SUSTAINABILITY IN METALS & MINERALS SECTOR IN THE ERA OF GEO-POLITICAL & ECONOMIC UNCERTAINITIES

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Human civilization is becoming increasingly technology oriented. Technology is the study of that branch of knowledge which enables shaping of resources for some useful purpose. Resources are tangible and intangible both. Tangible resources are equipment, hardware, materials etc whereas intangibles include data, software, information, knowledge etc. Tangible part of technology needs metals and minerals. Availability of metals and minerals are limited, for some items, reserves are fast going deep. Humans are *homo sapiens* ("man the thinker") which made them *homo faber* ("man the maker"). Aristotle had said – 'man is by nature a political animal' Humans are also *homo æconomicus*, or the economic man of the world. Permutation and combinations of these four characteristics determine political and economical dynamics at global level which in turn affect trades. Under these circumstances, for the sake of economics and security, it is essential to take measures to meet the growing demand of metals and minerals. Apart from exploration and mining in newer areas and increasing production, followings are suggested for long term sustainability in metals and minerals sector:

(A) Augmenting supply of metals & minerals

1. Increasing life span of metals: Life span of metals vary from metal to metal. Moreover, metals used in defence-equipment and space exploration are having single life and are considered as consumed. Efforts are to be made to increase lifespan of metals used in other sectors. RRR (Recycle, Reuse & Reduce)
2. Use of alternate resources: Use of inorganic polymers and similar items need to be explored.
3. Fullest utilization of extracted minerals: Hundred percent utilization of minerals / mine-products are to be ensured. If required, Plant & Machineries using the minerals need to be upgraded / replaced.
4. Beneficiation and enrichment processes based on Physics of Non-destructive Evaluation: Environment friendly beneficiation processes based on Physics of Non-destructive Evaluation technology enables obtaining different grades of minerals within the same RoM (Run of Mine) products.

(B) Minimizing requirement of metals and minerals:

1. Extended Life Program for Capital Equipment: Instead of scrapping, end of life of an equipment may be extended through upgradation / rehabilitation / overhauling etc.

2. Increase in life expectancy norms of capital assets: Instead determining life on the basis of depreciation rate, life expectancy norms are to be decided on the basis of feasibility of increasing life from the prevailing norms.
3. Optimisation of Capacity / Weight of equipment, where possible: Weight of an equipment depends upon the content of metals. Capacity of an equipment depends on many factors other than sturdiness or robustness of an equipment. Higher capacity equipment even with marginal increase in weight content need to be considered during procurement process.

Conclusion:

To cope up with the challenges posed by ensuing trade war as well as scarcity of reserves of some minerals, the system should be flexible and responsive to change. Adoption to the changing conditions is need of the hour. Research & Development in metal and mining sectors, polymer and oligomer technology need to be emphasised and promoted by incentivisation.

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