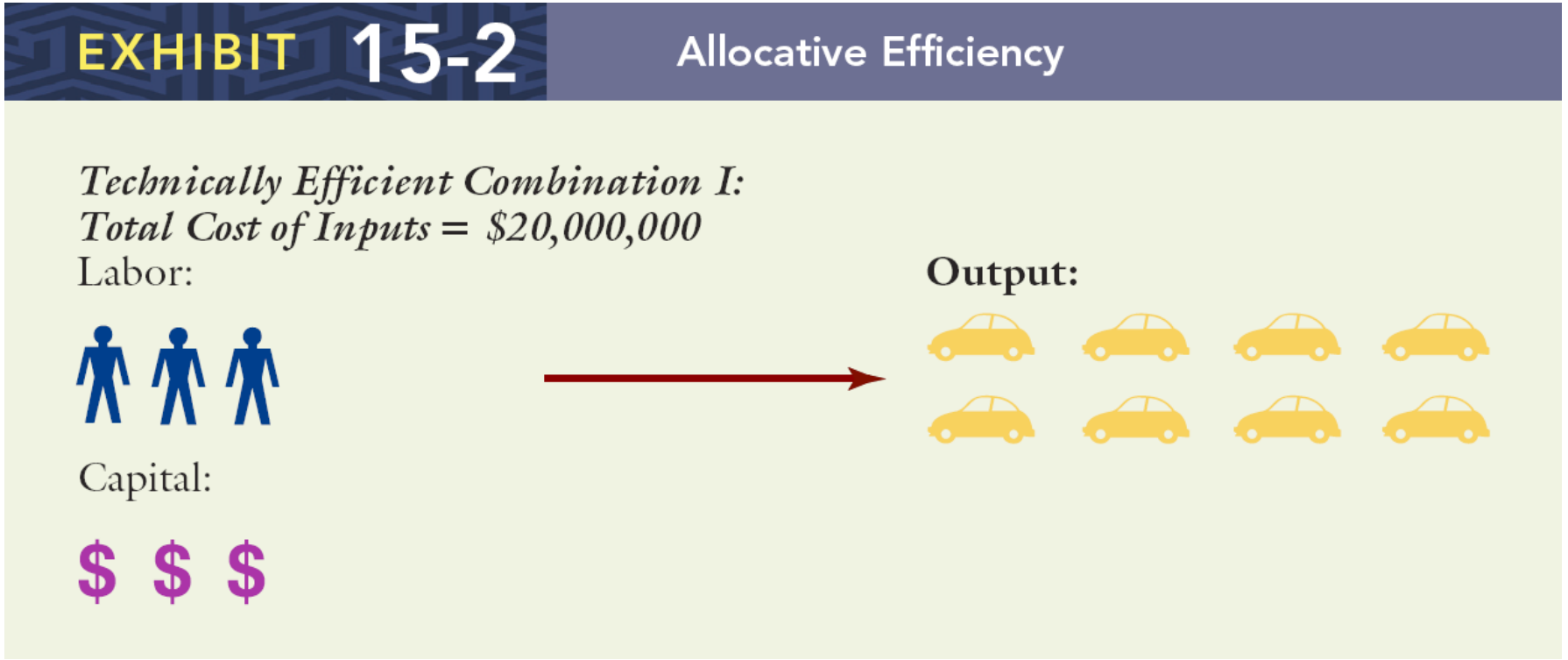
Productive Efficiency



Productive Efficiency



Productive Efficiency



Productive Efficiency

EXHIBIT 15-2 Allocative Efficiency

Technically Efficient Combination II:
Total Cost of Inputs = $25,000,000

Labor:

Capital:

Output:

Of the two combinations that produce the same output, the least costly combination would be chosen.

Partial Productivity Measurement

Partial Productivity Measure

- Measuring productivity for one input at a time.

Productivity ratio = Output ÷ Input

Operational Productivity Measure

- Partial measure where both input and output are expressed in physical terms.

Financial Productivity Measure(Value added measures)

- Partial measure where both input and output are expressed in dollars.

