



A Study on Sustainable Development
of Society in context of
“Natural Rubber Technologies”

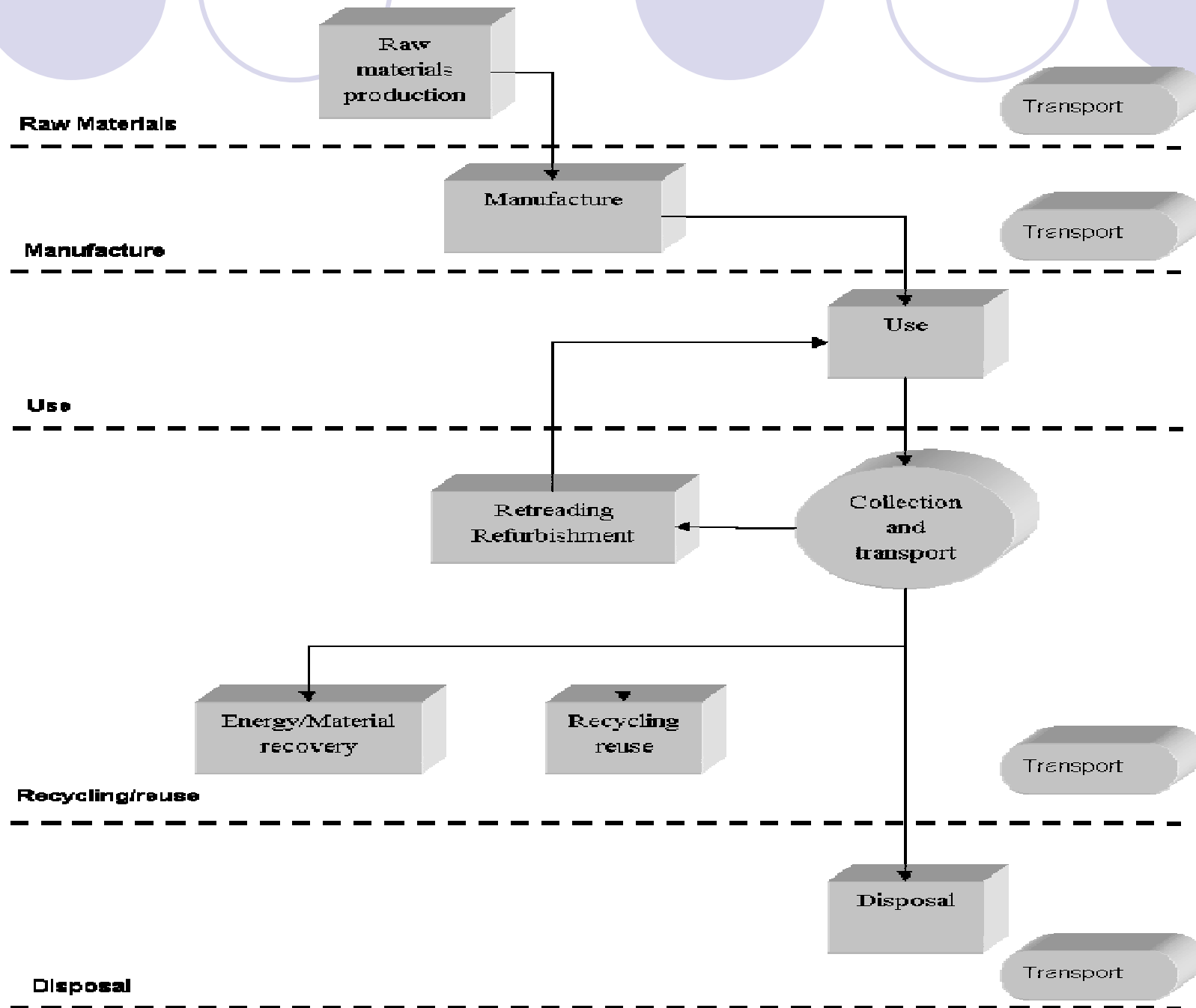
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Overview

- Natural Rubber Tyre Life Cycle
- The Technology
- Societal Change
- Society Sustainability
- Morphology
- System - Indicators
- Simulation
- Conclusion & Recommendations

