THE ROLE OF MINING CADASTRE SYSTEMS IN MINERAL DEVELOPMENT OF PAKISTAN

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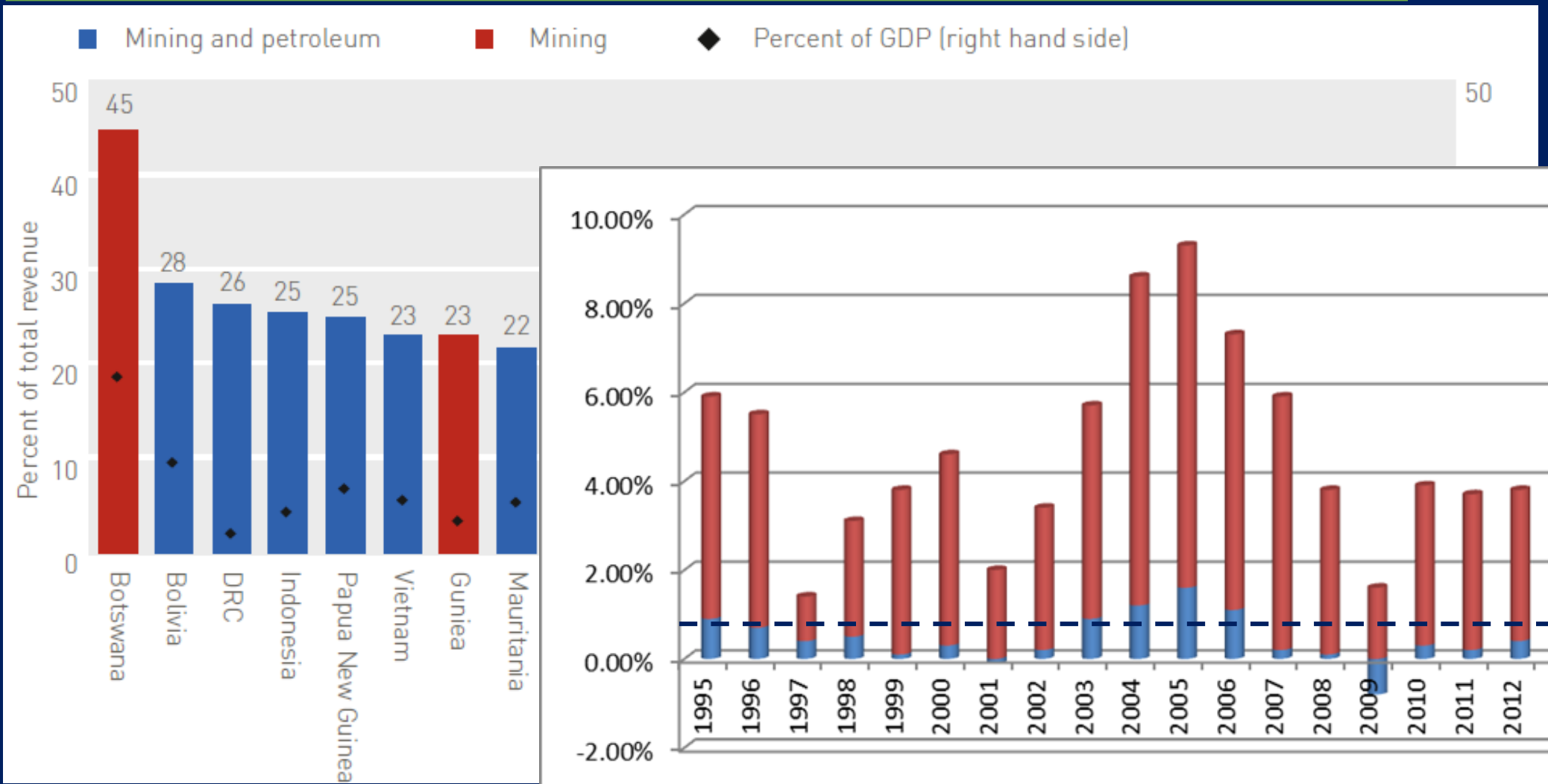
MINERAL DEVELOPMENT OF PAKISTAN

- Countries earning major contribution to their GDP from their mineral sector;
- Despite the presence of large mineral deposits, Pakistan has been unable to get the required economic boost like the other developing mineral-based economies of the world.



Source: USGS, 2013

HOW IT STARTED?

Reko Diq

- The Reko Diq Town-Chagai District, Baluchistan, Pakistan;
- Large copper mine with estimated reserves of 5.9 billion tonnes of ore grading 0.41% copper;
- The mine also has gold reserves amounting to 41.5 million oz

HOW IT STARTED?

The BHP Billiton & the TCC

Mistakes

Non-compliance of leading practices

- JVA, not a leading practice;
- Extension of RL tenure beyond 6 years;
- Grey areas in contracting over the extents of RL & prospecting;
- Confusion over prospecting of single versus all discovered deposits;
- Legal fiasco (SCP) forcing TCC to ICSID - 2011

- 2000, BHPB sold its shares to TCC
- 2006 , TCC was taken over by Antofagasta PLC
- TCC mineral interests have been managed and operated by a 50:50 JV between Antofagasta and Barrick Gold.
- GoB has a 25% interest in the project.

- Chagai Hills Exploration Joint Venture agreement (CHEJVA), signed between the Balochistan Government and Broken Hill Properties Minerals (BHPM) in 1993.
- Agreement envisaged exploration by BHPM for 6 years over the Exploration Area, followed by preparation of a Feasibility Study to undertake mining of the proven mineral resource.
- According to the JVA, BHPM would have earned 75% interest on satisfactory completion of Exploration Program while BDA had 25% share in the JV, both in cost and profit.

HOW IT STARTED?

- 2012 - Rector NUST/ Director SAGE conceptualized the development of a Modern Mining School

PAKISTAN-SPECIFIC

- NUST-WITS MoU – 2012

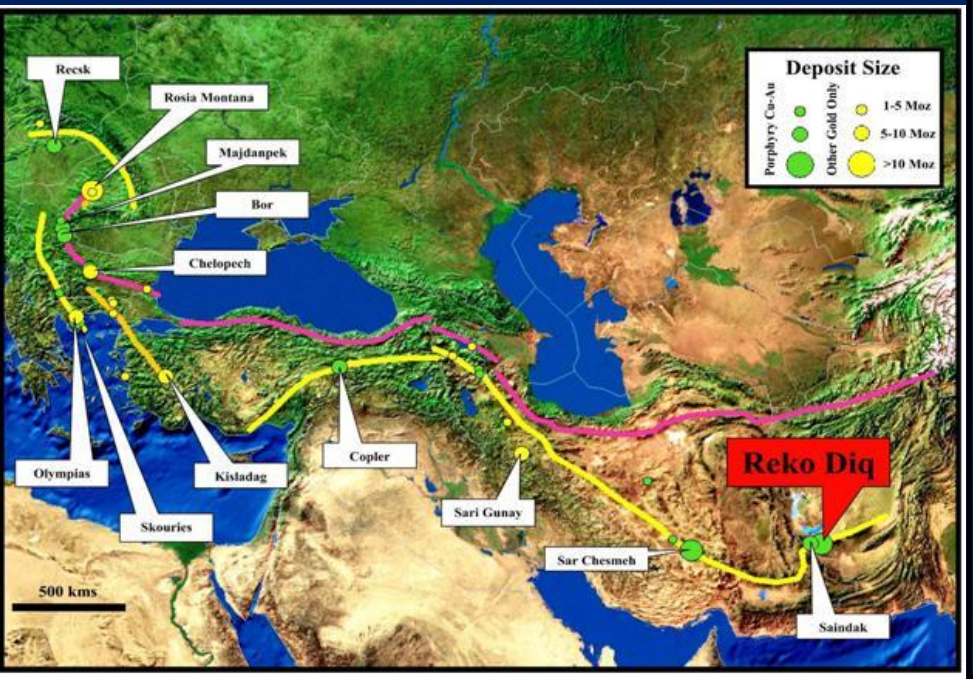
(Faculty building program)

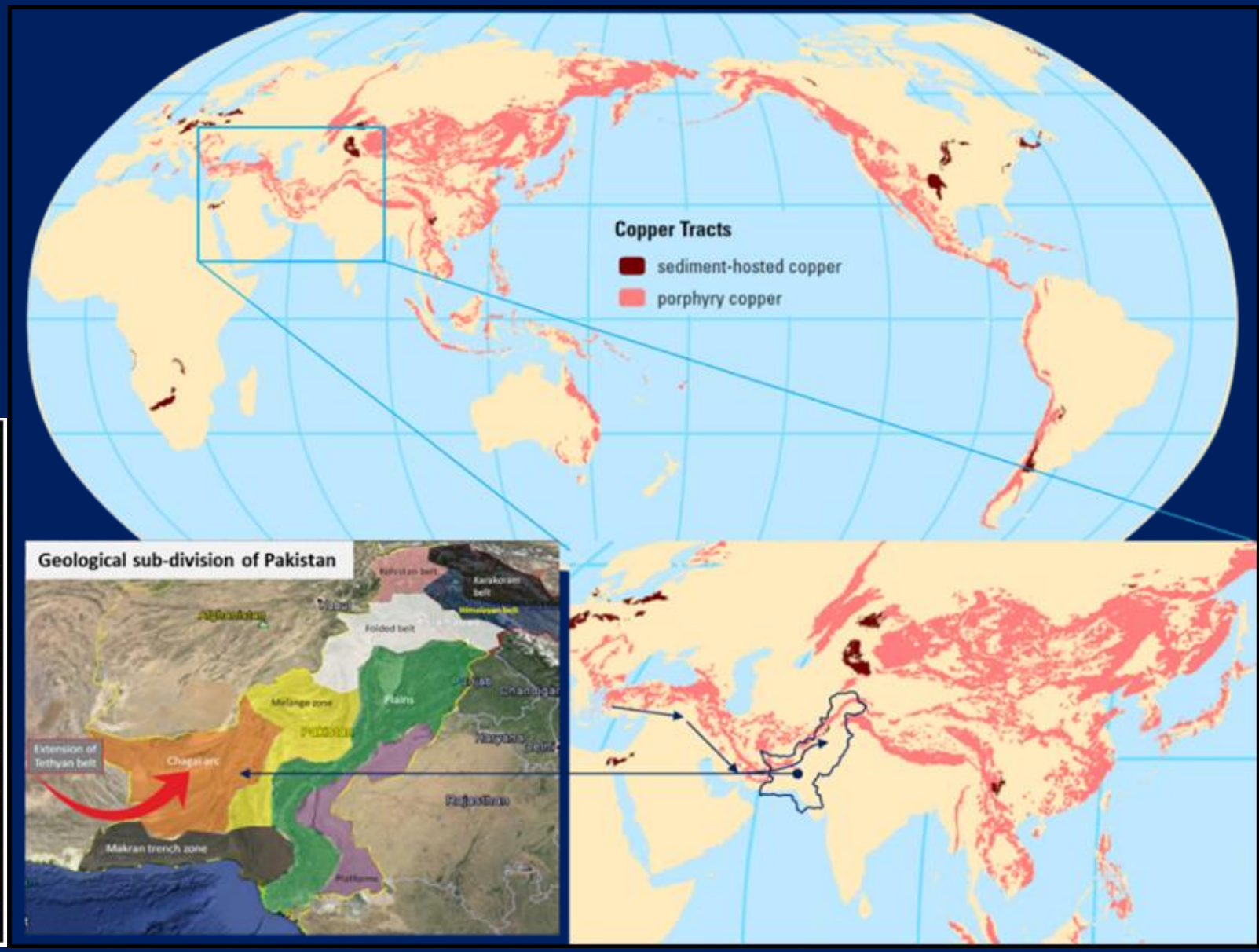
SAGE – SEP 2017

- 3 x PhDs
- 1 x Post Doc
- 5 x MS

MINERAL POTENTIAL OF PAKISTAN IN GLOBAL PERSPECTIVE

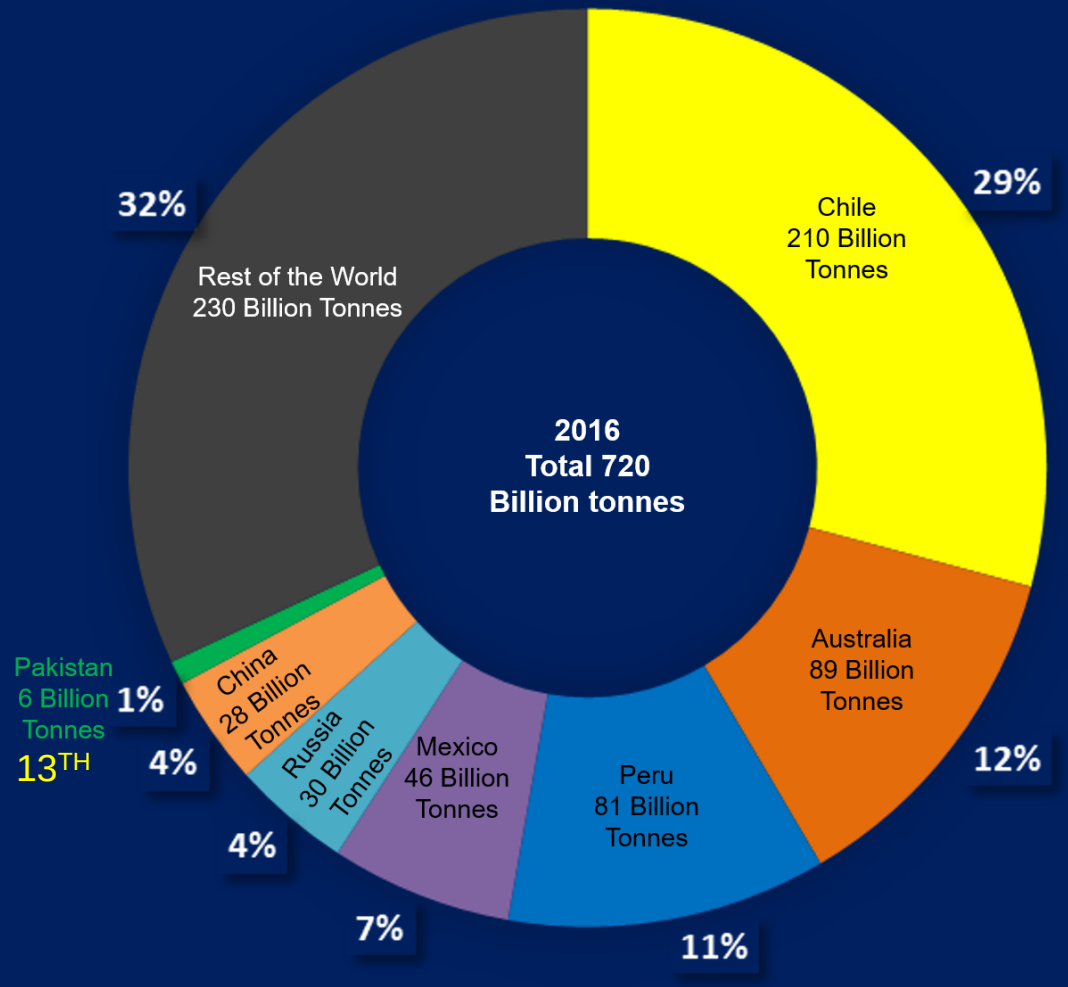
- Pakistan has inferred copper and gold resources at Reko Diq and coal resources at Thar;
- The World's famous Tethyan copper belt enters Pakistan at Chagai Arc in Baluchistan Province.