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Profit Linked Productivity Measurement

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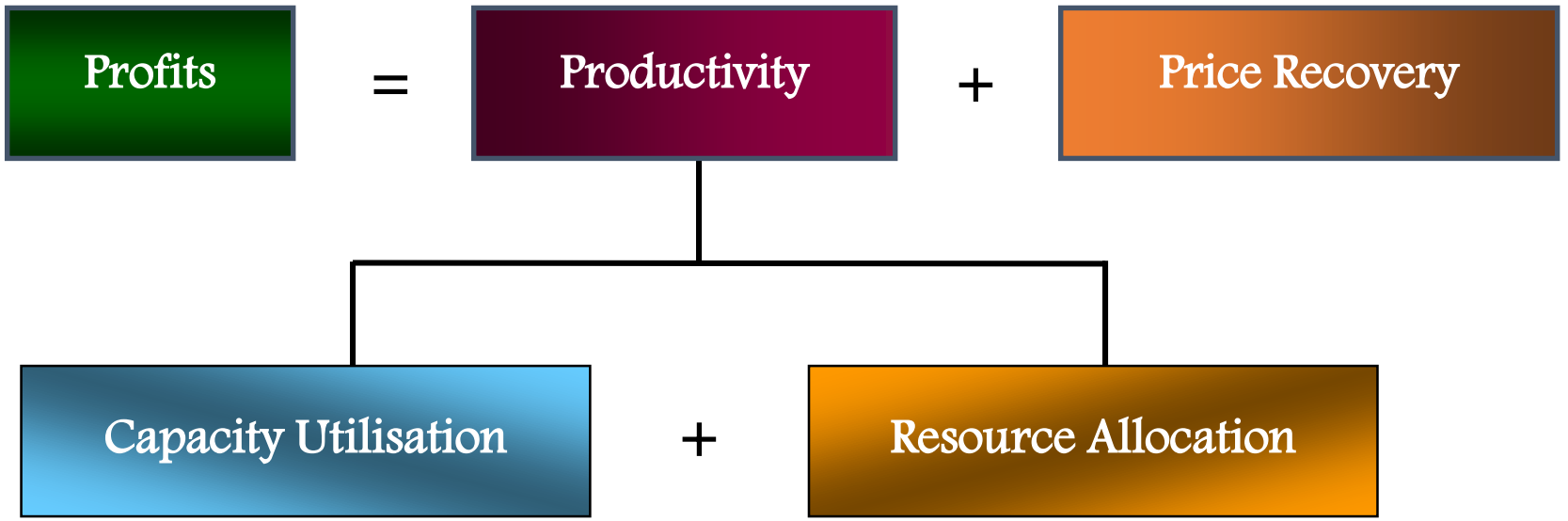
Productivity Accounting – Key Components