Natural Rubber Tyre Life Cycle



Natural Rubber Tyre Technology

- Fabrication of Natural Rubber Tyre demands three main processes
 - Mixing or Compounding
 - to soften the rubber (mastication)
 - to admix the rubber with the compounding ingredients - fillers, vulcanizing agents, protective agents etc
 - Shaping
 - is done by molding under pressure in a heated mould
 - The processes are - Injection molding, Extrusion etc
 - Vulcanization
 - A specific curing process of rubber that makes the rubber springy, harder, much more durable and also more resistant to chemical attack
 - Dynamic properties are improved which are important for flexing movements
- Recycle of Natural Rubber Tyre
 - De-Vulcanization
 - It begins with the delinking of the sulfur molecules from the rubber molecules, thereby facilitating the formation of new cross-linkages

Technology vs Environment



- Rubber trees consumes lot of underground water
- Rubber trees absorbs the Co_2 gas
- Industrial emissions for processing natural rubber and making tyres out of it
- Used Rubber Tyres burnt for fuel causing Air Pollution due to So_2 and Co_2 gas emissions
- Recycled tyre products have environmental friendly applications

Technology vs Society



- Rubber wood can be used as fuel, making furniture, construction purpose etc
- Many countries lifestyles and settlements are Rubber cultivation oriented which is a very natural way of living
- Tyres contribute a lot indirectly to the present society in the area of Transportation, Sports and Recreation activities



Technology vs Economy/Industry

- At least 20 million people are reliant upon natural rubber cultivation for their primary source of income
- Dry natural rubber requires the use of about a tenth of the fossil fuel required to produce synthetic rubber, hence great fuel economy

Sustainable Development



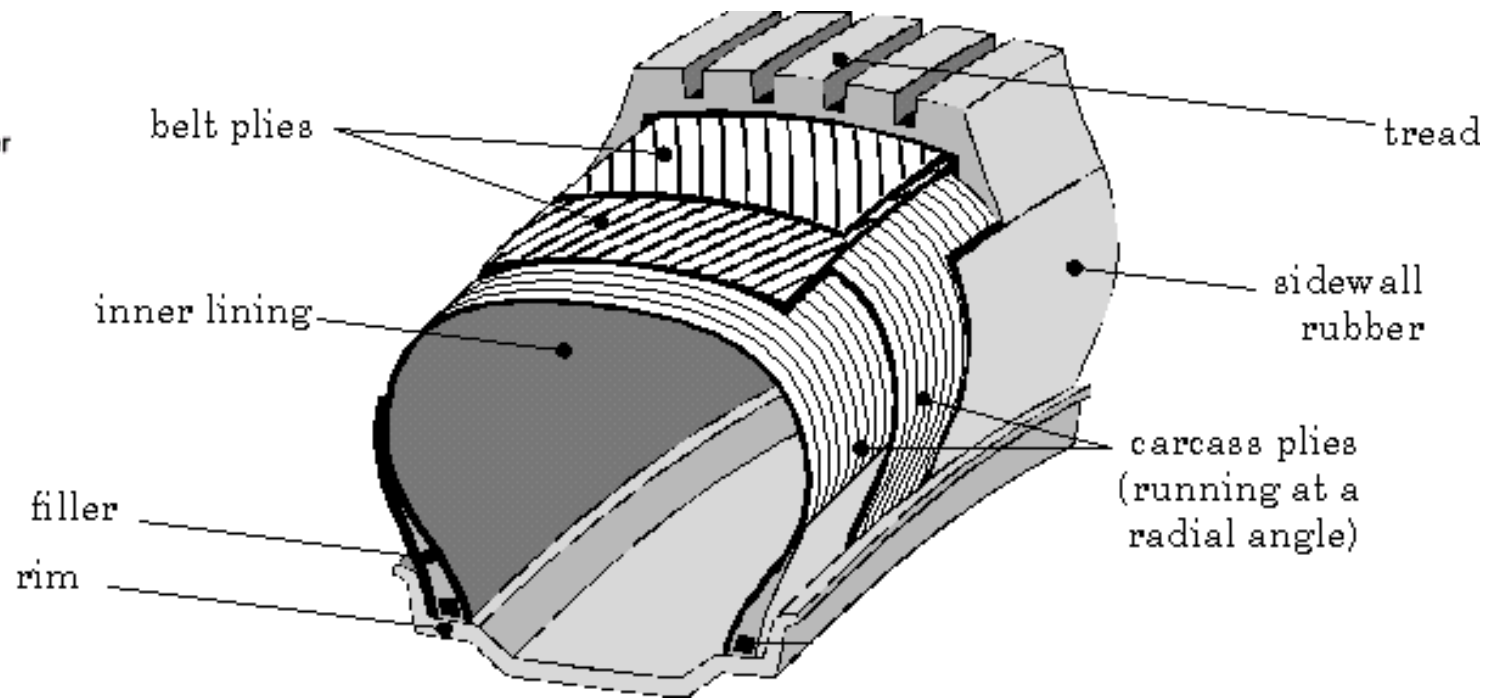
- It means achieving a healthy life that can be maintained for many generations because it is:
 - **Socially desirable** - fulfilling people's cultural, material, and spiritual needs in equitable ways
 - **Ecologically sustainable** - maintaining the long-term viability of supporting ecosystems
 - **Economically viable** - paying for itself, with costs not exceeding income