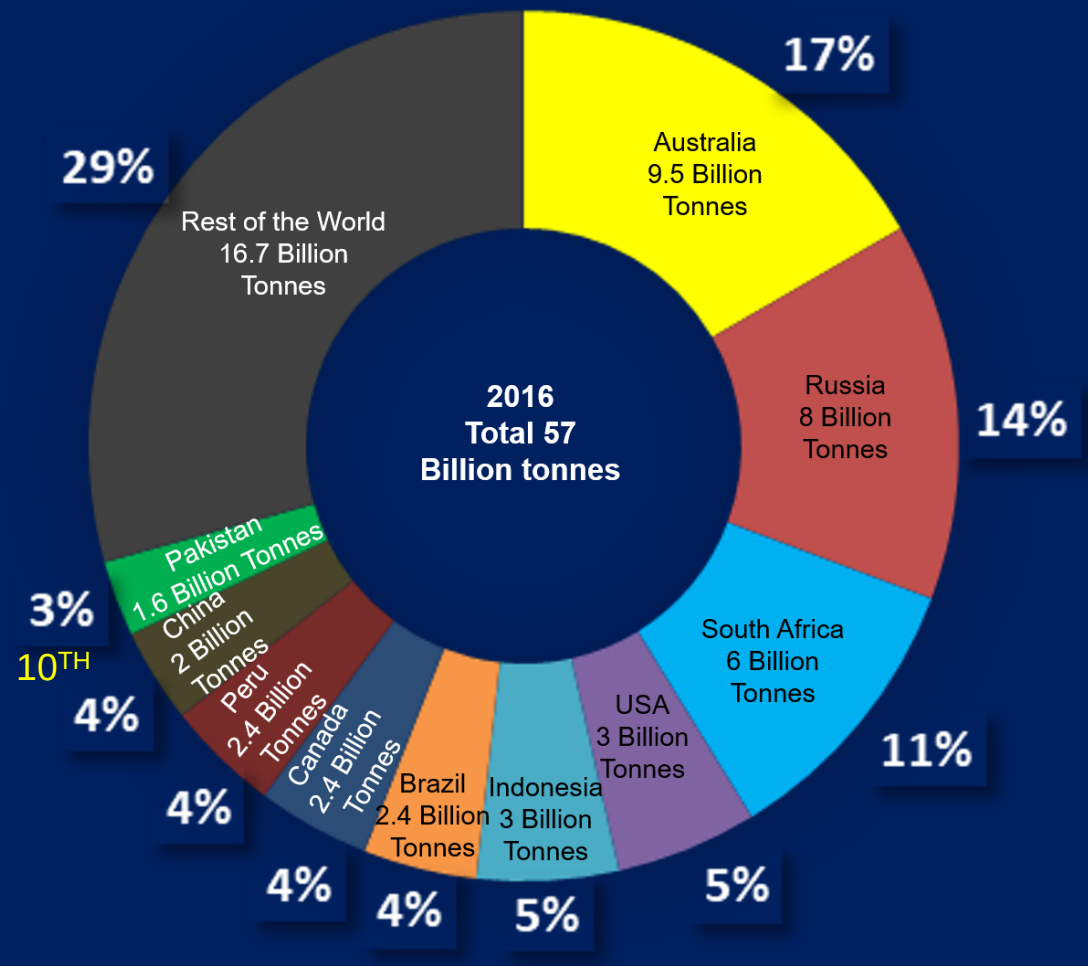


MINERAL POTENTIAL OF PAKISTAN IN GLOBAL PERSPECTIVE

World Proven Copper Reserves



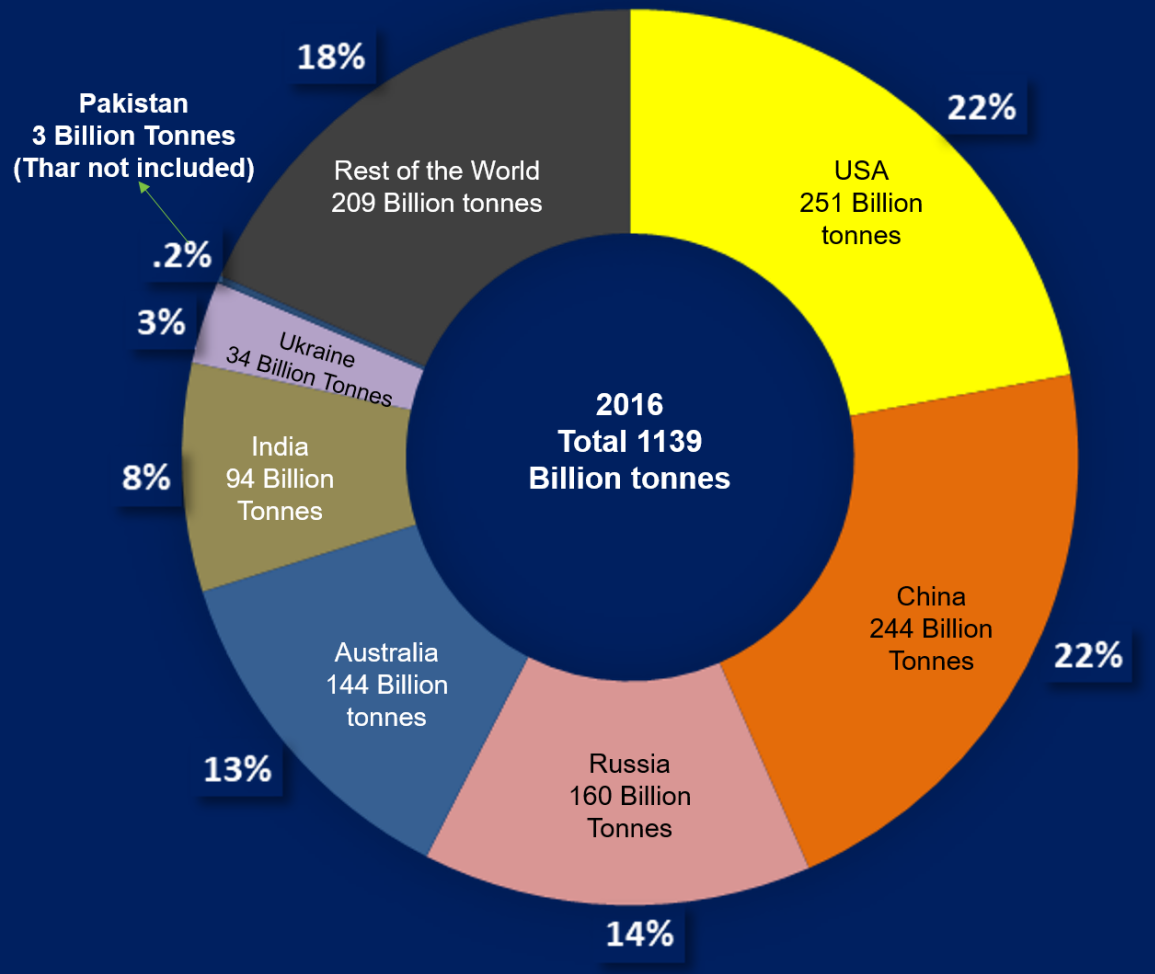
World Proven Gold Reserves



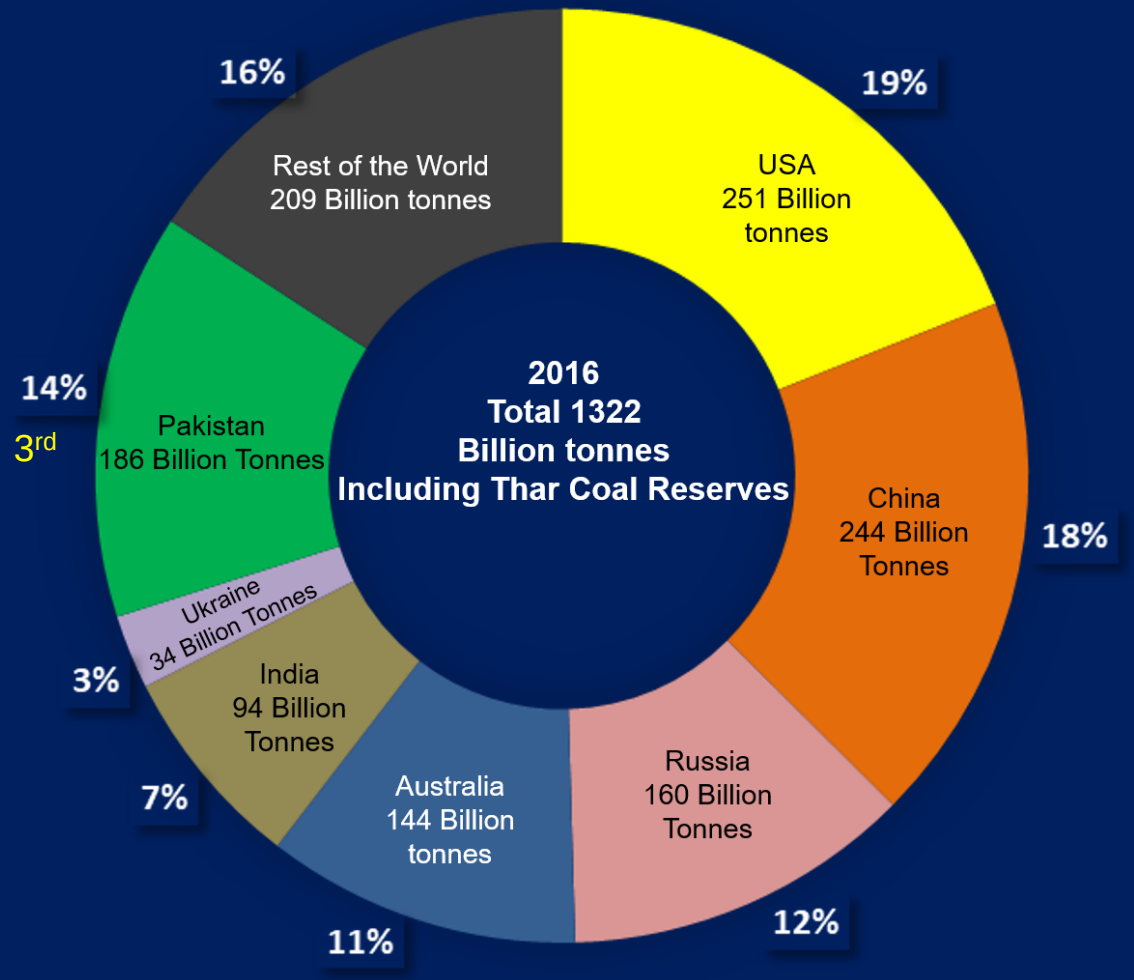
Source: Mineral Commodity Summaries 2017, USGS

MINERAL POTENTIAL OF PAKISTAN IN GLOBAL PERSPECTIVE

World Proven Coal Reserves



World Proven Coal Reserves including Thar Coal Resources

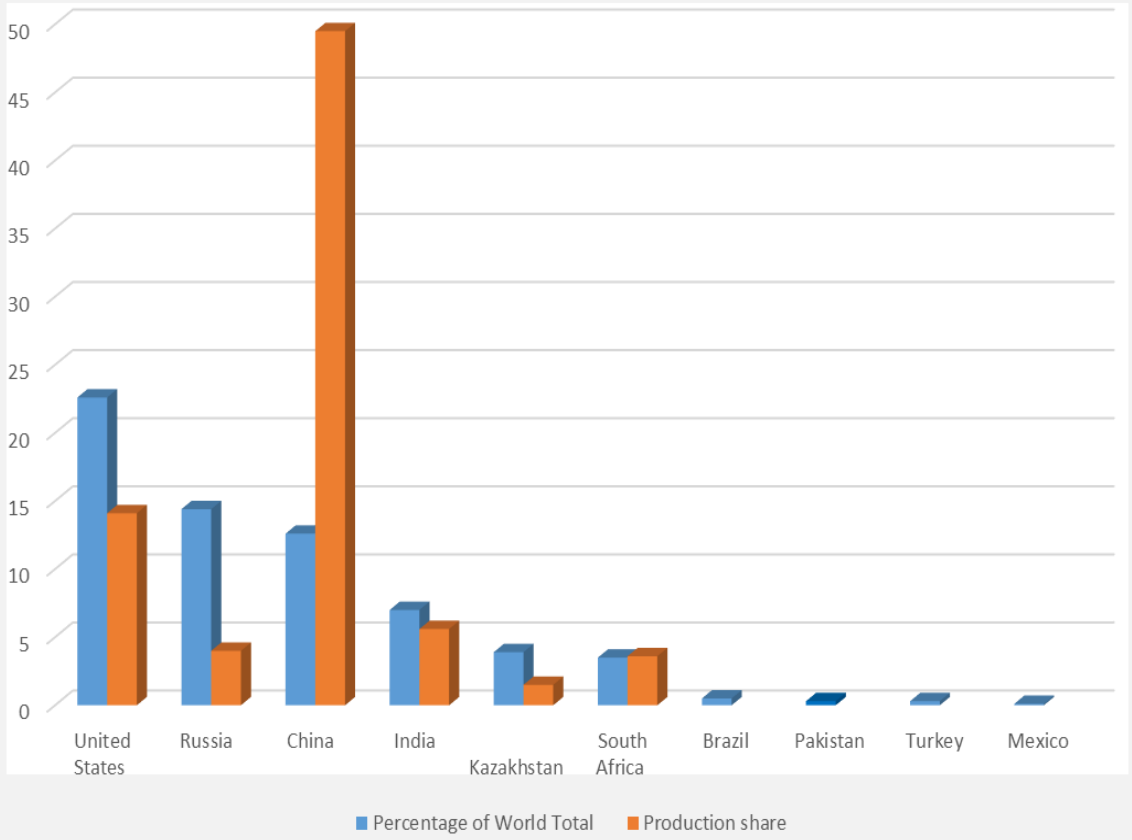


Source: Mineral Commodity Summaries 2017, USGS

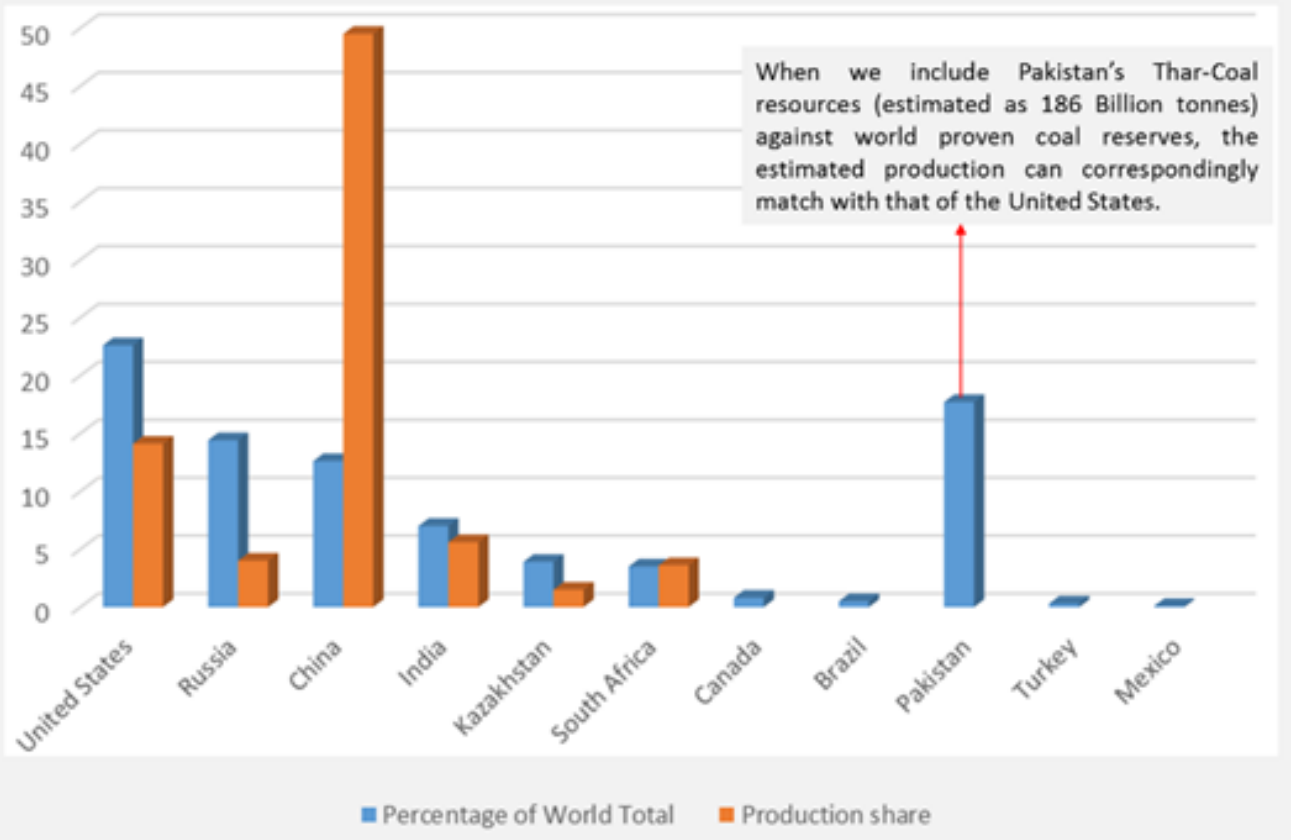
MINERAL POTENTIAL OF PAKISTAN IN GLOBAL PERSPECTIVE

- Pakistan has the world's 3rd largest coal resources amounting to 186 billion tonnes. This is equivalent to 618 billion barrels of crude oil. To put it into perspective, it has oil resources comparable to Saudi Arabia.

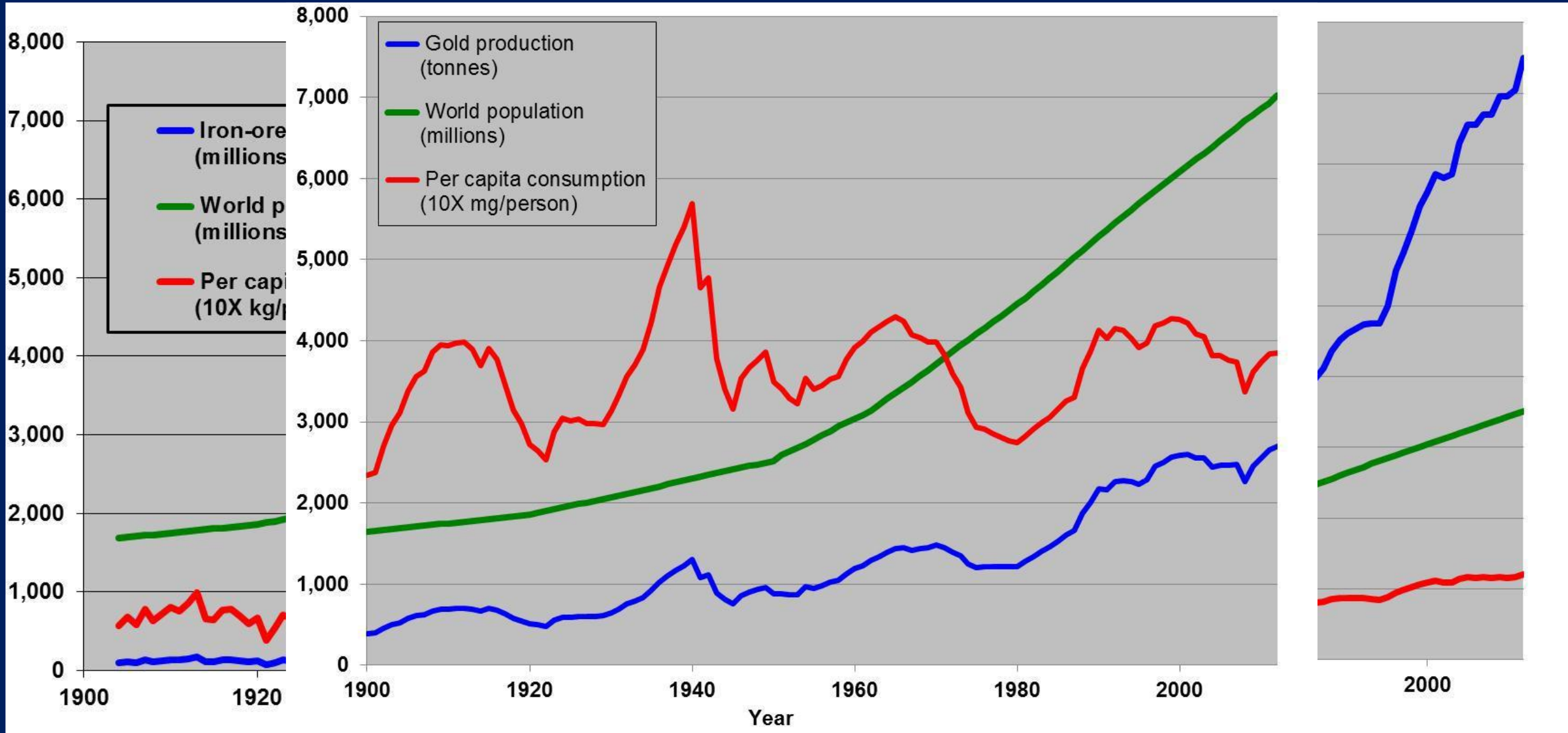
World Proven Recoverable Coal Reserves Vs Production by Country



World Coal Reserves and Production Vs Thar-Coal Resources of Pakistan (Percentages)



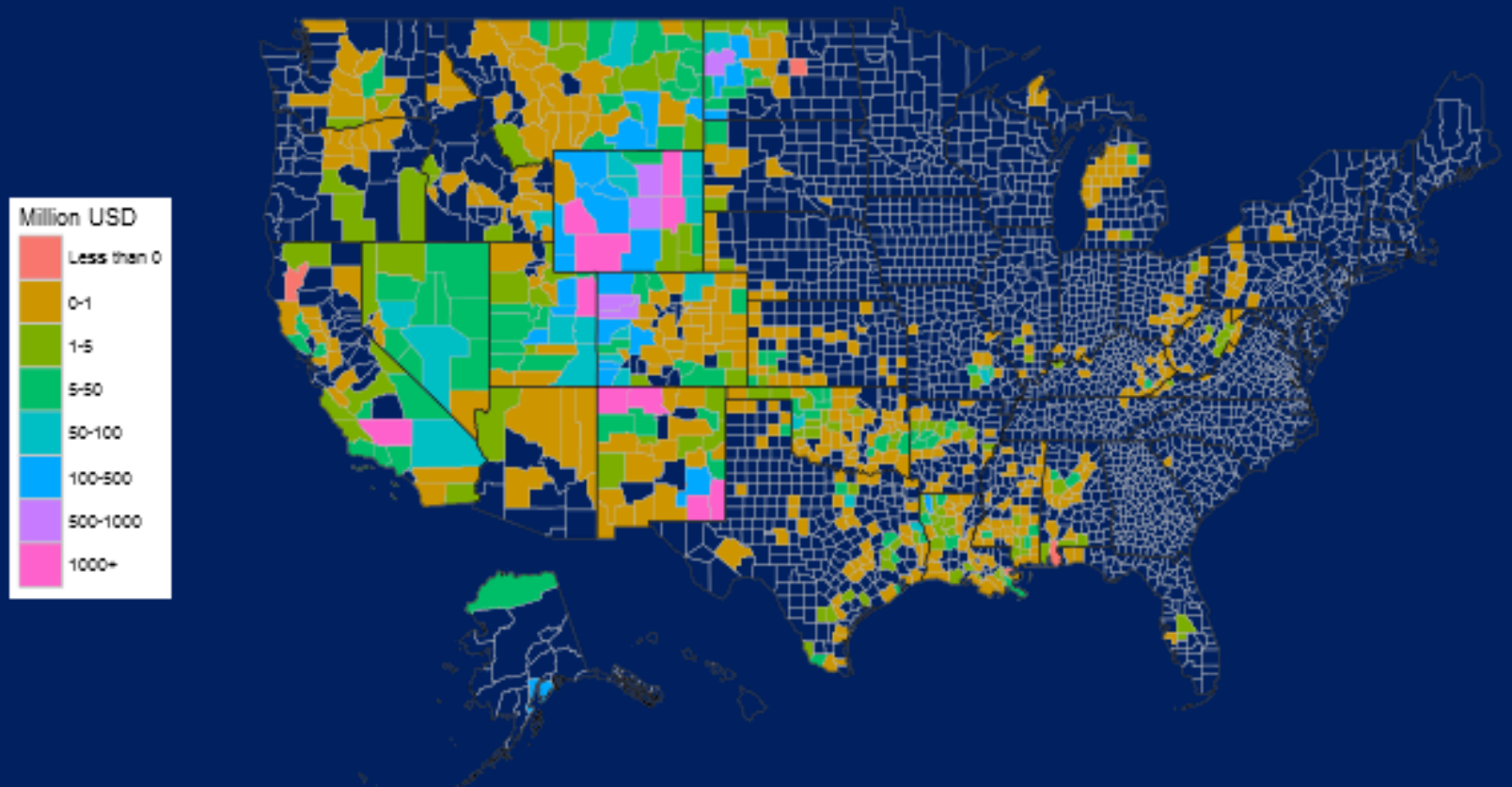
THE IMPORTANCE OF MINERAL RESOURCES IN ECONOMIC GROWTH