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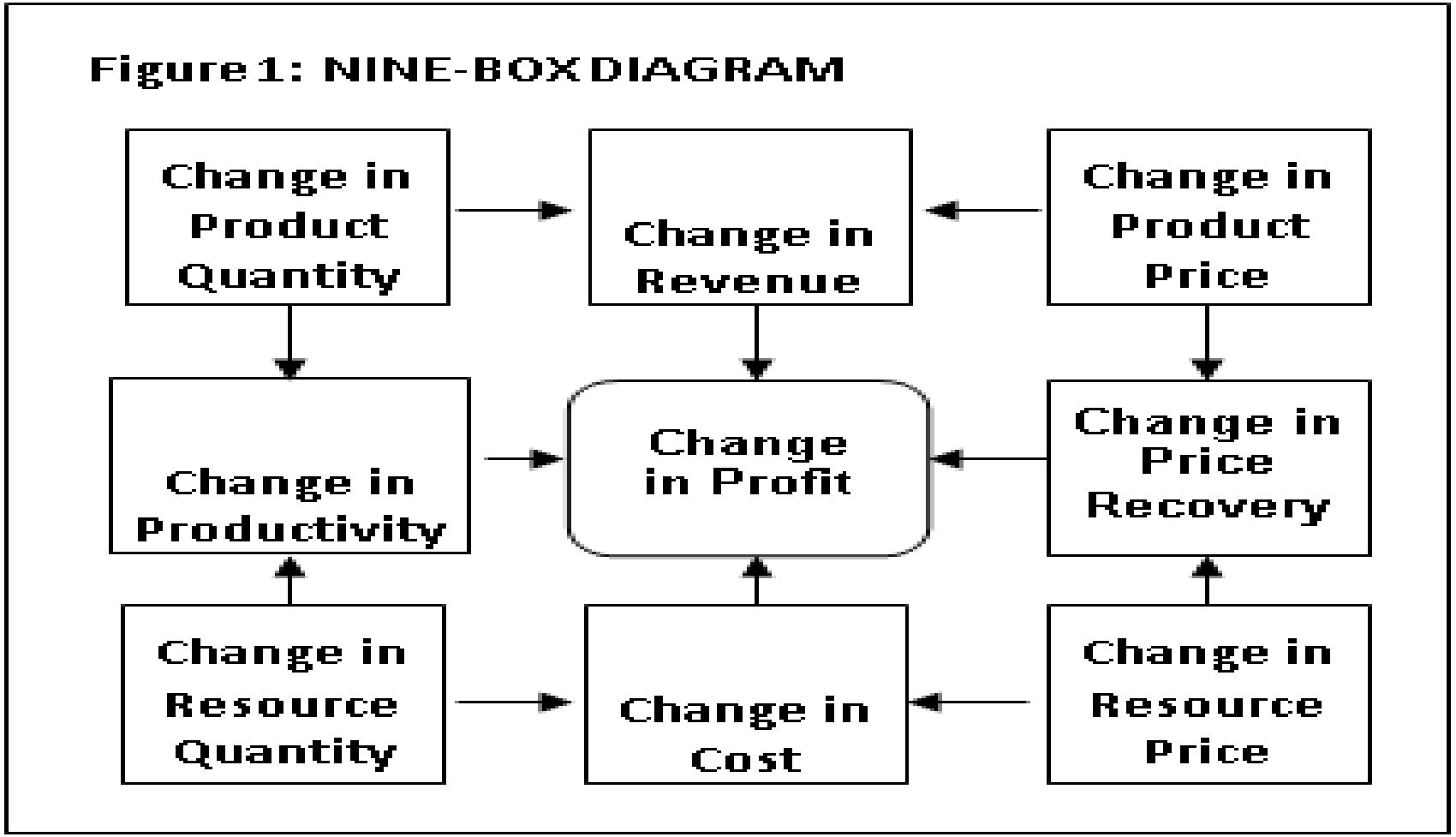

Major ways to Improve Productivity

- Investment in high output and modern plant & equipment and new technology
  - ~ ***capital intensive approach***
- Improving the efficiency and effectiveness of existing resources especially **Labour**
  - ~ ***The quality of management affect how the two major resources are managed ; capital and labour***

Productivity from a Profit Linked Perspective

- The change in profit is described as the sum of two elements; the change in productivity and the change in price recovery.
- Productivity is defined as the ability to turn inputs (resources) into outputs.
- Price recovery is defined as a firm's ability to capture value it creates through price power.
- We know that change in product prices and changes in product quantities drive change in revenue.
- Likewise changes in resource prices and changes in resources quantities drive the change in the cost of producing the products.
- Price recovery is a measure of structural position or degree to which a firm is able to capture value it creates through pricing power.
- Partial measures of productivity such as sales or revenue per input e.g. sales per employee give conflicting signals because they do not isolate productivity from price recovery

With this approach a business can;

- Monitor historical productivity performance and measure how much , in dollars or percent return on investment , profits were affected by productivity growth or decline
- Evaluate business profits plans(budgets) to determine whether the productivity changes implied are overly ambitious , reasonable or not sufficiently ambitious
- Measure the extent to which productivity performance is strengthening or weakening its overall competitive position relative to its competitors

Please note:

- The accounting template in your organisation should be used as a template when collecting data, especially of products and resources labels.
- This helps when interpreting the results.
- The model can be applied to both profit (profit model) and non-profit (cost model) making organisations.
- The key thing in this process is authenticity of data i.e. data specification, collection, analysis and interpretation.