Society Sustainability



- Healthy and Happy people
- Safeguard / Rise of Employment of people
- Retaining of fertility of the land growing Rubber Plant
- Maintaining the underground water level
- Diversity in agriculture embedded with Rubber plantation
- Stopping misuse of Tyres like - burning for fuel, high wear and tear

Tyre Construction



Morphology

Natural Rubber Tyre Morphology		
Structural Components - Dimensions	Functional Characteristics	Variants - Options
Tread	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Cross-Section	Different Cross-Sections
	Material	Different Types of Rubber
	Flexibility	In all directions
	Grip	Different Forms and sections
Belt Plies - Steel Belt, Nylon Overlays	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Cross-Section	Different Cross-Sections
	Material	Different Types of Steel and rubber
	Flexibility	In all directions
Carcass Plies	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Shape	Flat
	Material	Different Types of Rubber
	Flexibility	In all directions

Morphology

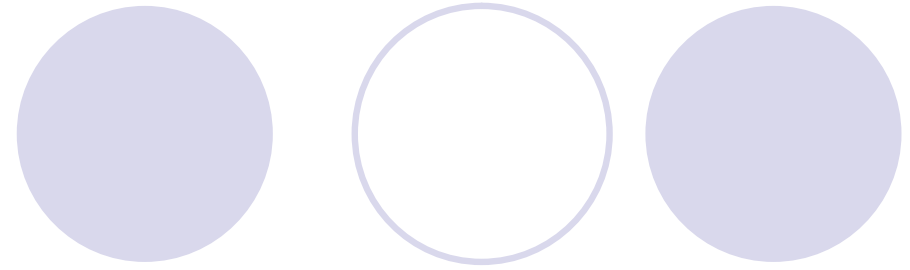
Natural Rubber Tyre Morphology		
Structural Components - Dimensions	Functional Characteristics	Variants - Options
Side Wall	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Material	Different Types of Rubber
Rim / Bead	Length	Different Lengths
	Cross-Section	Generally Circular
	Material	Different Types of Steel
Filler / Apex	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Cross-Section	Generally Triangular
	Material	Different Types of Rubber
Inner Lining	Length	Different Lengths
	Width	Different Widths
	Thickness	Different Thicknesses
	Material	Different Types of Rubber
Operation		Manual (Passive) Fuel (Active)
Storage		Resting on Vehicle Wheel Rim



System

- Natural Rubber Tyre Technology
 - Natural Rubber Plantation
 - Pre-Processing
 - Tyre Manufacture
 - Tyre Consumption
 - Tyre Disposal
 - Tyre Reclamation/Recycle

Sub-System - Entities



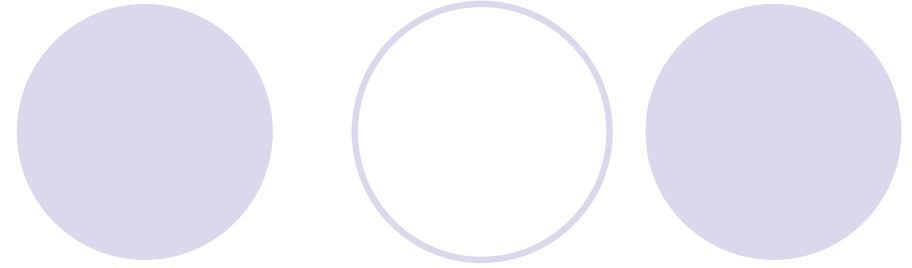
- **Society**

- Farmers
- Employee
- Consumer
- Retailer
- Residents

- **Environment**

- Trees
- Land
- Water
- Natural Rubber

Sub-System - Entities



- Industry

- Plant
- Technology
- Machinery
- Processing Material
- Tyre
- Energy
- Sales unit
- Recycled units
- Recycled products