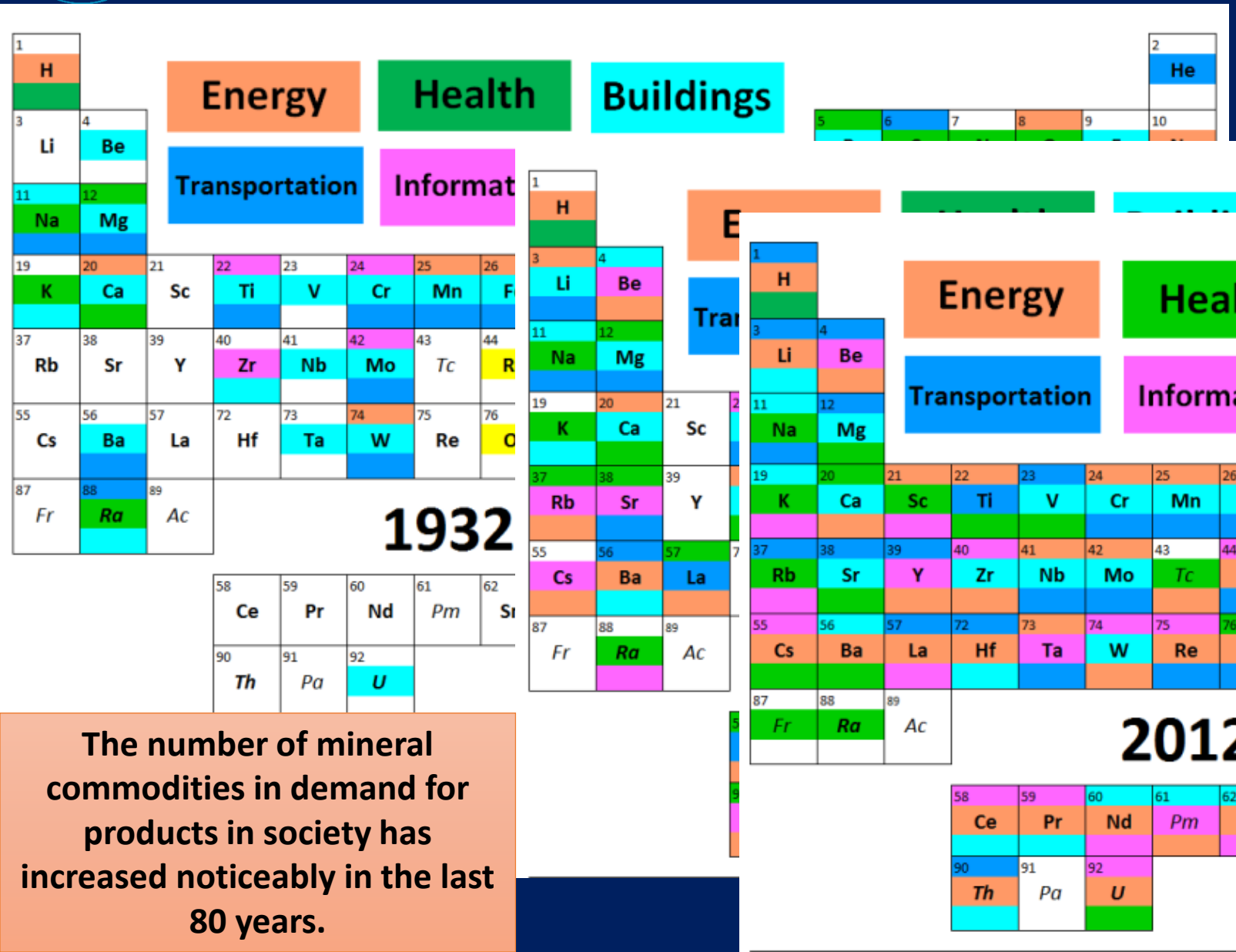
THE IMPORTANCE OF MINERAL RESOURCES IN ECONOMIC GROWTH

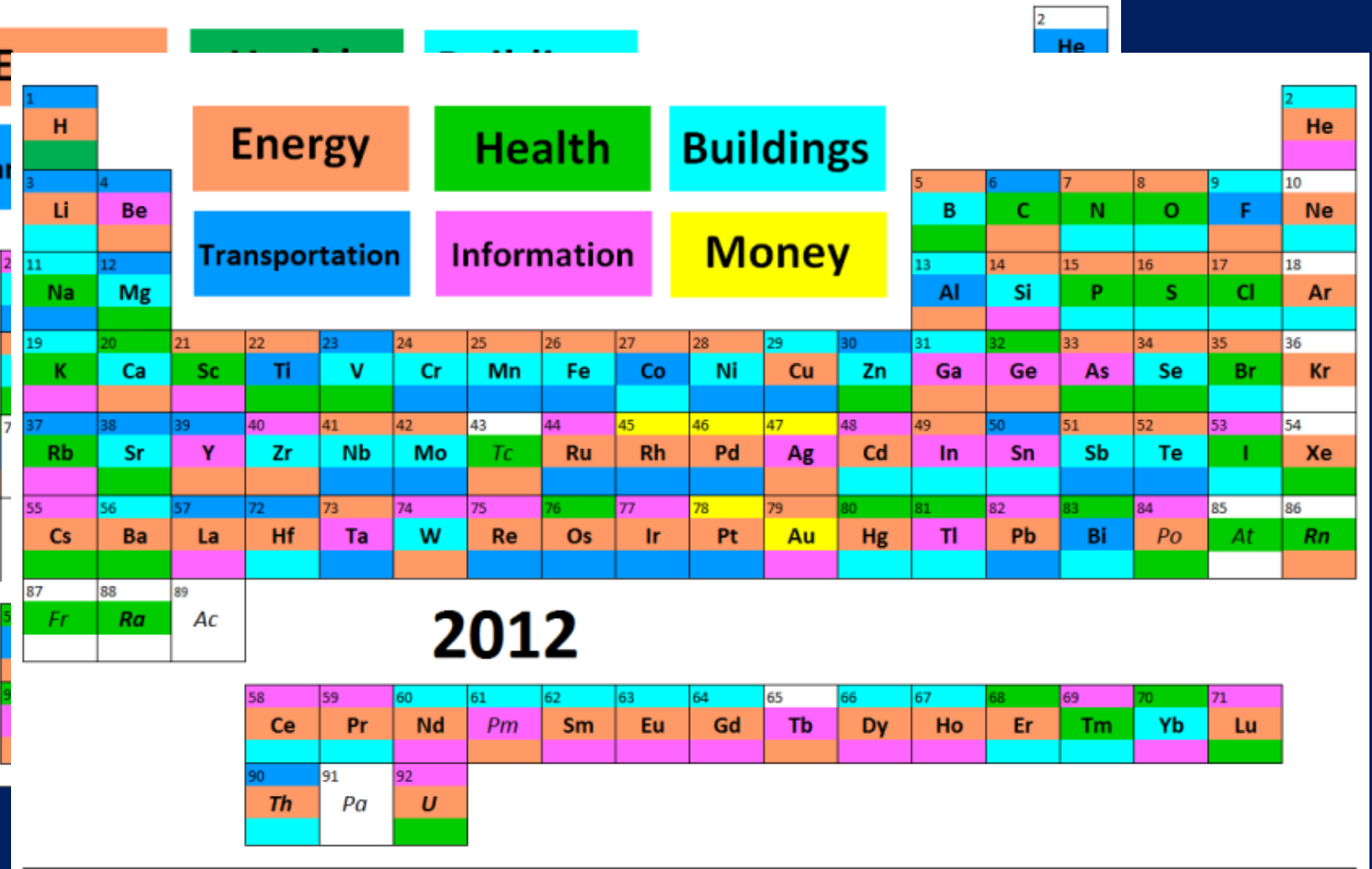
The United States (US), which was a leading mineral-based economy in the period from 1890 to 1910, emerged as a global leader. In this period the US was the major exporter of almost all mineral commodities, which played a very important role in the development of US into a world leader.

Extractive Industry



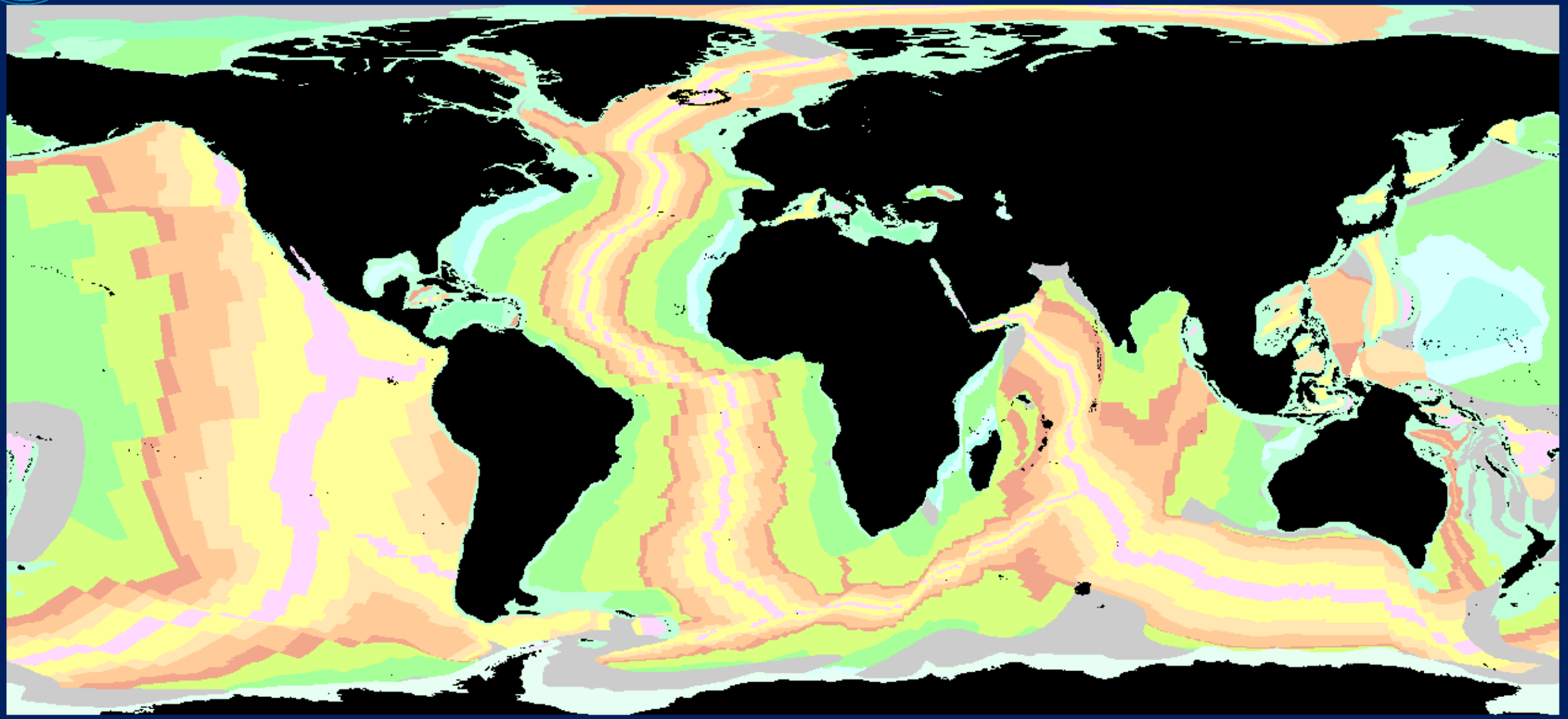
WE ARE MINERAL CONSUMING ANIMALS





The number of mineral commodities in demand for products in society has increased noticeably in the last 80 years.

AND WE HAVE BARELY STARTED EXPLORING OCEANS!



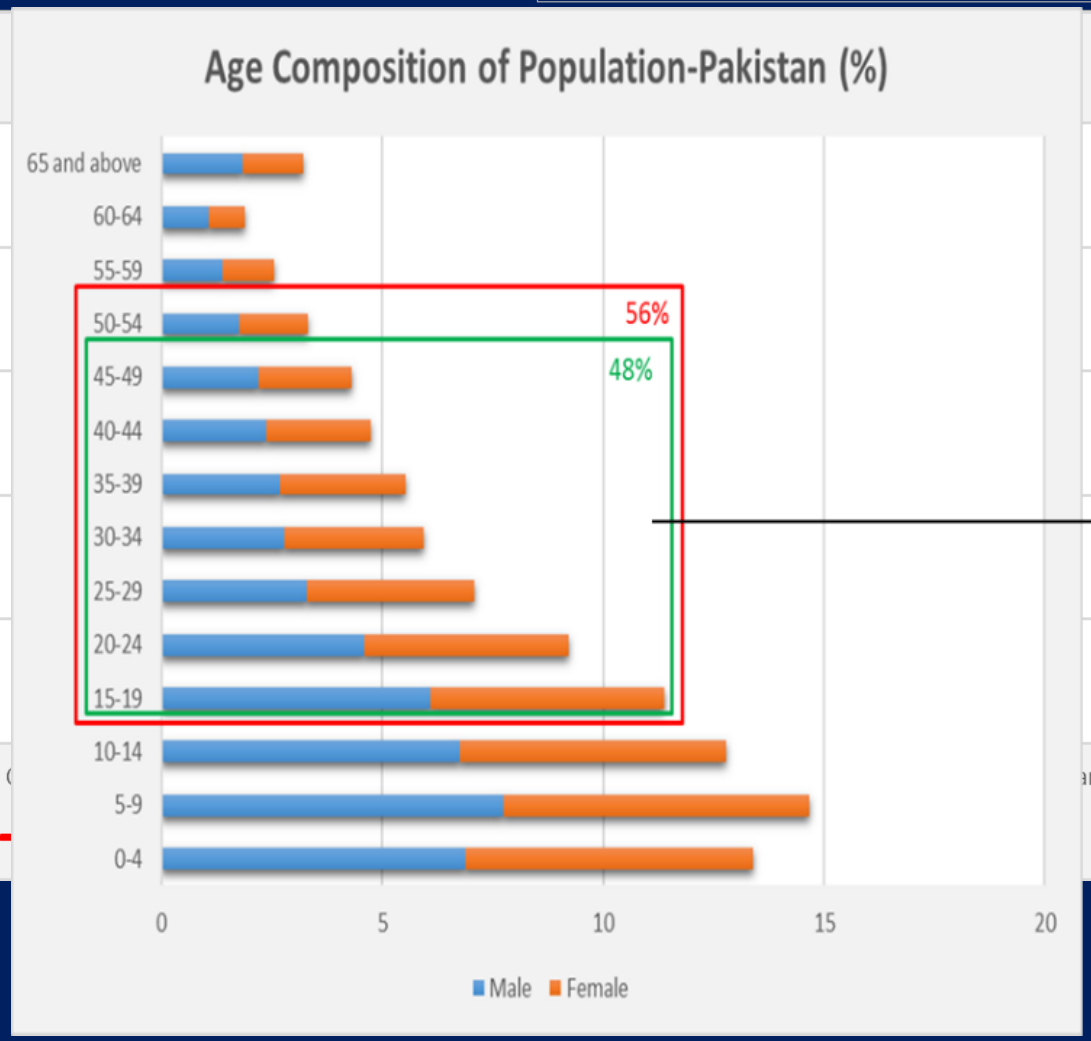
oceanic crust – potential for ore deposits of manganese (Mn, Ni, Co, Cu), sulfide deposits & seafloor vents (Cu, Zn, Pb, Au, Ag)

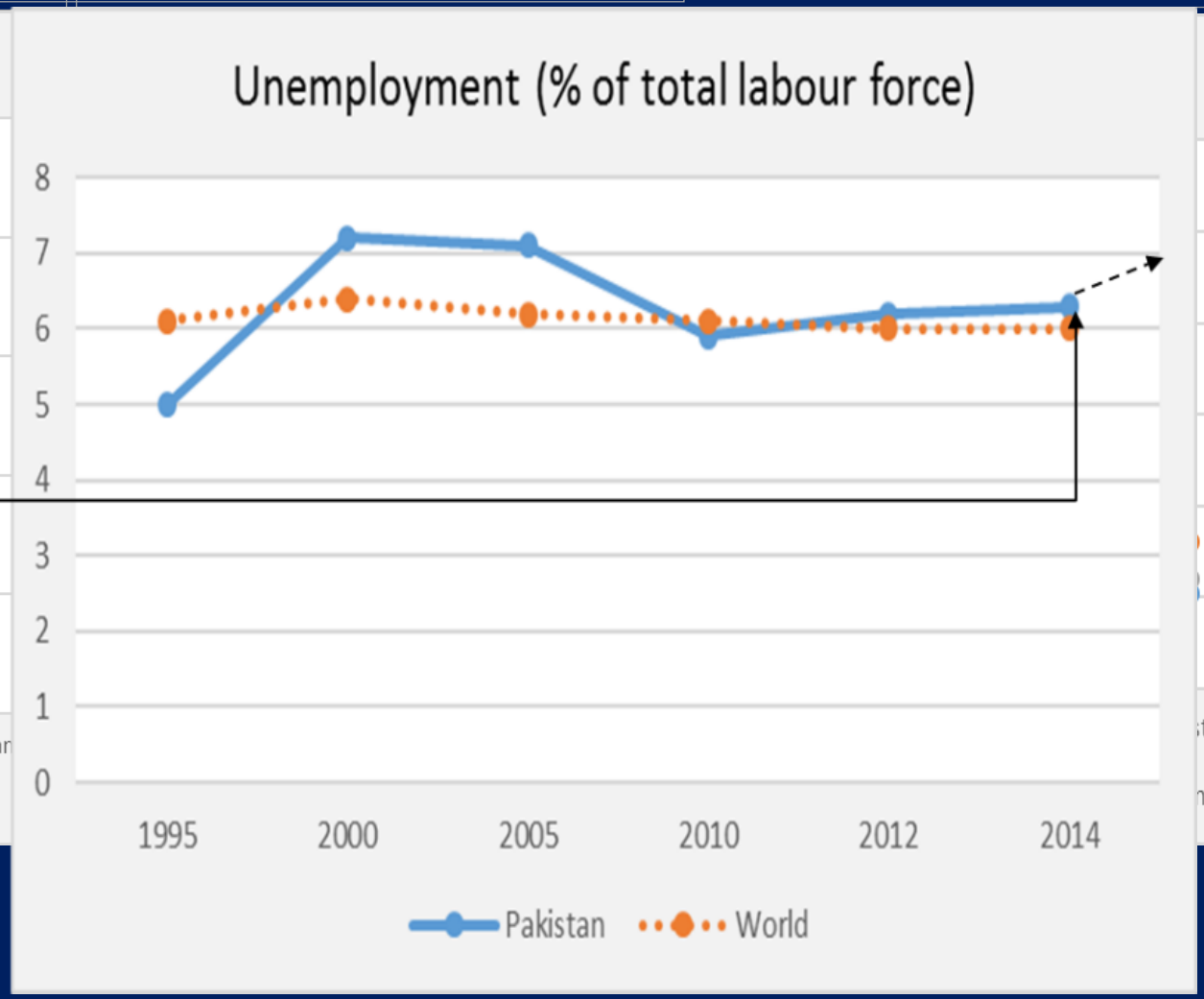
POPULATION GROWTH AND UNEMPLOYMENT

Comparison of population growth rate of Pakistan with the World and selected developing countries.