Outputs

- Your outputs are the products you produce or the services you provide.
- Your revenue or sales in your financial statements or management accounts represent the value of products sold and the value of services provided.
- To reach that value (revenue or sales) you sold a certain quantity of products or services at some average price.
- This is the only information required for each product or service you provide (Value = Quantity X Price).
- If you have the value and quantity of goods or services sold you can easily get the price.
- So what we want you to input into the template i.e. Value of goods or services sold= Quantity of goods or services sold X Price of good or services sold - that's it.
- This should match the values on your management or financial statement. Even if you have hundreds of products, list each in terms of value of goods sold, quantity of goods sold and price of goods sold.
- All this should match the total revenue indicated in your financials.

Inputs

- The inputs represent the resources or the cost side of your financials used in producing the products itemised above.
- Again, similar to the outputs, they have a value (cost) calculated from the quantity of resources used X by the price of the resources.
- Here, again you itemise each resource. It helps to group your resources (costs) under major headings.
- All the major headings will have multiple elements. Labour, for example, will comprise various categories e.g. managerial, non-managerial, you can categorise by grade etc.
- Under each of these you could have sub items such as training, leave, canteen, school fees, etc.
- Material (any material that goes into making a product) will include the full range of material used e.g. water, cement, chemicals, etc.

Capital

- Capital is another form of input apart from the inputs mentioned above.
- It is found in your balance sheet.
- Capital should initially be split into fixed and working capital.
- Working capital(variable capital) includes inventories, accounts receivables, cash at hand, etc.
- Fixed capital includes land, buildings, plant, vehicles etc.
- The costs (including interest, depreciation, and lease payments) represent values and the physical form (items held in inventory, square meters of floor space, number of vehicles by type) would represent the quantities.
- Energy is usually a separate resource group and include electricity, fuel, and so on.

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Reporting the Results
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Profit Linked Productivity Analysis

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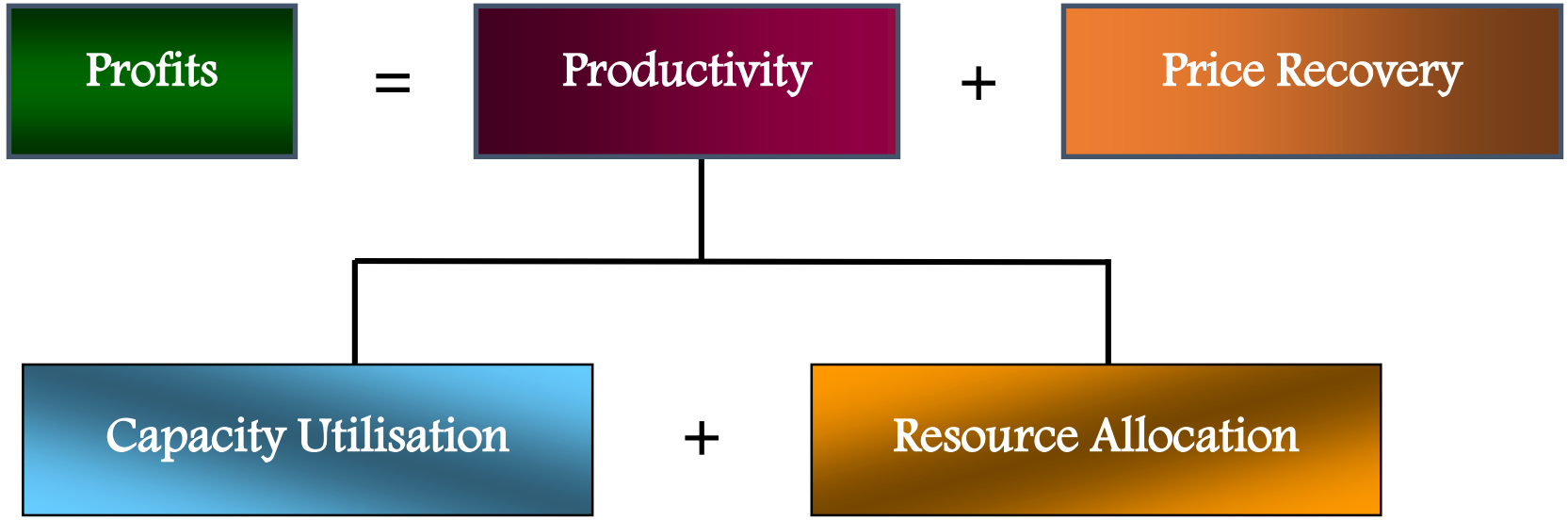
Productivity Analysis