Indicators



- The three aspects underlying Sustainable Development are
 - Environmental
 - Economic / Industry
 - Social

which determines the capacity of living environment's ability to support a quality of life commensurate with the community's aspirations



Indicators - Society

- Health
- Adults employed
- Child employed
- Child literacy
- Vehicle ownership
- Waste generated
- Income level
- Migration level
- Tyres burnt for fuel



Indicators - Environment

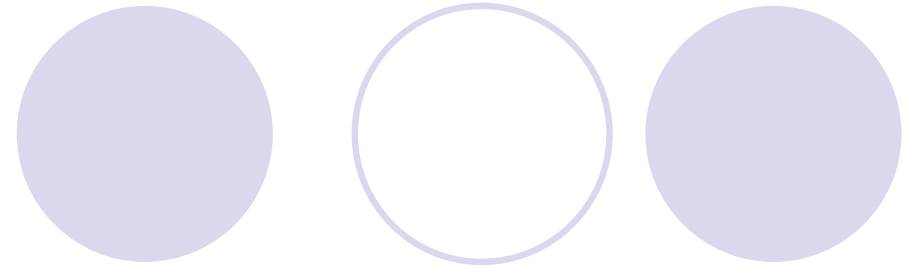
- Diversity Loss
- Soil pollution
- Air pollution
- Water pollution
- Underground water level
- Soil fertility loss
- Forest cover loss
- CO₂ emissions



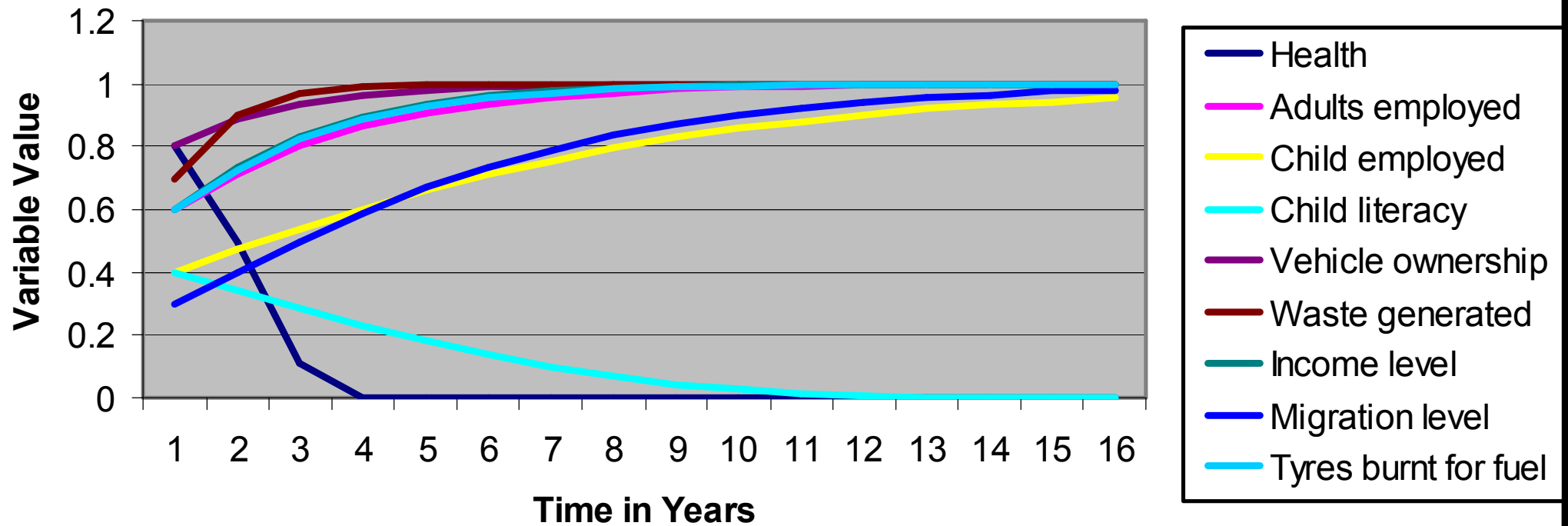
Indicators – Industry/Economy

- Qty of material used
- Qty of material produced
- Qty of tyre consumed
- Income level of Industry
- Environmental Friendly Technology used
- Power consumption
- Qty of processing material
- Qty of reclaimed tyres
- Qty of recycled products