Population age composition of Pakistan and its effects on unemployment

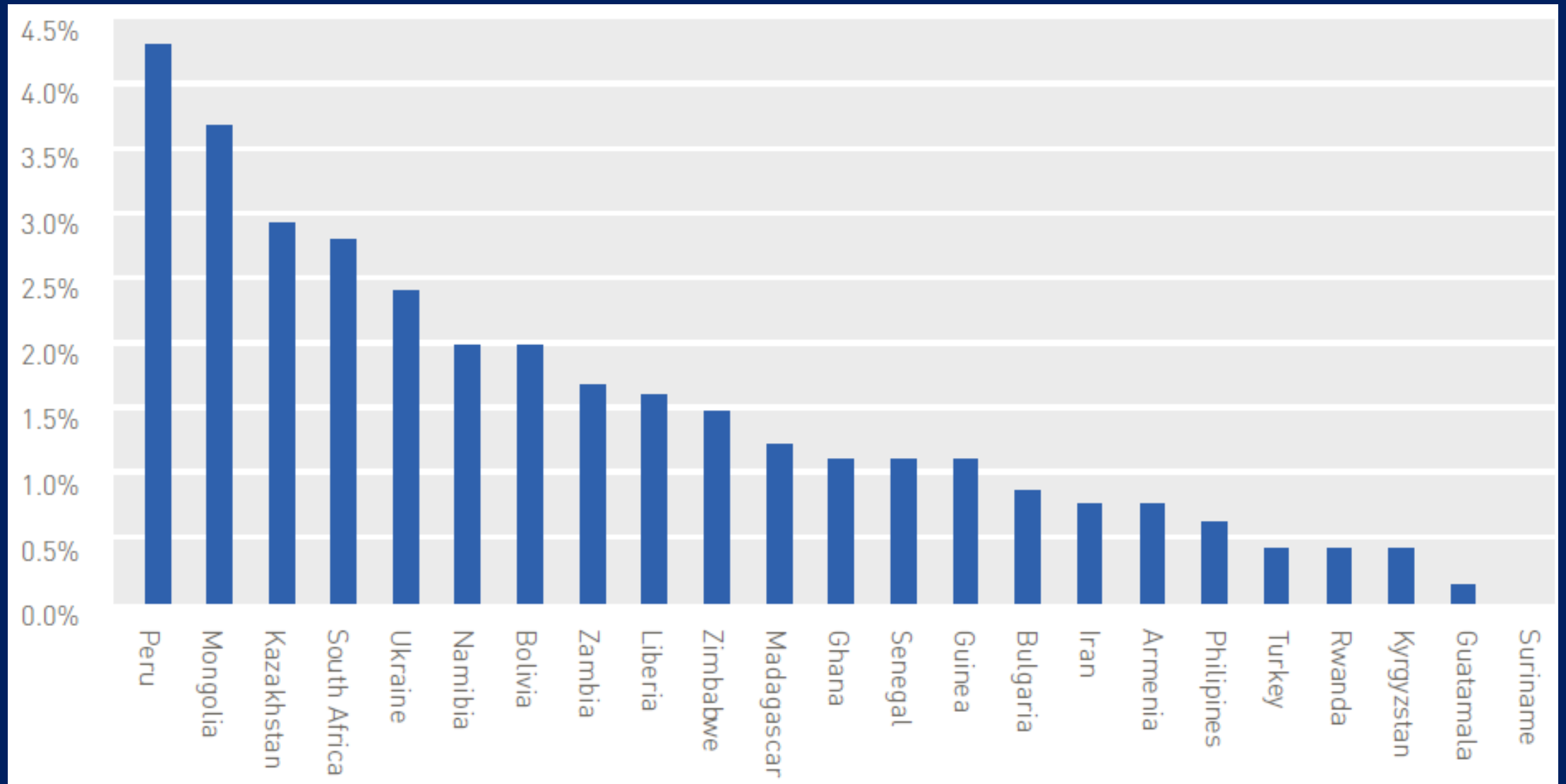
Comparison of unemployment rate of Pakistan with the World and selected developing countries.





CONTROLLING THE UNEMPLOYMENT

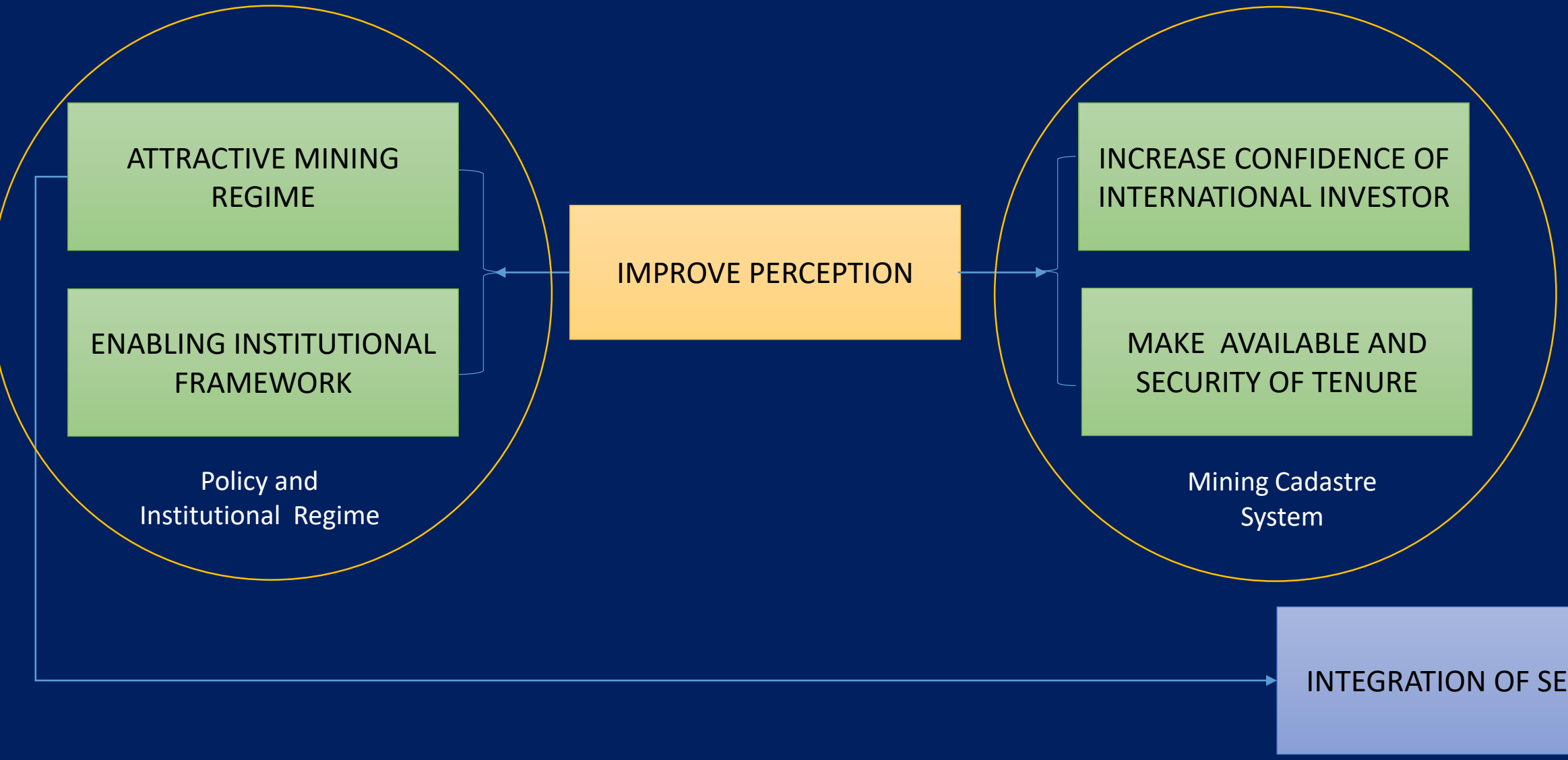
Mining sector direct employment as a percentage of total employment



MINERAL DEVELOPMENT FOR GROWTH

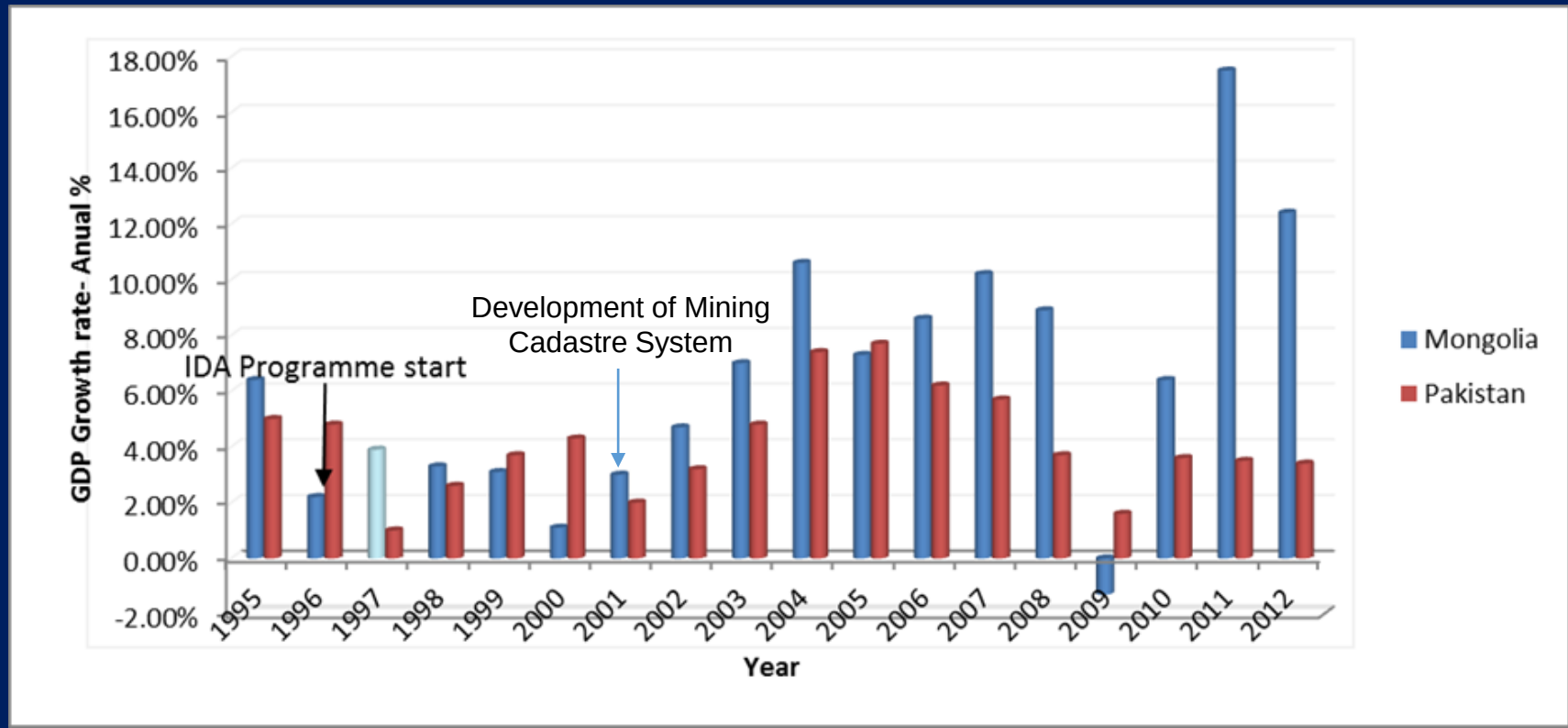
HOW?

MINERAL DEVELOPMENT FOR GROWTH



MINERAL DEVELOPMENT AND MINING CADASTRE SYSTEM

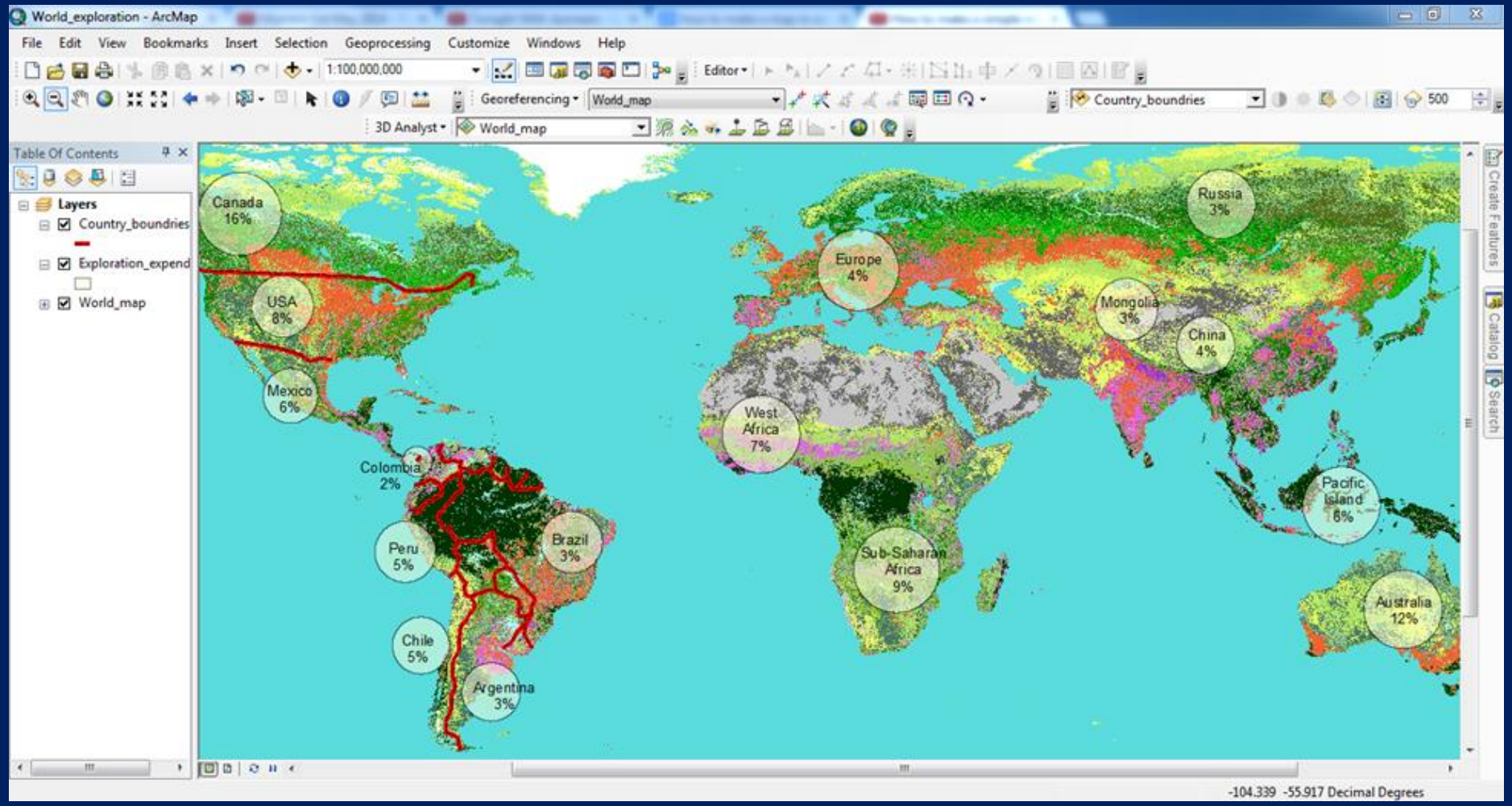
Mongolian GDP growth rates (annual %) from the time of start of IDA support and from the time of development of mining cadastre system as comparative to Pakistan in the same period



WORLD EXPLORATION PATTERNS

The world exploration spending in a region or country is the direct indicator of country's mineral wealth and good regulatory framework

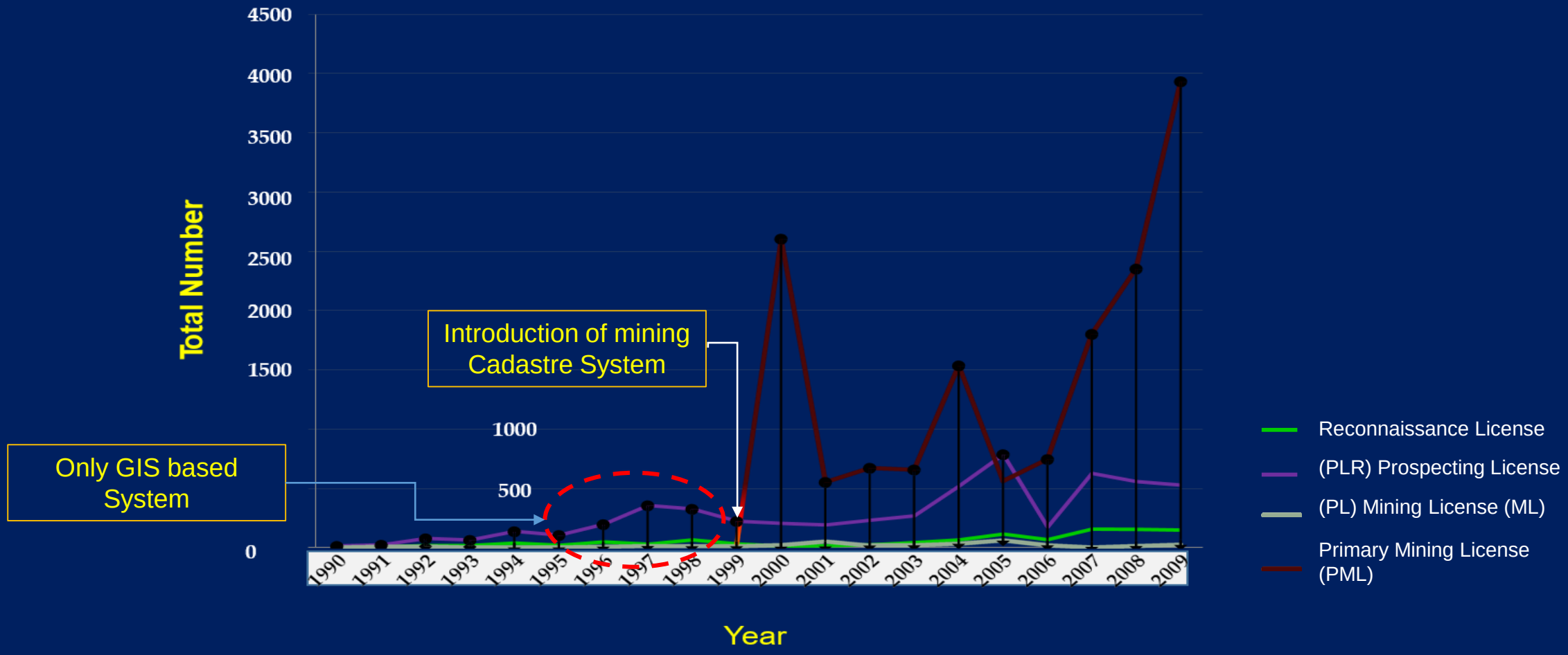
- Canada – 16%
- Latin America – 13%
- Australia – 12%
- Sub Saharan Africa – 9%