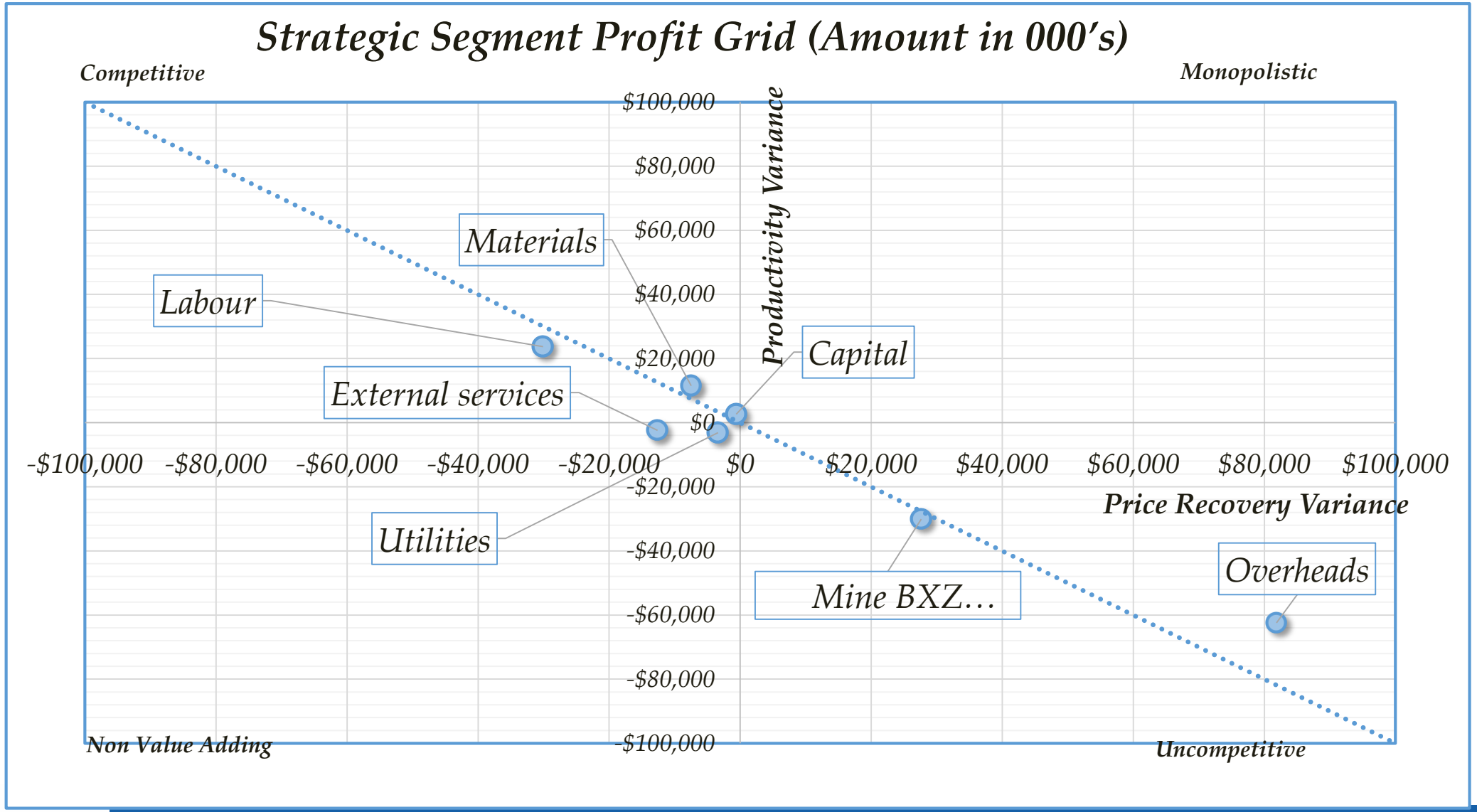
- Productivity Analysis Allows to interrogate where your profits or losses are coming from
- The Productivity Accounting Equation is the Key