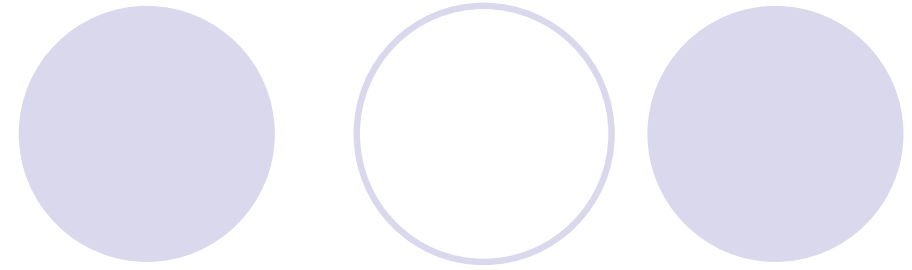
Society Variables



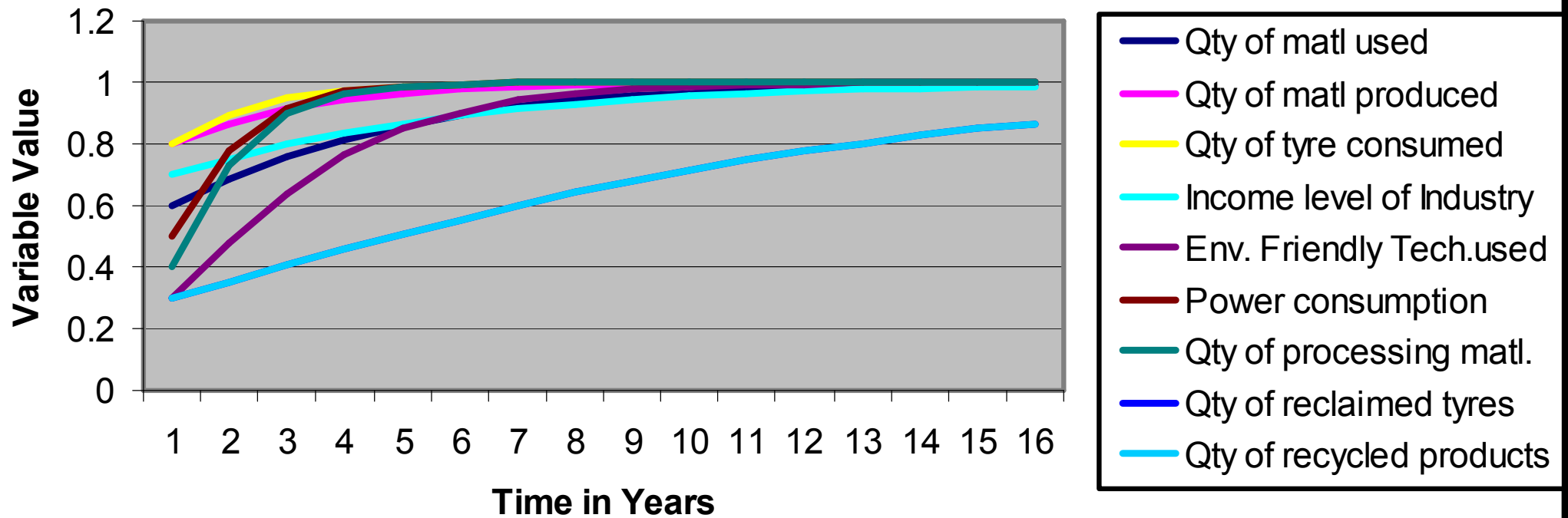
Society Variables



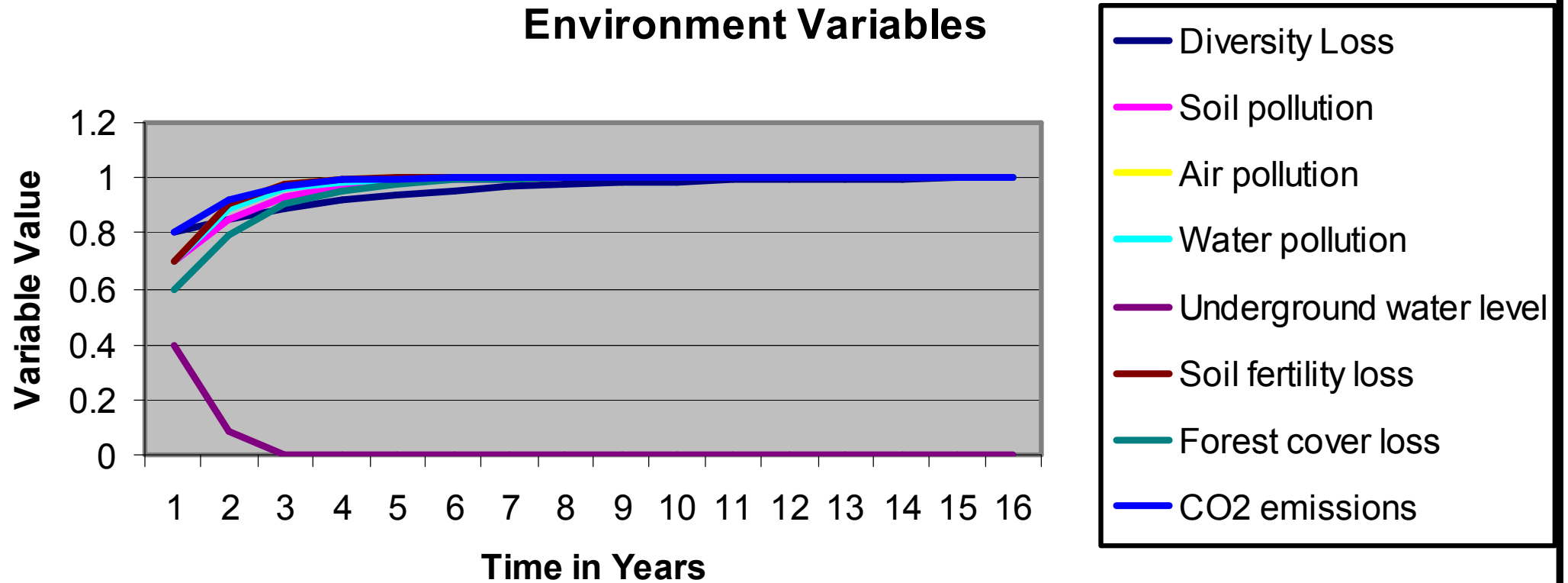
Industry Variables



Industry Variables



Environment Variables



Conclusion & Recommendation

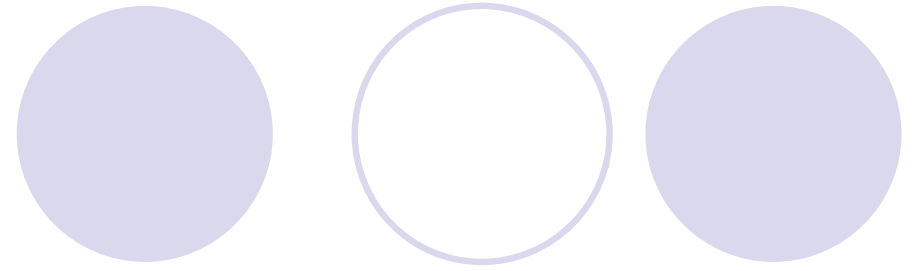
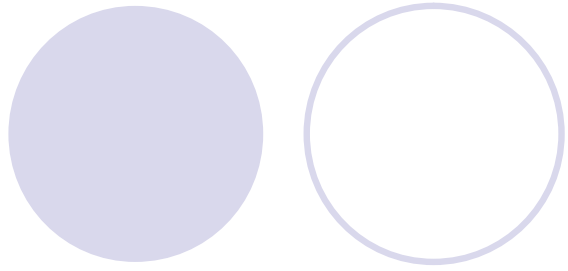
Conclusion:-

- Natural rubber is produced by an environmentally friendly industry and assists in diminishing the environmental damage caused by the widespread use of fossil energy sources
- Many countries major income comes from the Natural Rubber production
- Rubber Tyre plays unbeatable role in the area of transport

Rubber Tyre technology is very much beneficial for the sustainability of the Society

Recommendations:-

- The De-Vulcanization Technology can very much improve Sustainable development of society due to Rubber Technology



Thank You