Budgetary statistics compiled by Metals Economic Group (MEG)
Regional and site specific mining exploration activities compiled by USGS

MINERAL RIGHT (LICENSE) GRANTING TREND

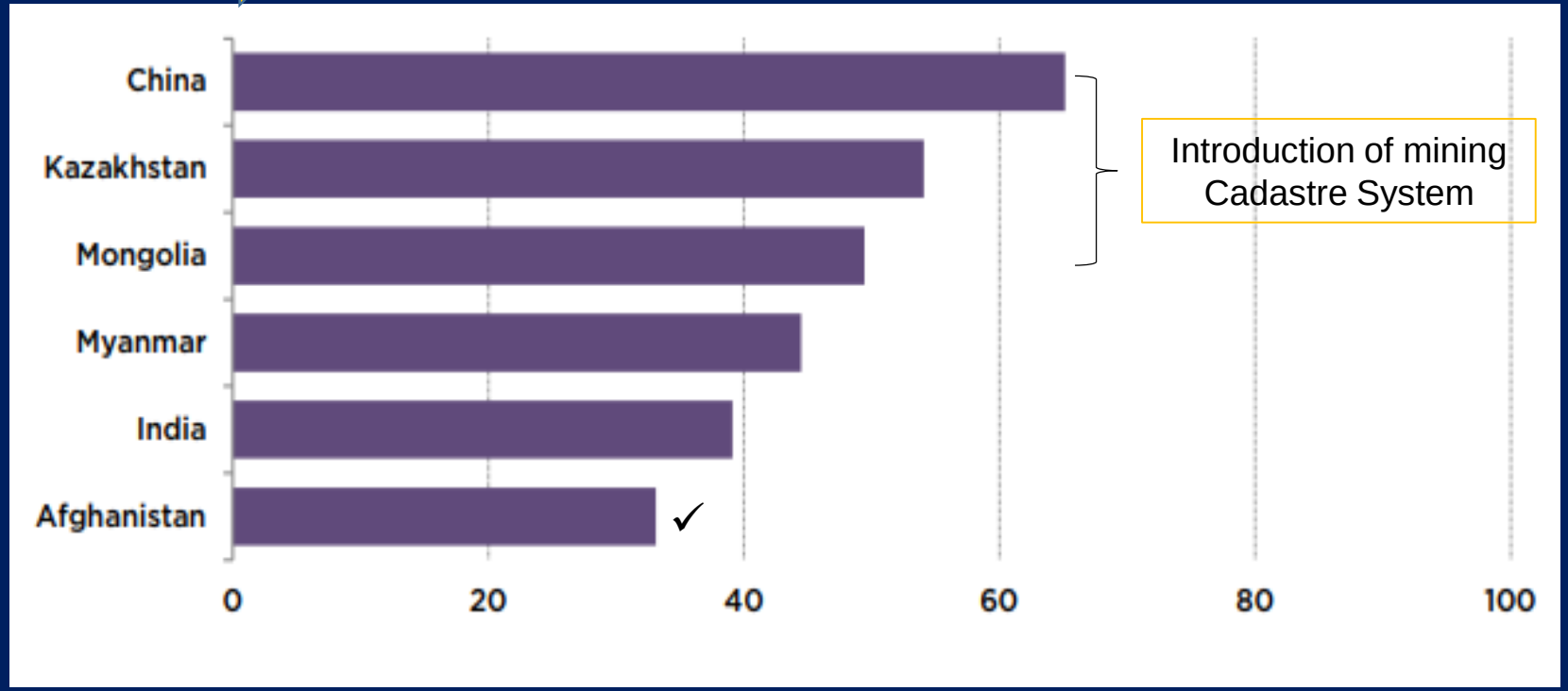
Sub-Saharan Africa



PERCEPTION & ATTRACTIVENESS BY FRASER

FRASER INSTITUTE

Policy Perception Index → **Investment Attractiveness Index**



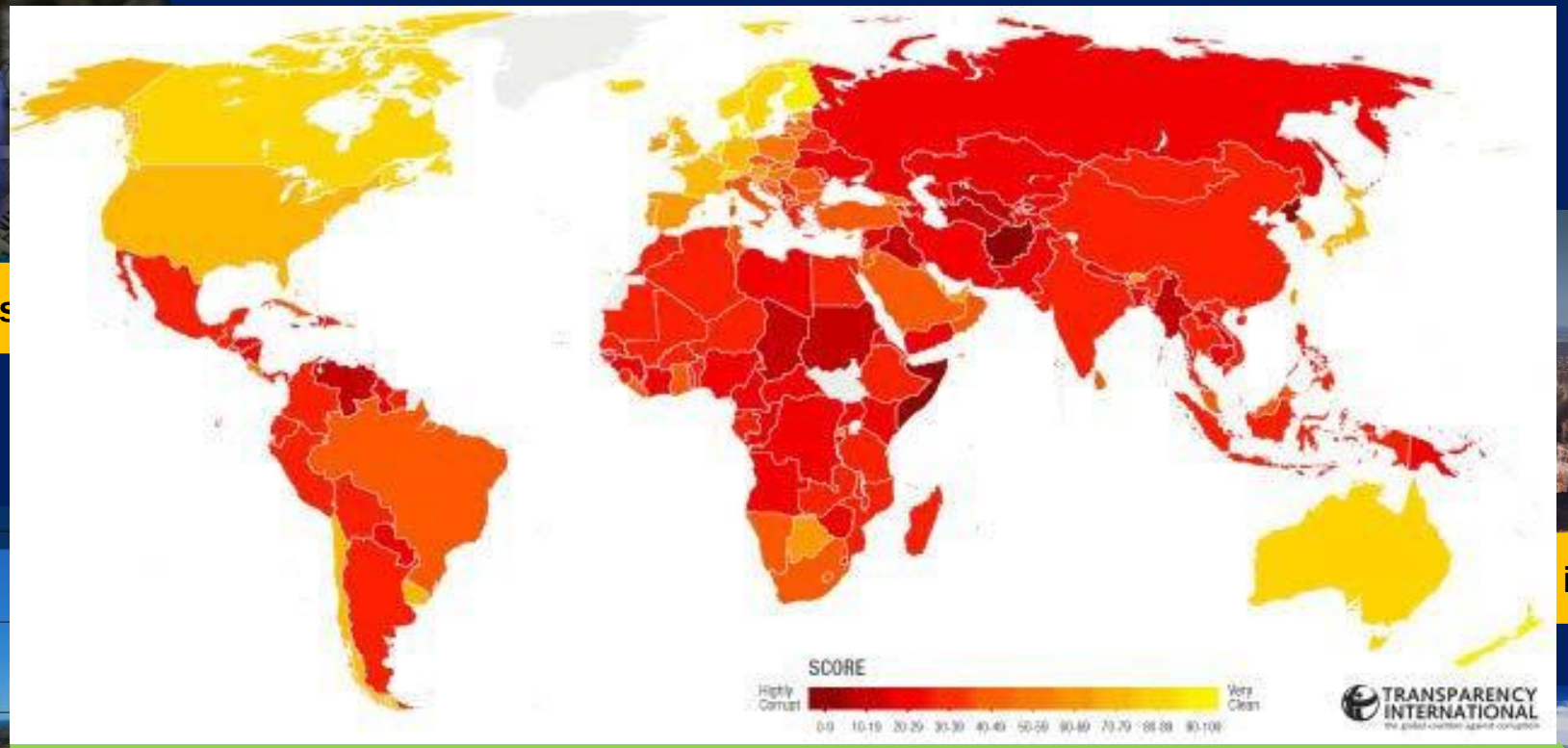
MINING CADASTRE SYSTEM & INVESTMENT

Country rankings	Mining and quarrying annual growth rate (%)
1. Zambia	15.7
2. Mozambique	3.0
3. Tanzania	1.2
4. DRC	-0.2
5. Mauritania	-2.0
6. Angola	-2.7
7. South Africa	-4.2
8. Algeria	-6.0
9. Guinea	-7.3
10. Ghana	-10.5

Introduction of mining Cadastre System

BENEFIT DRIVING

Attract responsible inves



inspectorate functions

Ensure R

Manage perceptions

Manage full life-cycle

Support large scale sector

MAKING IT A REALITY

SAGE Inaugural Seminar

Our Mission

Out reach Mining Industry

Patronize a progressive way forward

MAKING IT A REALITY

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National Strategy

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KPK Province

1st

ADP Program

MCS Conceptualized

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Due Diligence

Comparative Analysis

Landfolio

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Fit for Policy

MAKING IT A REALITY

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Integration

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Comparative Analysis

Landfolio

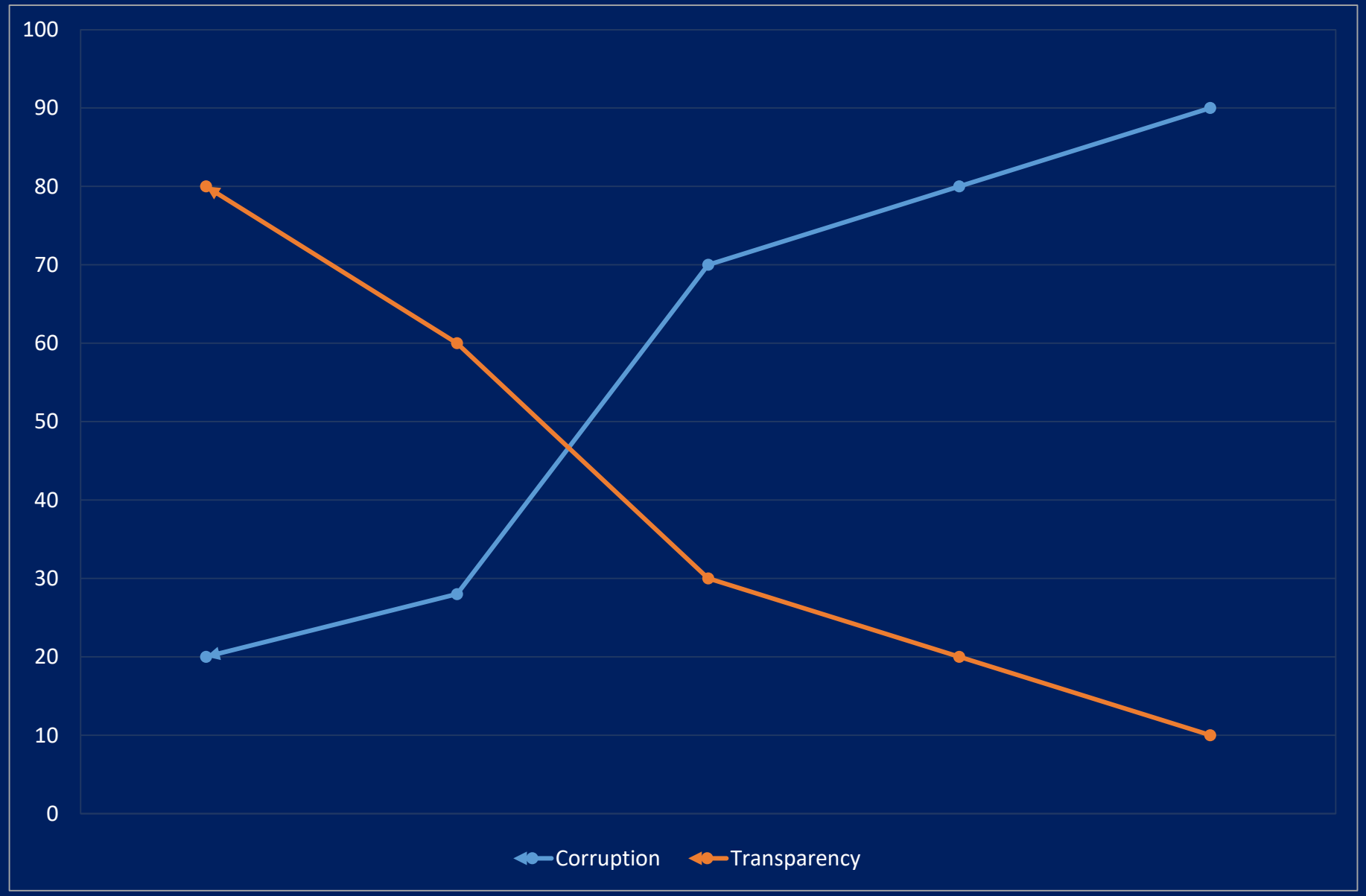
Gap Analysis

Fit for Policy

Leading Practices

CPEC

THE END GAME!



WAY FORWARD

National Priority

Revoking 8th amendment;

Improve perception (Regulatory, fiscal & Legal regime)

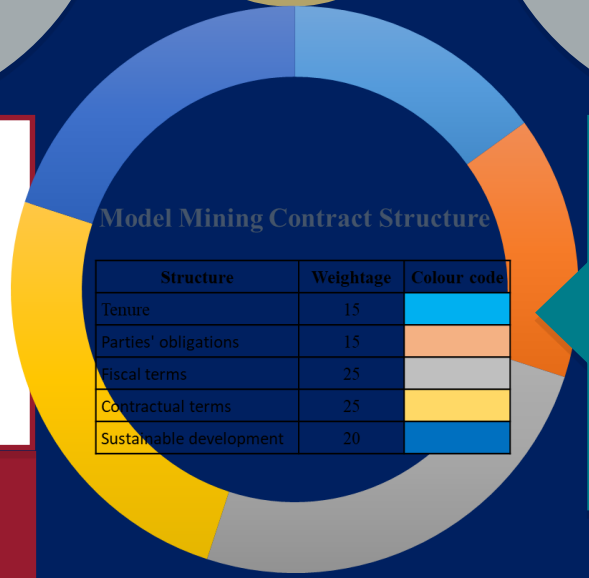
Land folio

spatial dimension
A TRIMBLE COMPANY

Mining Cadastre System for security of tenure

Modern Mining Contract

(Leading practices)



Integration of Mineral Resources

Spatial Centre of Economic Activity Model

Pledged Investment Cmts

Peru: Antamina Mining Agreement

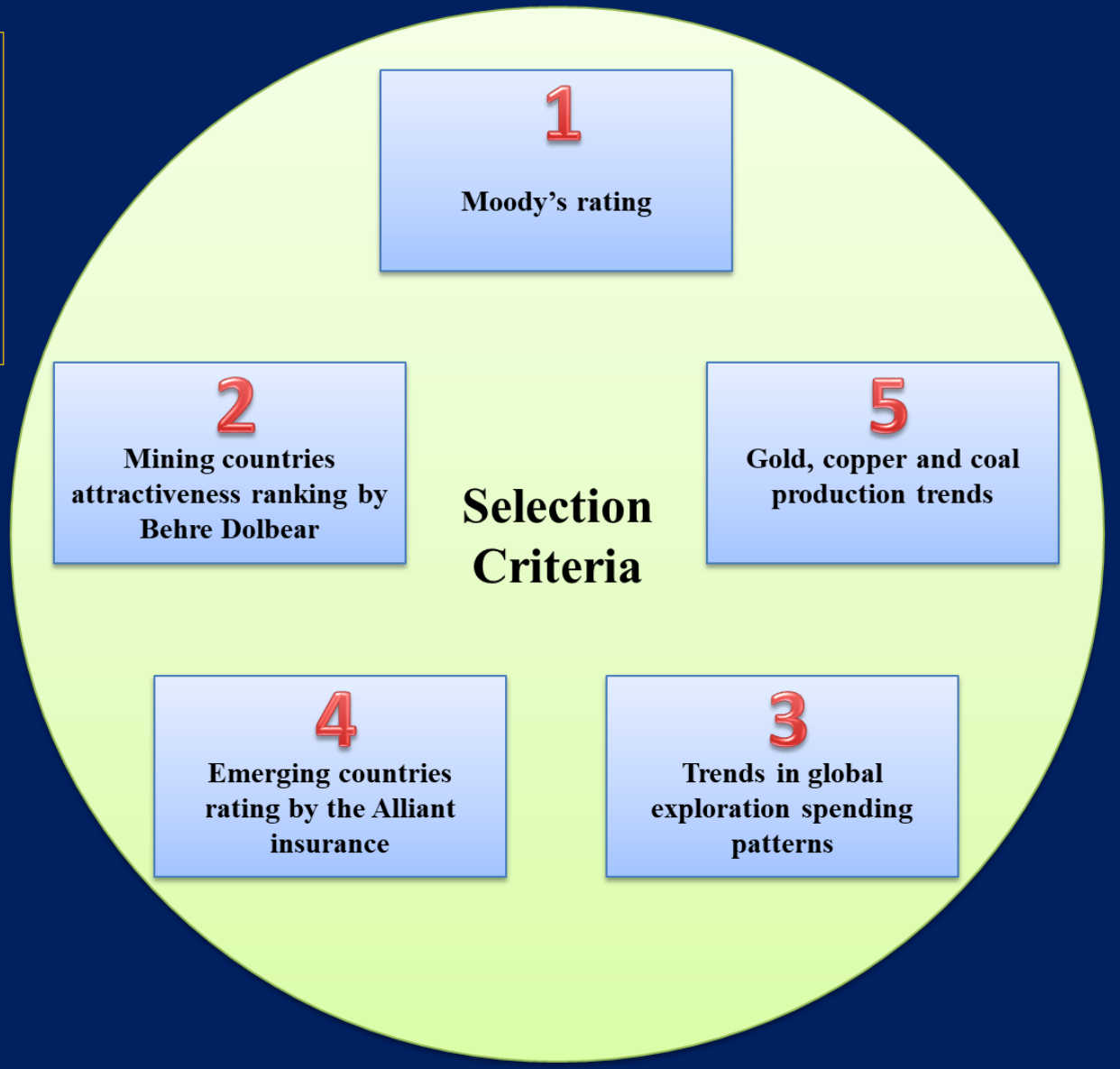
If the ML bidder fall short of the pledged investment commitment, it owes the govt a penalty.

THANKS

SELECTION CRITERIA

Important considerations for selection of the countries comparable to Pakistan:-

- First, a developing country like Pakistan had to be selected; and
- Second, at least two countries must have Islamic background and law.