Productivity Analysis

Input Category	Profit Variance (000)	Productivity (000)	Productivity (%)	Capacity Utilisation (000)	Resource Allocation (000)	Price Recovery (000)
Materials	4,016.65	11,490.13	22.33%	-	11,490.13	-7,473.47
External services	-15,028.20	-2,395.39	-11.25%	-	-2,395.39	-12,632.82
Labour	-6,364.53	23,734.20	1.90%	-	23,734.20	-30,098.73
Utilities	-6,520.78	-3,121.13	-8.05%	-	-3,121.13	-3,399.65
Overheads	19,422.38	-62,421.11	-1.16%	-	-62,421.11	81,843.49
Capital	20,386.70	26,374.10	2.81%	26,374.10	-	-5,987.40
Mine BXZ Overall	-2,435.81	-30,075.89	-1.90%	2,637.41	-32,713.31	27,640.09

Strategic Segment Profit Grid



Productivity Analysis - Detailed Analysis

Input Category	Input Name	Profit Variance (000)	Productivity (000)	Productivity (%)	Capacity Utilisation (000)	Resource Allocation (000)	Price Recovery (000)
Materials	Laboratory Supplies	$3,517.04	$641.60	2.81%	$0.00	$641.60	$2,875.45
	Repair Material	($1,072.18)	$3,211.25	26.79%	$0.00	$3,211.25	($4,283.43)
	Safety Equipment	$1,571.79	$7,637.28	37.28%	$0.00	$7,637.28	($6,065.49)
	Total	$4,016.65	$11,490.13	22.33%	-	$11,490.13	($7,473.47)

Productivity Analysis - Detailed Analysis

Input Category	Input Name	Profit Variance (000)	Productivity (000)	Productivity (%)	Capacity Utilisation (000)	Resource Allocation (000)	Price Recovery (000)
Labour	Geology	($1,334.32)	$1,903.90	2.81%	$0.00	$1,903.90	($3,238.22)
	Laboratory	$3,353.31	$13,063.86	13.09%	$0.00	$13,063.86	($9,710.56)
	Location A - Mining	($6,405.45)	$2,024.05	2.81%	$0.00	$2,024.05	($8,429.50)
	Engineering	($5,526.26)	$2,266.21	2.81%	$0.00	$2,266.21	($7,792.47)
	Finance, HR, IT and Admin	($4,413.98)	$7,618.38	2.81%	$0.00	$7,618.38	($12,032.36)
	Marketing	($1,928.44)	($6,815.79)	-14.33%	$0.00	($6,815.79)	$4,887.35
	Location B Mining	$491.09	$1,084.24	2.81%	$0.00	$1,084.24	($593.14)
	Smelter	$9,399.52	$2,589.36	2.81%	$0.00	$2,589.36	$6,810.17
	Total	($6,364.53)	$23,734.20	1.90%	-	$23,734.20	($30,098.73)

Productivity Analysis - Detailed Analysis

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	Laboratory	$3,353.31	$13,063.86	13.09%	$0.00	$13,063.86	($9,710.56)
	Location A - Mining	($6,405.45)	$2,024.05	2.81%	$0.00	$2,024.05	($8,429.50)
	Engineering	($5,526.26)	$2,266.21	2.81%	$0.00	$2,266.21	($7,792.47)
	Finance, HR, IT and Admin	($4,413.98)	$7,618.38	2.81%	$0.00	$7,618.38	($12,032.36)
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	Smelter	$9,399.52	$2,589.36	2.81%	$0.00	$2,589.36	$6,810.17
	Total	($6,364.53)	$23,734.20	1.90%	-	$23,734.20	($30,098.73)

Profitability /Productivity Relationship

Case	if Profitability	If Productivity	Then what will happen	What should be done
1	High	High	Financial position will be sound and stable	Maintain and increase productivity further
2	High	Low	High profitability may not be sustained on a long term basis on the long run. Low productivity will eat up profit	Improve productivity
3	Low	High	The company may soon be operating at a loss and may be on the brink of shutdown	Improve profitability, strengthen marketing strategy, market research, promotion and pricing policy
4	Low	Low	Shutdown	Improve productivity and strengthen market