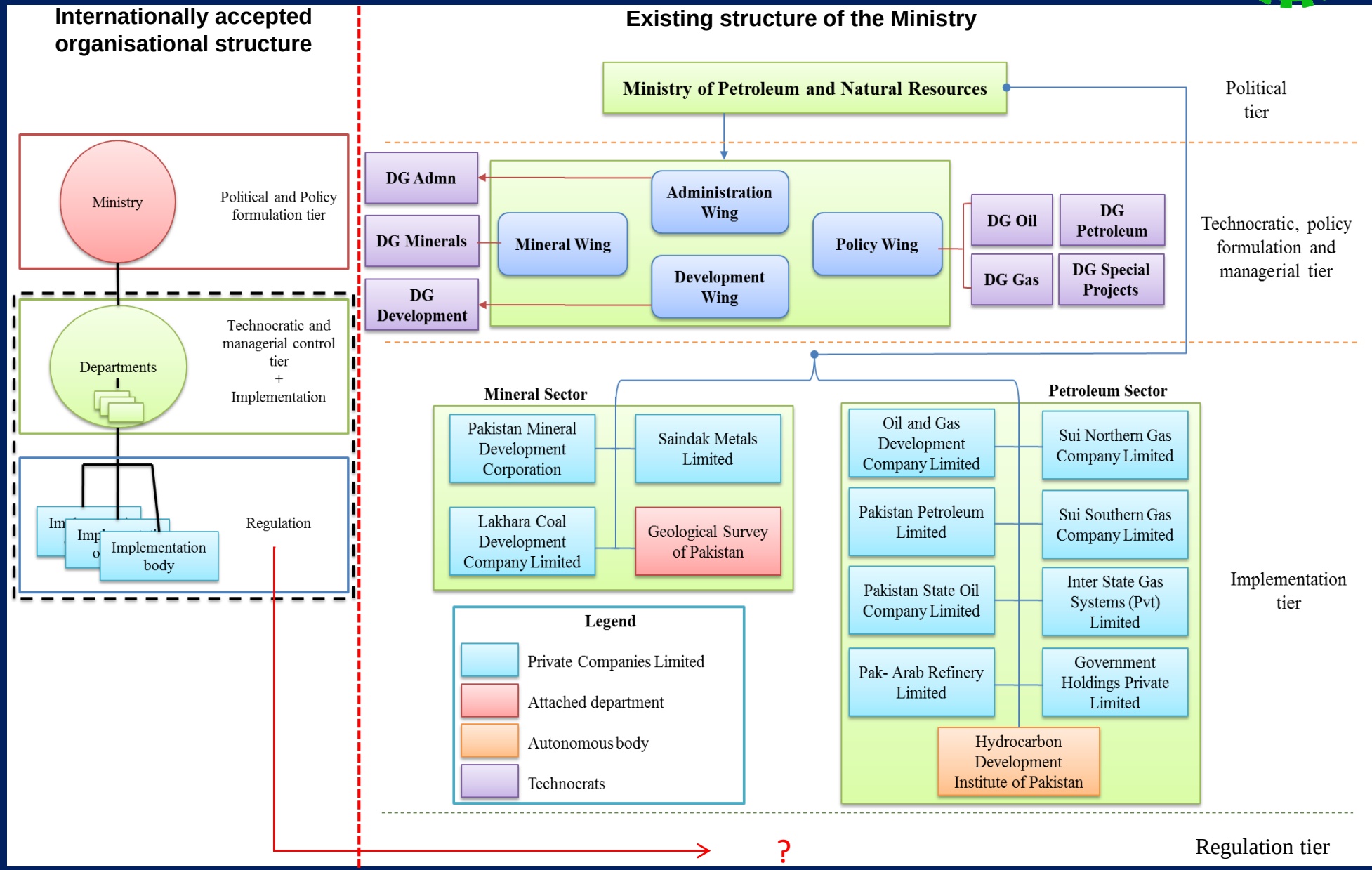


CRITICAL ELEMENT 1: ENABLING INSTITUTIONAL FRAMEWORK

Shortcoming in the policy formulation tier:-

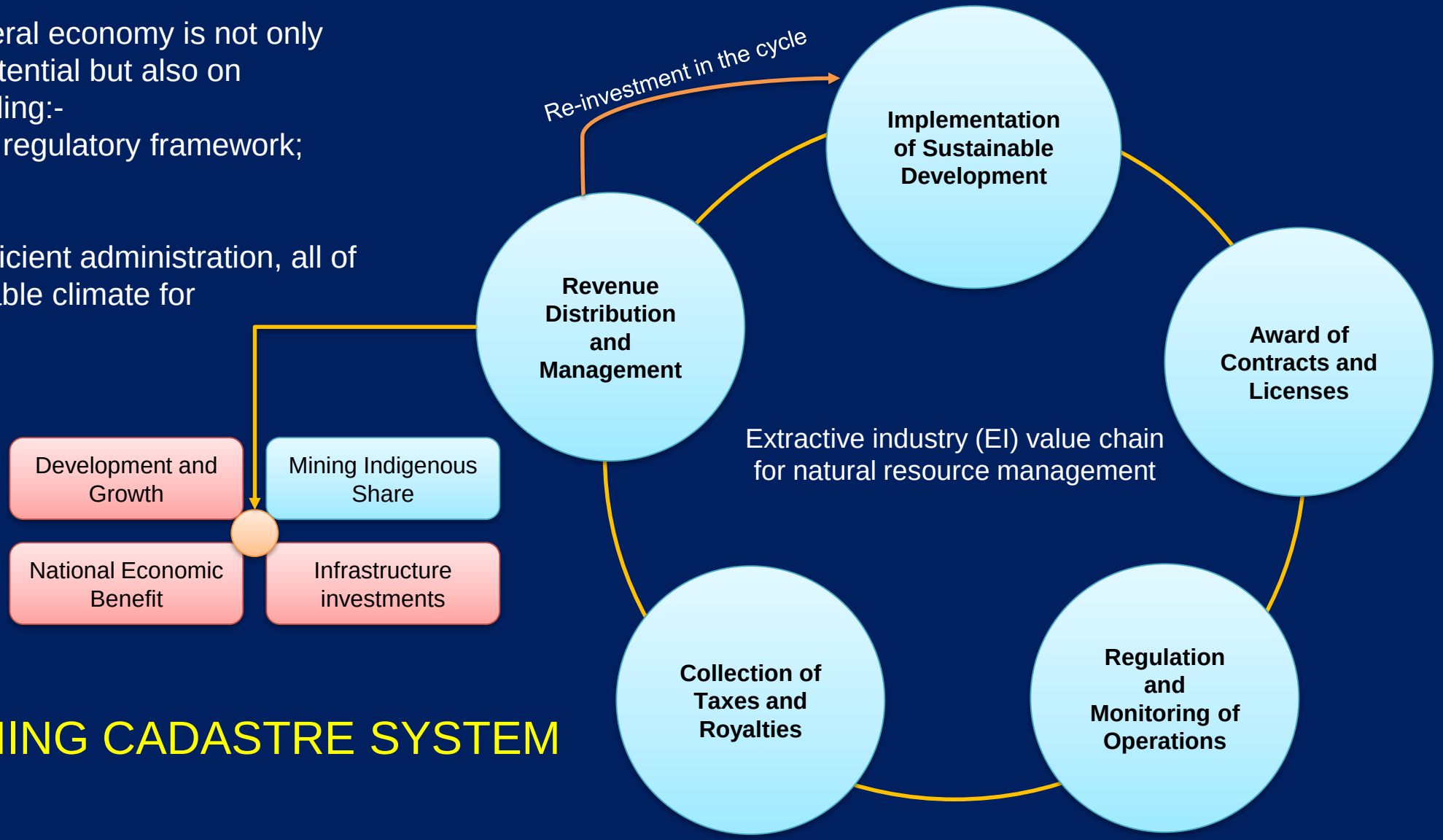
- Policy formulation is being done at the technocratic level instead of the political level;
- Separate Wings are responsible for policy formulation of the Petroleum and Mineral sectors; and
- Investors are caught in an organisational dilemma between the different Wings at the Federal level and between the Federal and Provincial authoritative control.

The organisational structure of the Ministry needs to change so that it can be aligned with the leading international practices to provide an enabling environment for investments.



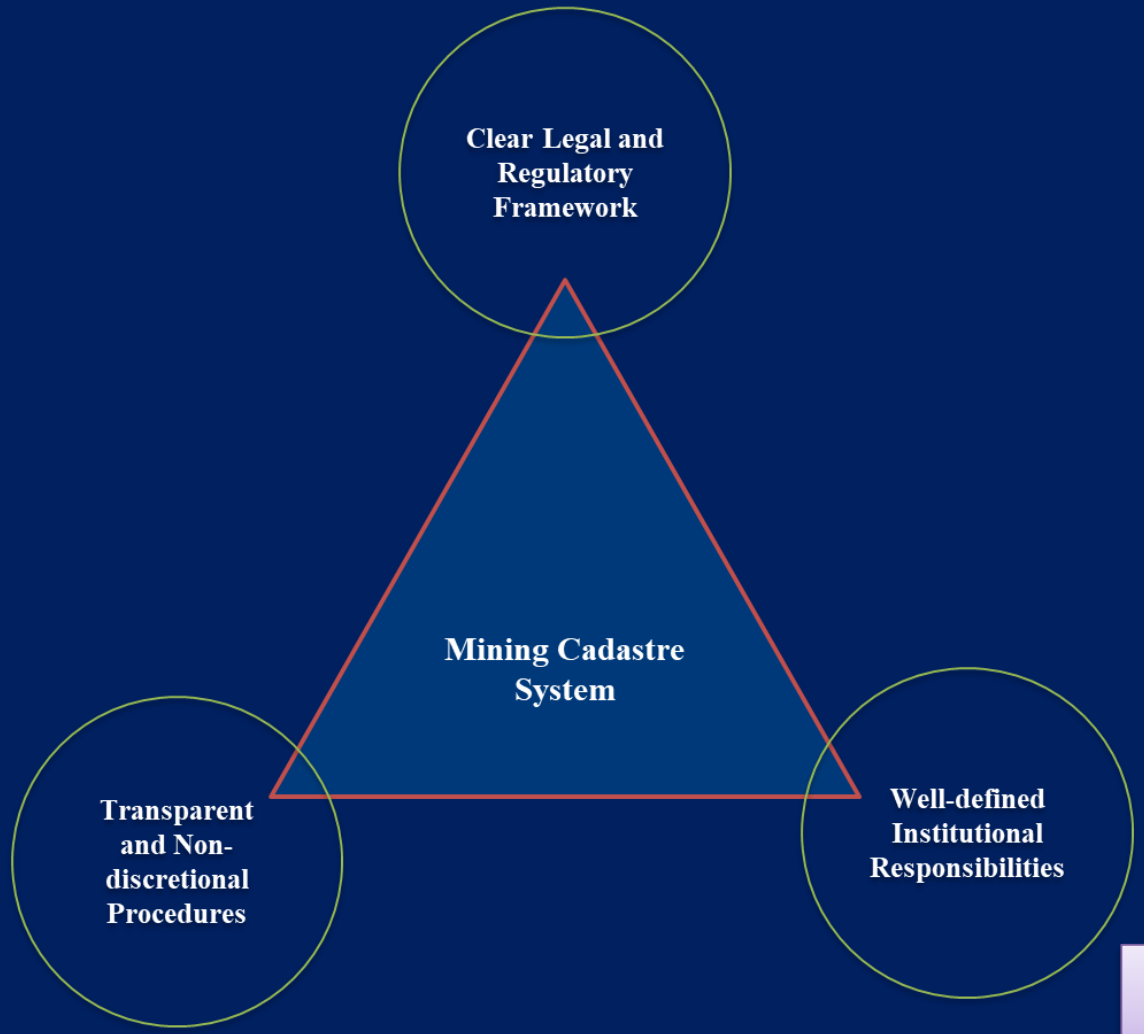
BUILDING BLOCK 2: MINERAL DATABASE AND MINING CADASTRE SYSTEM

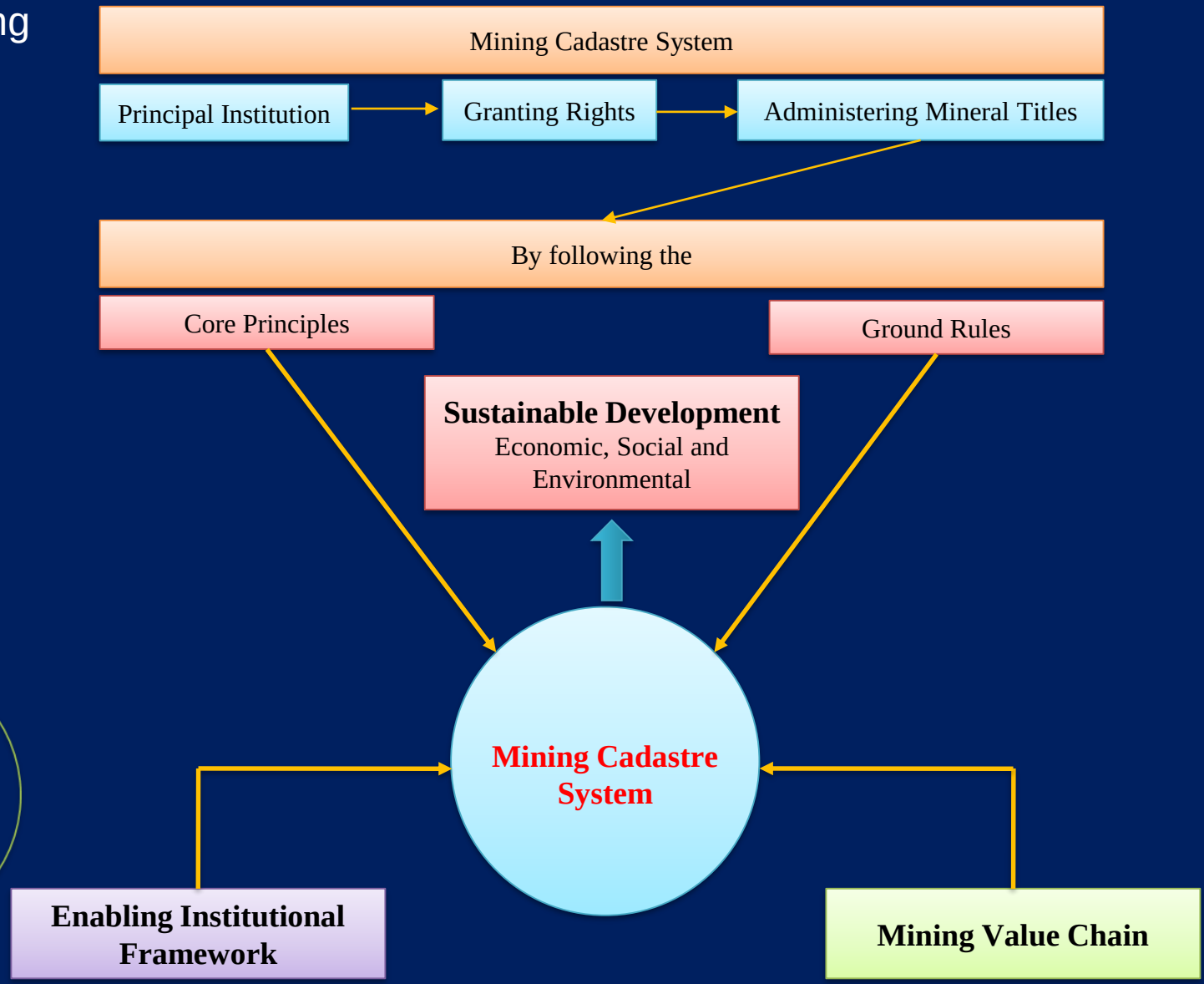
- The development of mineral economy is not only dependent on mineral potential but also on organized systems including:-
  - An efficient legal and regulatory framework;
  - Security of tenure;
  - Investment risks; and
  - Transparency and efficient administration, all of which create a favorable climate for investment.