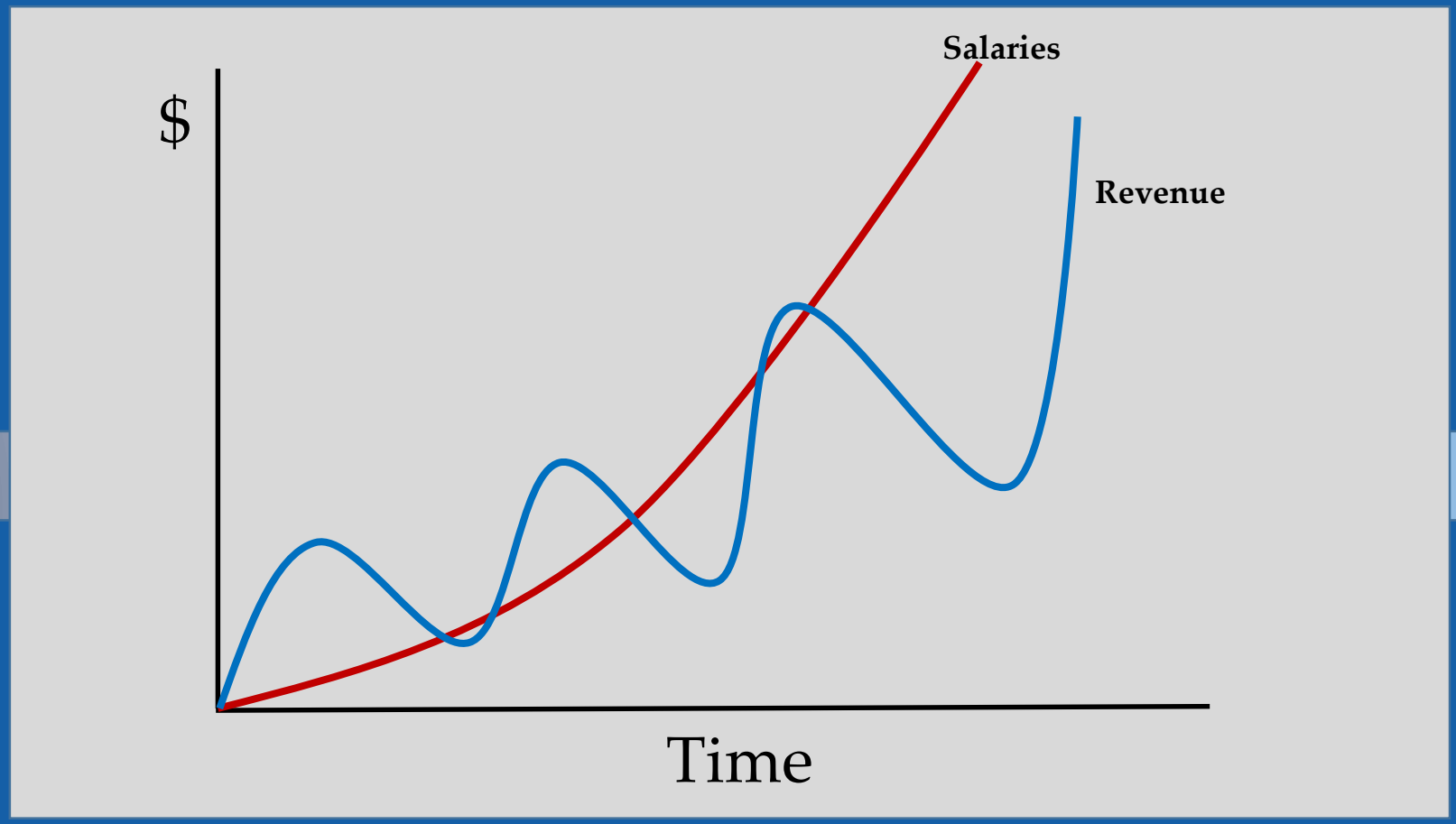
High Impact Areas to Target for Productivity Improvement in the Mining Sector

- Headcount Management
- Capital efficiencies
- Labour efficiencies
  - Quality of labour
  - Deployment of labour
- Quality of Management

Be Warned !!!!!!!!!