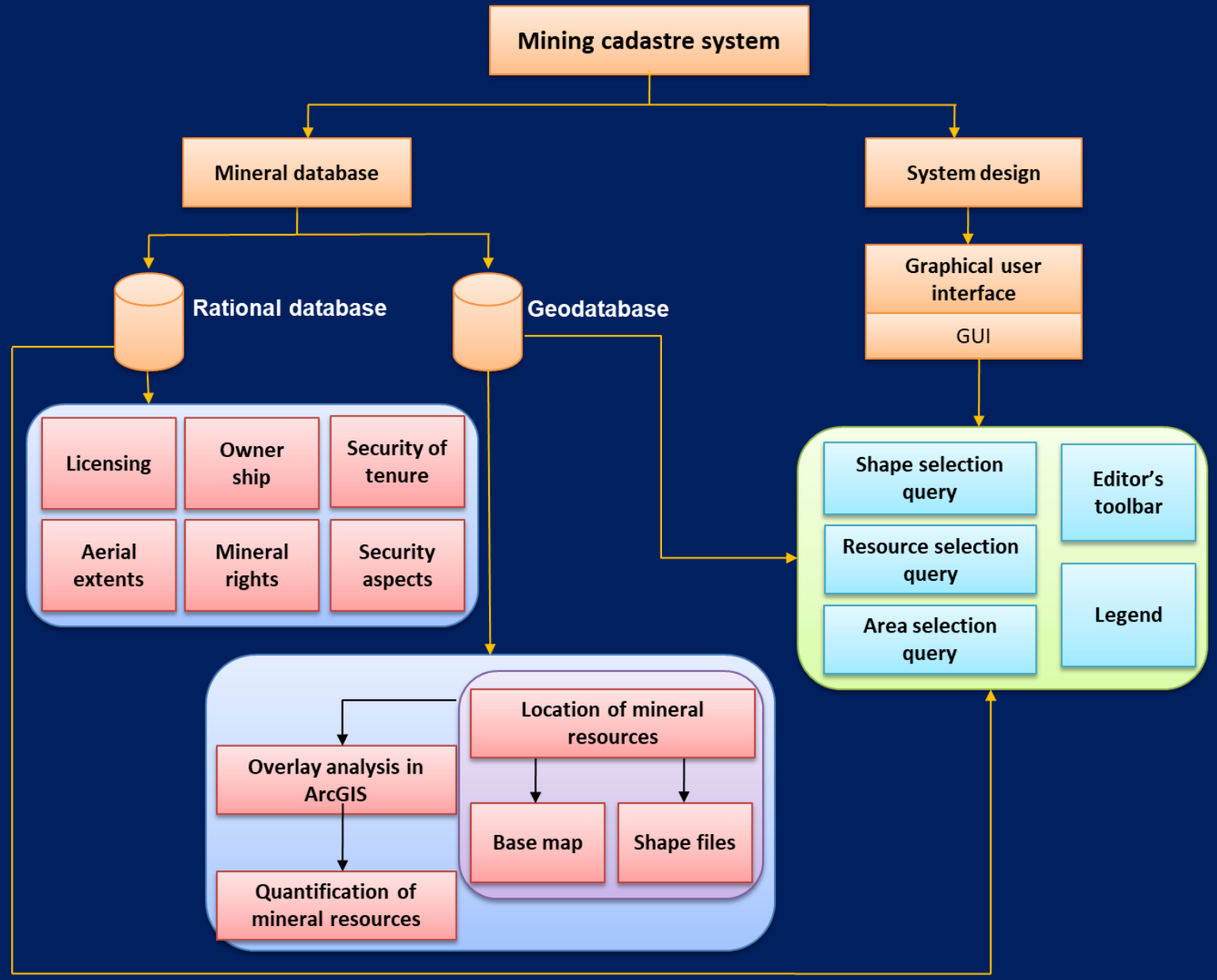
BUILDING BLOCK 2: MINERAL DATABASE AND MINING CADASTRE SYSTEM

Basic principles for an efficient and effective mining licenses granting system



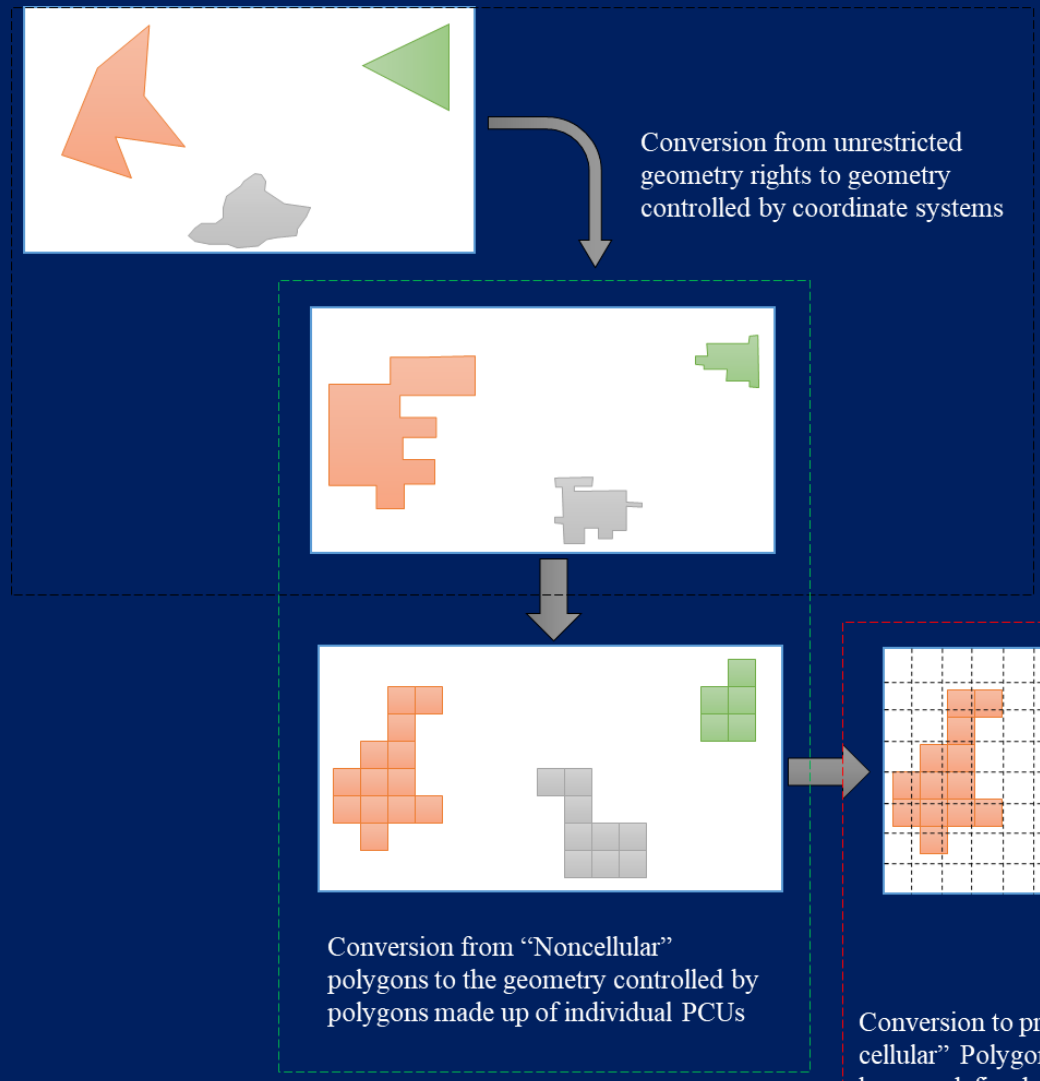


THE NEW PAKMINING CADASTRE SYSTEM – CONCEPTUAL DESIGN AND SYSTEM ARCHITECTURE



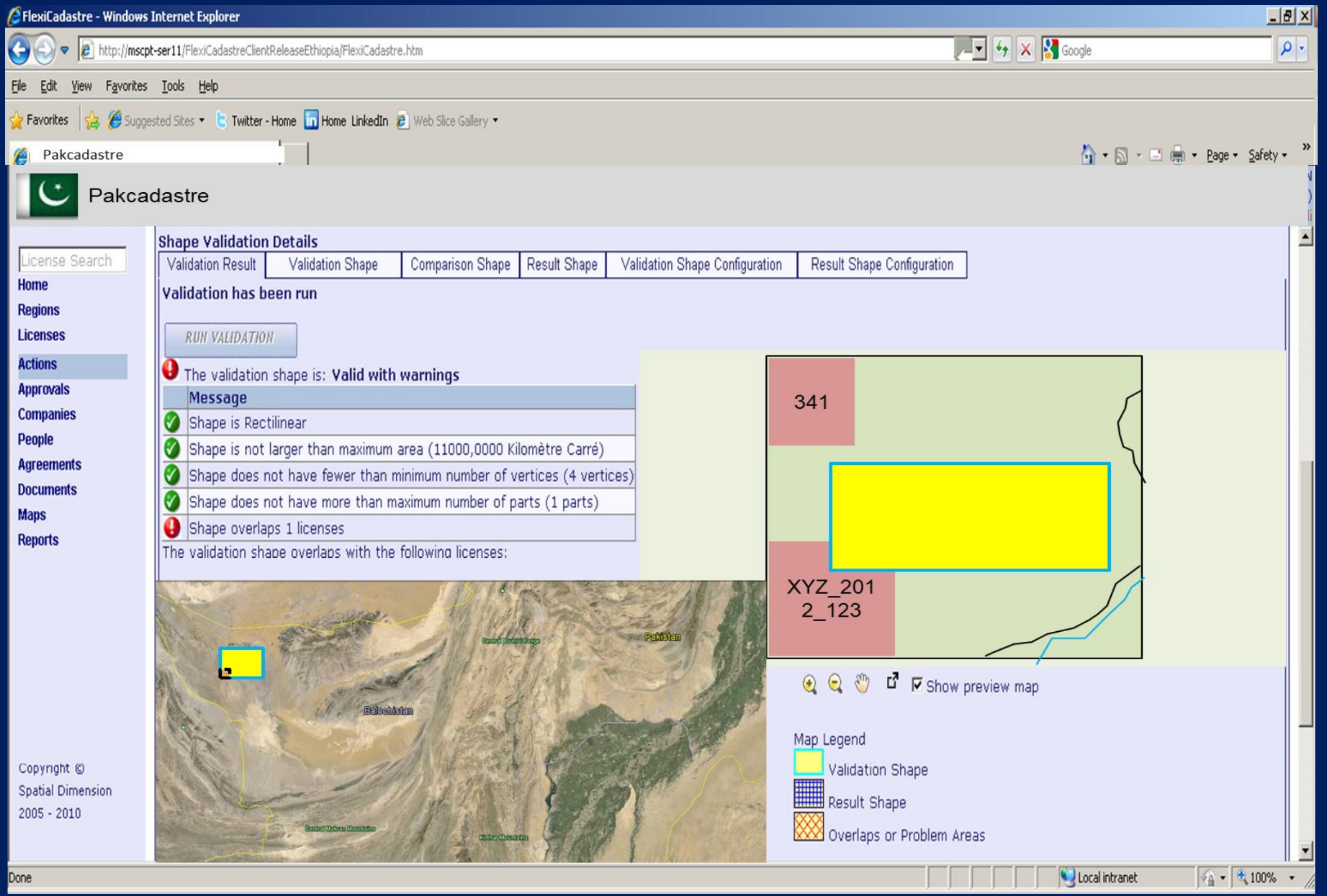
THE NEW PAKMINING CADASTRE SYSTEM – GEOMETRICAL ARCHITECTURE

- Official cartographic map produced by the Survey of Pakistan (same projection system, geoids, and datum)
- PakMining Cadastral Unit (PCU)
- Every mineral license will always be made up of a certain number of PCUs; thus the dimensions of the sides of any polygon corresponding to a mining license and mining rights will always be in multiples of a single side of the PCU

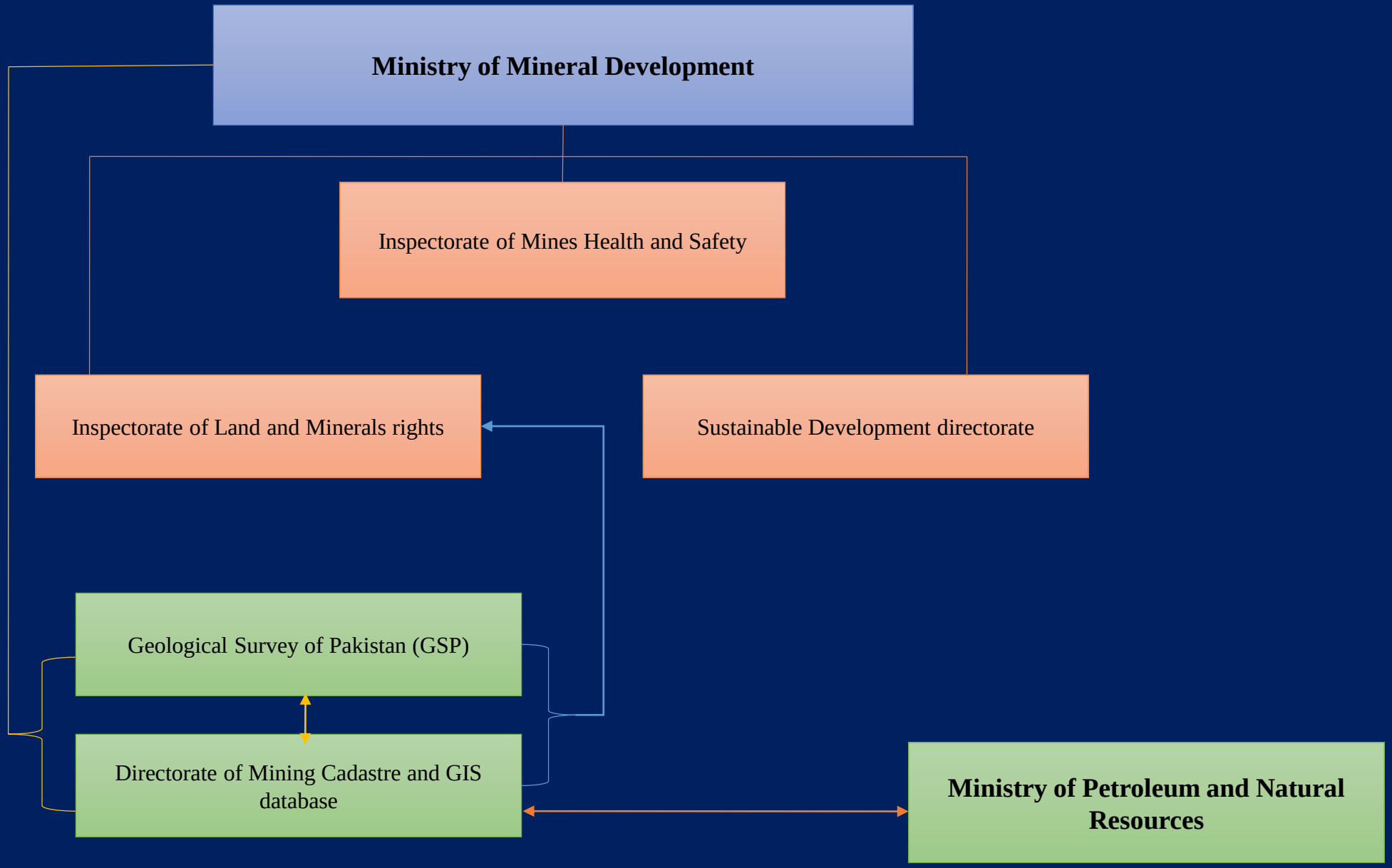


A PCU is a quadrangular polygon with constant dimensions that is referred to and has a fixed position within a system of coordinates.

THE NEW PAKMINING CADASTRE SYSTEM – USER INTERFACE OF PAKMINING CADASTRE SYSTEM



THE NEW PAKMINING CADASTRE SYSTEM – INSTITUTIONAL FRAMEWORK



MANDATE AND FUNCTIONS OF THE DIRECTORATE OF MINING CADASTRE AND GIS DATABASE

Sustainable Development
Economic, Social and Environmental

PakMining Cadastre System

Directorate of Mining Cadastre and GIS database

Inspectorate of Land and Minerals rights

Ministry of Mineral Development

Principal Mining Institution in Pakistan

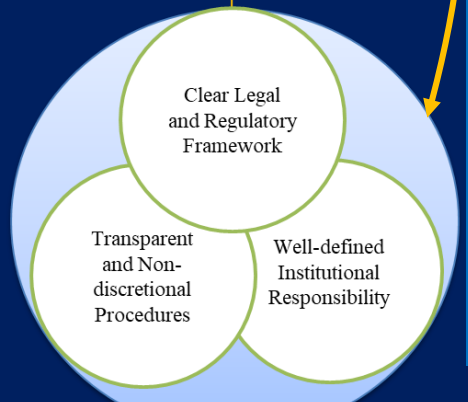
Granting Rights

Administering Mineral Titles

By Following

Core Principles

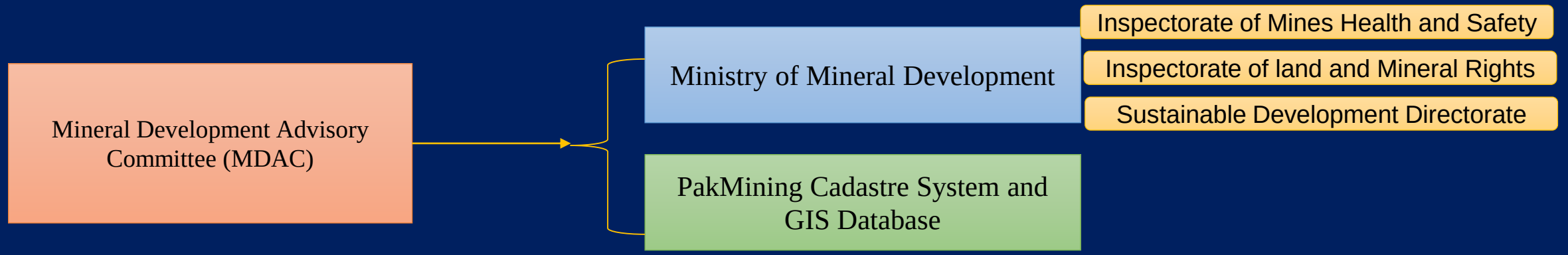
Ground Rules



- Liaison between the MMD and the license holder
- Receiving applications for new licenses, or renewal/ extension or transfer
- Producing updated cadastral maps on which existing minerals rights and mining activities are correctly plotted and Geo-referenced
- Verifying licenses overlap, checking the eligibility of applicants, and making decisions to grant or refuse applications
- Acting as a technical referee in the event of dissension between holders about the location of areas granted and resolving the disputes
- Initiating procedures for the revocation, cancellation, or expiration of licenses in accordance with the mining laws and regulations
- Keeping cadastral maps and registries open and accessible
- Collecting fees required for the submission of mineral rights applications.

RECOMMENDATIONS

- Recommendation 1: Enabling institutional framework to provide an investor-friendly environment



- Recommendation 2: Political economy is imperative for mineral development

Continuity in the political system

The economic benefits from mineral development should be transformed into national benefits

Infrastructure development should be announced as national priority

Mineral development should be integrated with CPEC

RECOMMENDATIONS

- Recommendation 3: Legal reforms in the mining sector

  - One mineral policy covering all aspects of mining in Pakistan.
  - Declare the promotion of investment in the mining sector as national interest and top priority.
  - Special guarantees between the foreign investors and the State (*Foreign Investment Statute* (Decree-Law 600)

- Recommendation 4 : Regulatory reforms in the mining sector

  - All minerals should be the property of the State.
  - Security of tenure protected in the legal framework through an Act.
  - Registry of rights should be protected through establishment of Mining Cadastre system.
  - Award of concessions should be through legal proceedings on merit decision through a unilateral administrative act on first come first serve basis.

RECOMMENDATIONS

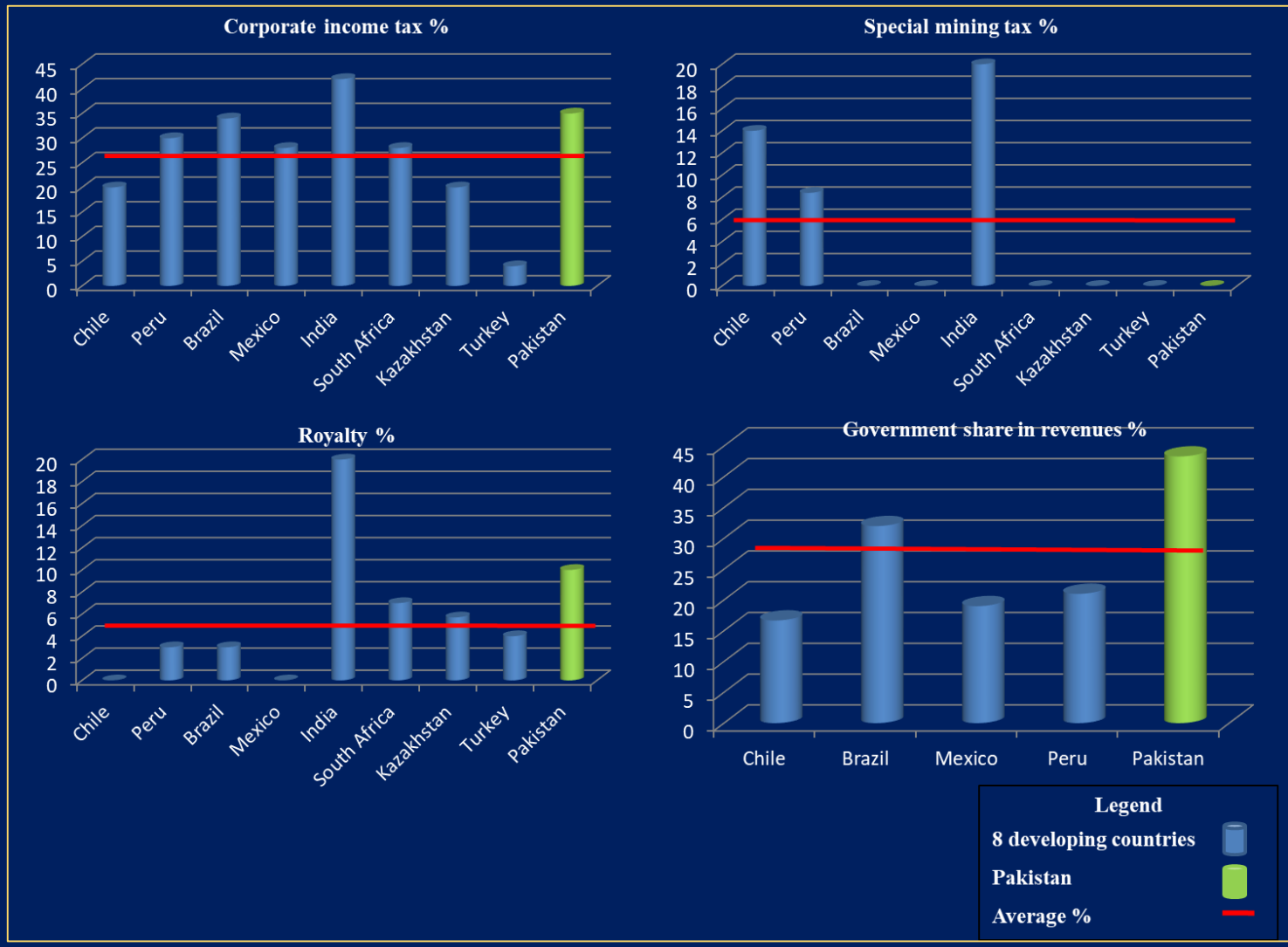
- Recommendation 5: Fiscal reforms in the mining sector of Pakistan

Royalty - ↓6.5 % for five years to attract investment.
A progressive increase after 5 years.