- Revenue is cyclical over time
- Wages grow exponentially over time

Salaries and Revenue Growth Over Time



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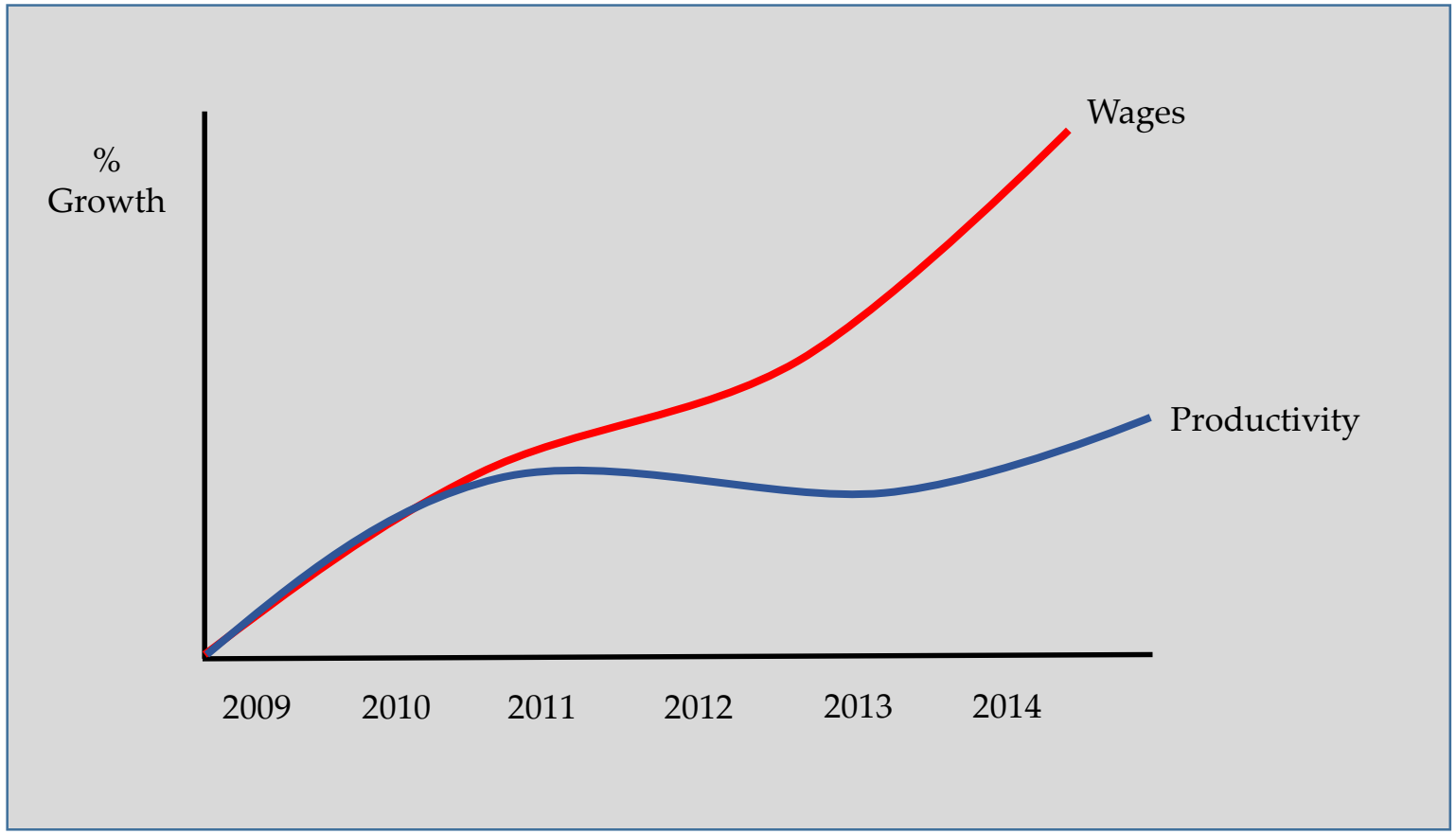
Wages and Productivity – Zim



Productivity Analysis - Detailed Analysis

- The same analysis can be broken down for all input categories
- Inefficiencies are quickly identified.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