Corporate Income Tax - ↓15% as an incentive for investors

Specific Mining Tax – Unchanged, however, specific mining incentive law

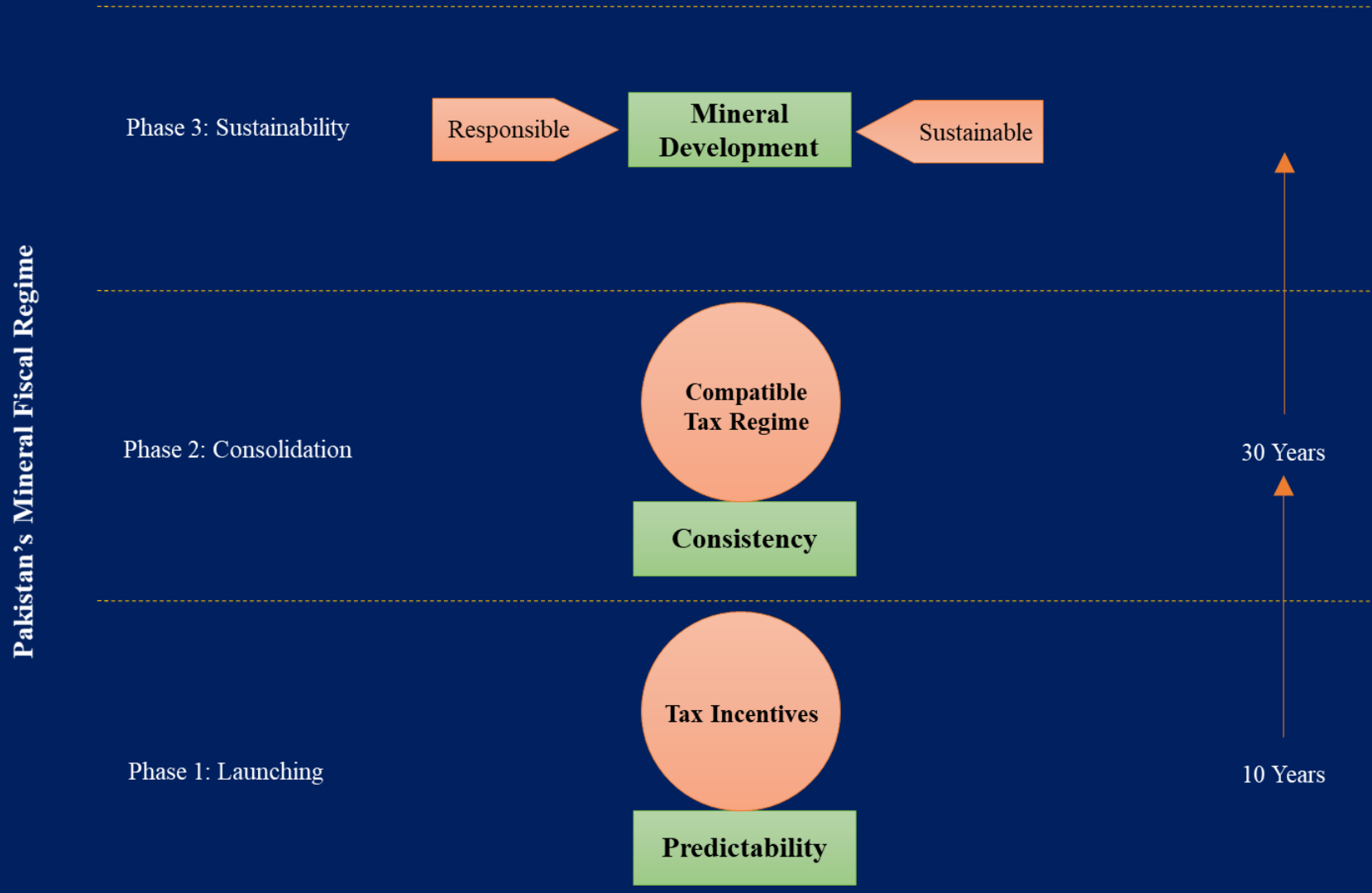
Government share in revenue – ↓ for 5 years, than progressive increase.



RECOMMENDATIONS

➢ Recommendation 5: Fiscal reforms in the mining sector of Pakistan

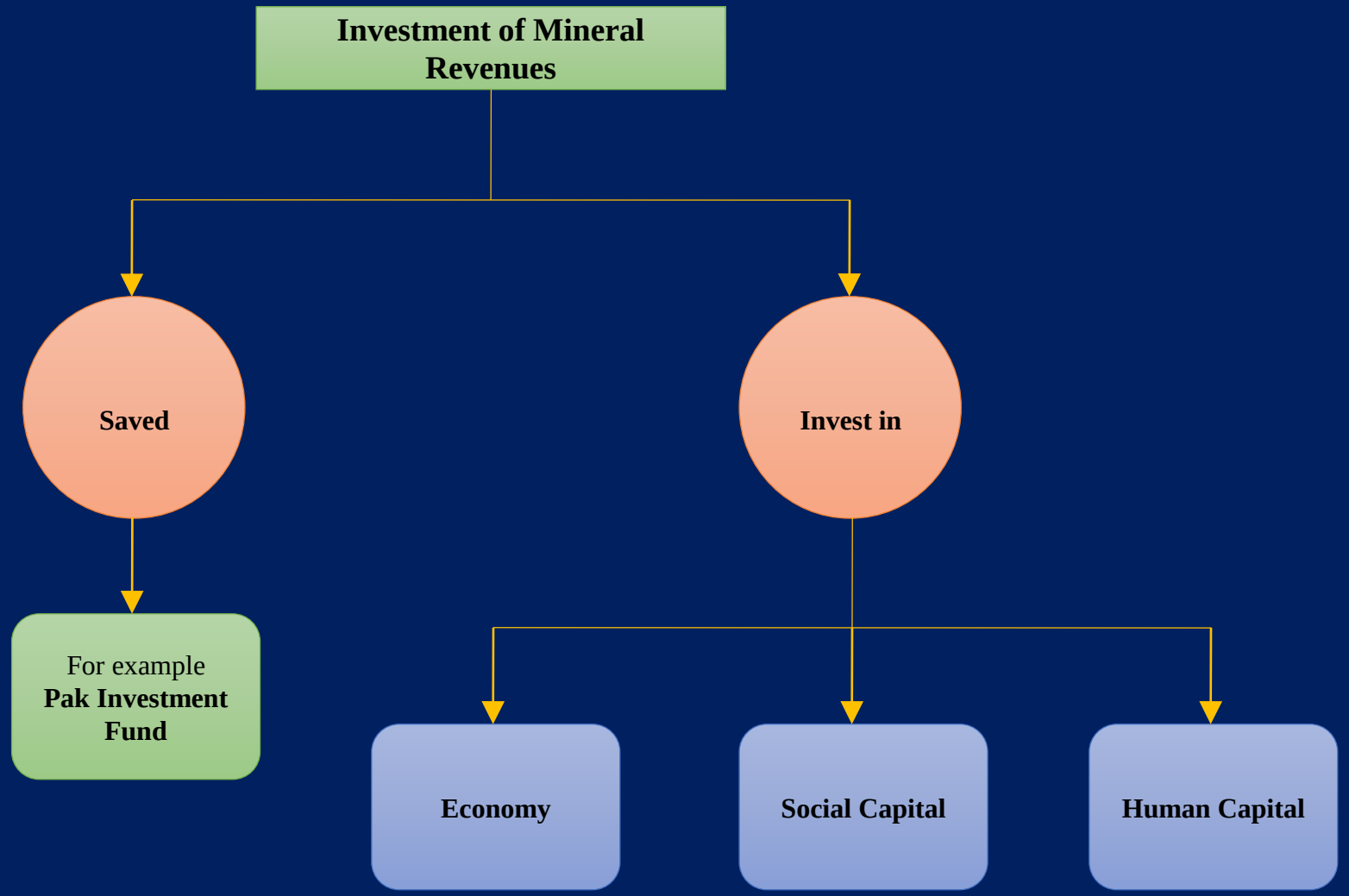
Pakistan should effectively appropriate the mineral rents, while leaving mining investors with sufficient return to compensate for the cost of capital and risk. Whereas a low-tax regime is of importance to mining investors, a predictable one will provide greater confidence.



RECOMMENDATIONS

- Recommendation 5: Fiscal reforms in the mining sector of Pakistan

Investment of Mineral Revenues. All mineral revenues must be saved or reinvested in economic, social or human capital. This will lead to the conversion of mineral-wealth to economic, social and human capital.



RECOMMENDATIONS

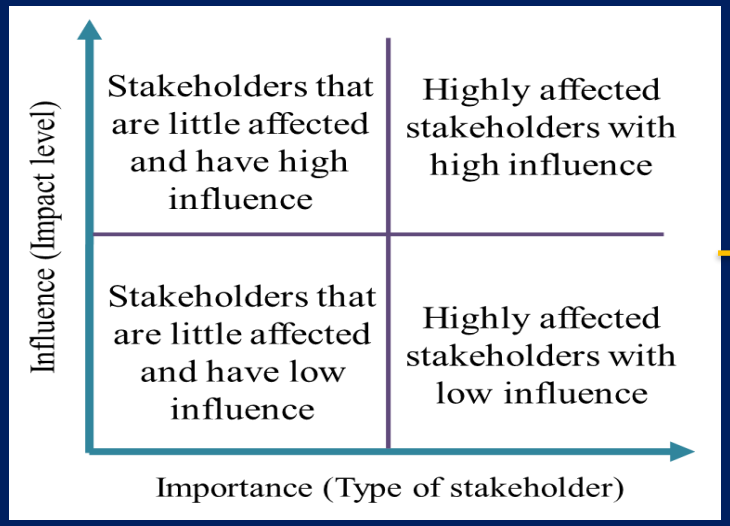
➢ Recommendation 6: Stakeholders participation framework

All the six critical stakeholders identified in this research should be taken on board before launching this framework. Special attention must be given to the local community/ populace of Baluchistan and KPK to incorporate their recommendations

Important Impact Area in Pakistan's environment

Economy
Social
Environmental
Law and Order

Power and impact matrix



Stakeholders with High Influence on Policy

- **Government**
- **Mining industry**
- **Local community and representatives**
- **Law enforcing agencies**
- **Religious Monarchs**
- **Financial institutions**

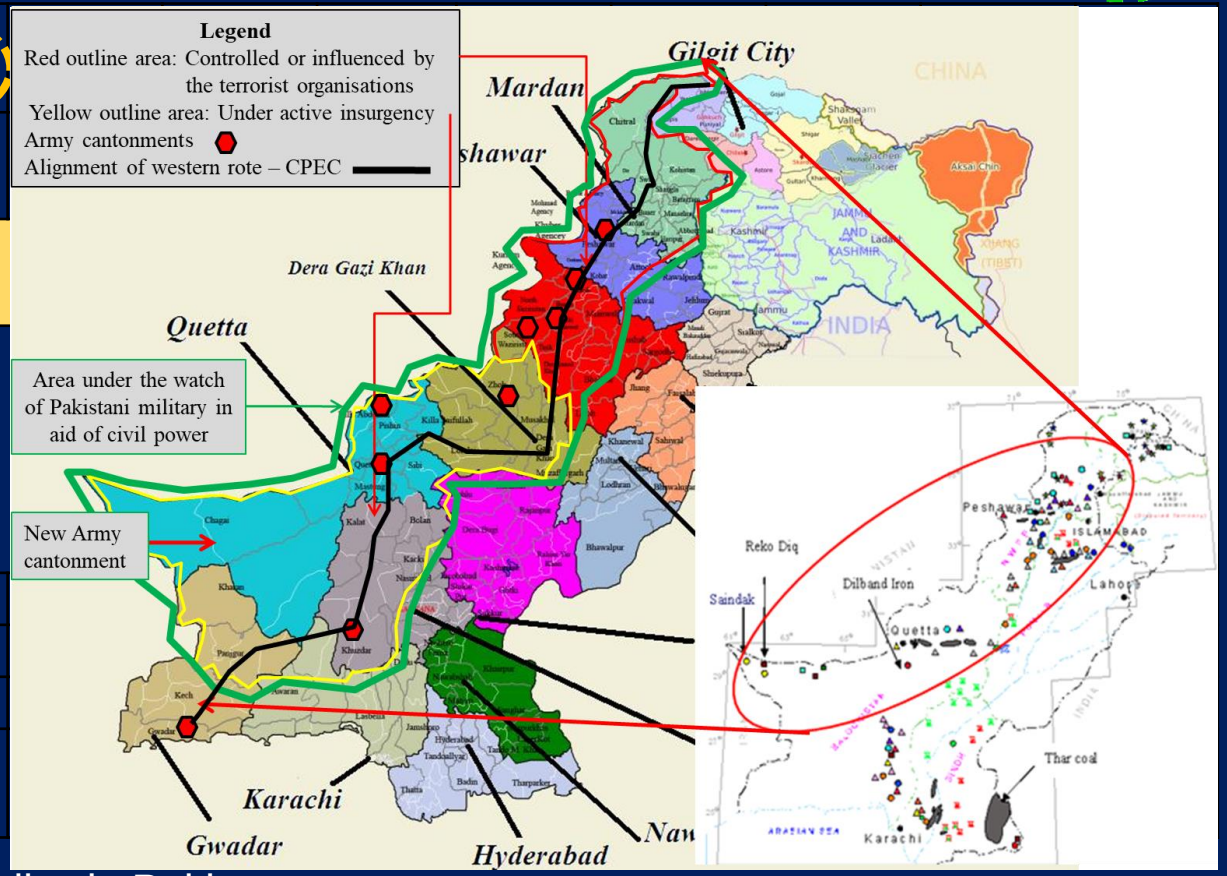
Legend

Internal Stakeholder

External Stakeholder

RECOMMENDATIONS

Impact area \ Stakeholder		Government	Mining industry	Local community	Local representatives	Law enforcing agencies
		Internal	Internal	Internal	Internal	External
		High influence on the policy				
Economic	Highly important	✓	✓	✓	✓	✓
Social		✓	✓	✓	✓	✓
Environmental		✓	✓	✓	✓	
Law &Order		✓		✓	✓	✓
Legislation	Low	✓	✓		✓	✓
Business	Low	✓	✓		✓	✓
Academia	Low	✓	✓		✓	
Confidence building	Low	✓	✓	✓	✓	✓



Important stakeholders for developing and implementing a mineral policy in Pakistan:-

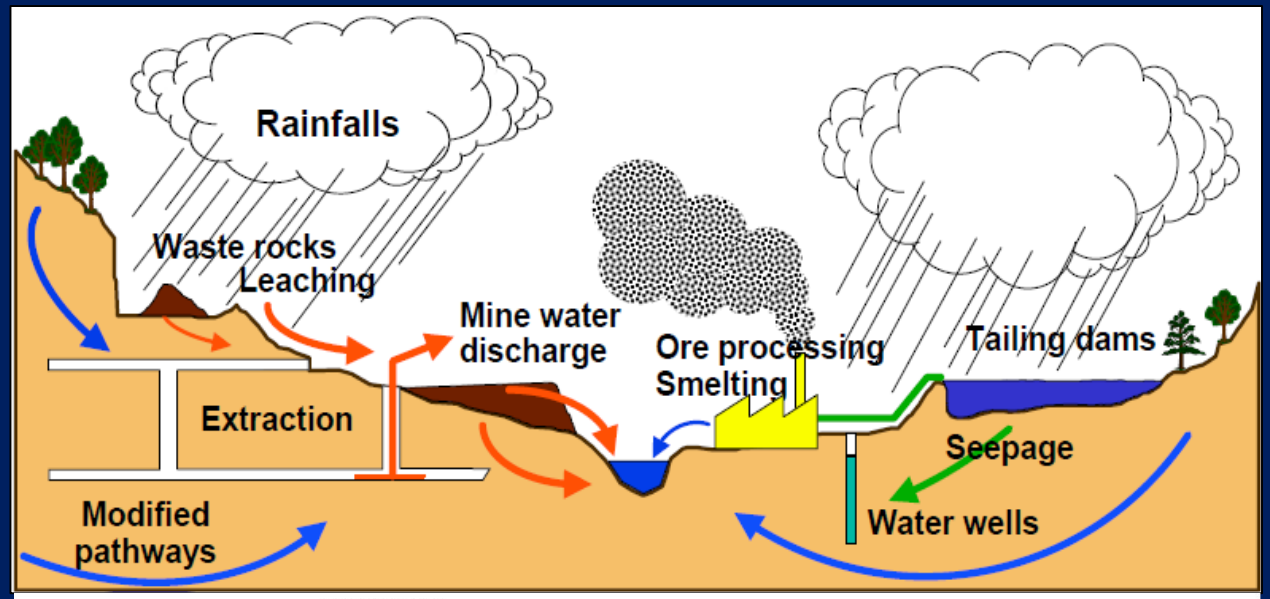
- First, the federal Government, because all the resources should belong to the State;
- Second, the Pakistan Army, because security and a safe-environment are of utmost importance for foreign-investment;
- Third, the local communities and their representatives;
- Last but not least, the mining industry itself.

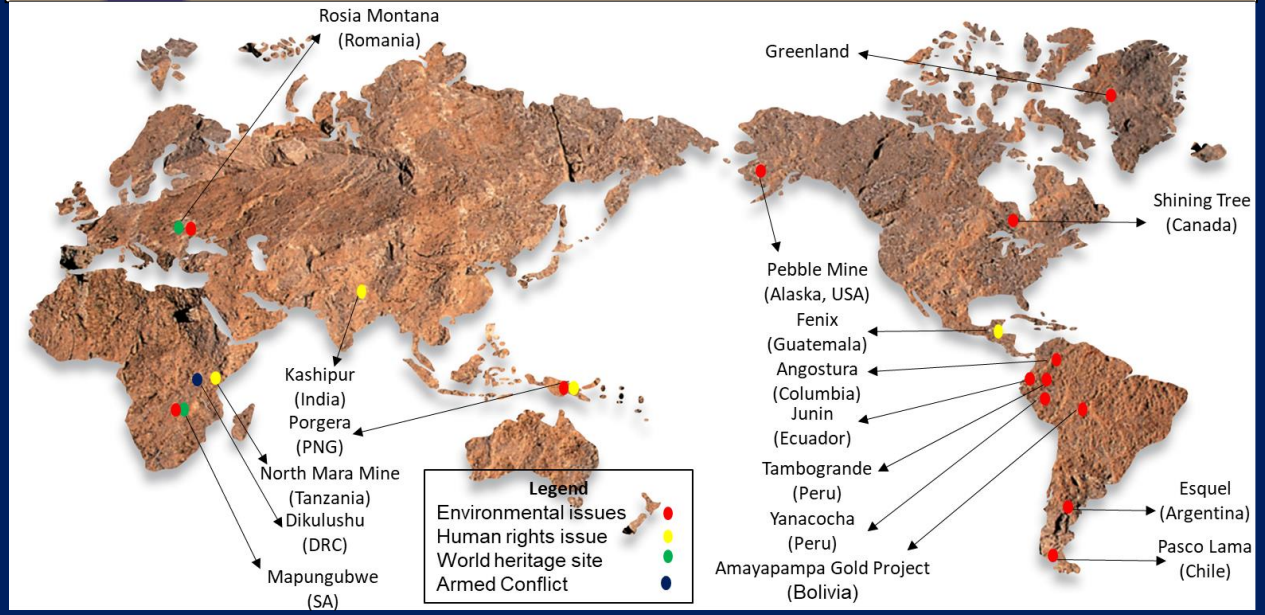
RECOMMENDATIONS

- Recommendation 7: Sustainable mineral development

3 environmental problems that arise as a result of mining:-

- First, it changes the land use of the area, which imposes restriction on the further use of the land.
- Second, it changes the hydrological conditions of the land (surface, underground and downstream; and
- Finally, it changes the geo-technical conditions of the rock and its balancing forces





RECOMMENDATIONS

- Recommendation 8: Mining Cadastre System and GIS Database

- Recommendation 9: Need for skills

NUST-WITS Collaboration Team

QUESTIONS?

THANK YOU!