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AVAILABLE RESOURCES AS A DESIGN DRIVER

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Abstract

A resource, from an ecological perspective, is what satisfies the needs of a living organism. Humans have created for purposes it has justified as needs, and in the process of creation, has been significantly influenced by the availability of resources. This influence of resources is explored in this article. Only when an entity is understood, when its existence is identified and comprehended by intelligence, it becomes a potential resource. In the biological world, design exists, unlike in the man-made world, wherein creation is natural or guided by natural processes. Man-made resources are now available resources to birds and animals. The matter is going to be programmable, where one will be able to alter any possible property of the material with an interface.

Key Words: *Resource, Design, Design driver, Nature, Man-made, Future.*

1. Introduction

The mind is a powerful entity, and what it can conjure is limitless. Where humanity stands today is all an outcome of human minds.

The mind has been able to perceive what is around us and, in the journey, to thrive, materialized aids for the journey. These aids have manifested as both tangible and intangible entities, and in the physical world of tangibility, humans have utilized the resources of the universe.

A resource, from an ecological perspective, is what satisfies the needs of a living organism. But for humans alone, a resource is a material or entity which is available in its environment, and which is technologically accessible, economically feasible and culturally sustainable.

Humans have created for purposes it has justified as needs, and in the process of creation, has been significantly influenced by the availability of resources. This influence of resources is explored in this article.

Manifestation of the driver in the man-made world

Of all the available resources that have driven and shaped the man-made world, the most perceptible manifestation has been from material resources. What is scientifically categorized as material science today, has shaped the evolution of the homo-sapiens and the development of civilizations from the time humans gained intelligence.

A resource can only become a resource when beings develop knowledge around an entity. Only when an entity is understood, when its existence is identified and comprehended by intelligence, it becomes a potential resource. There is a definite possibility that our perception in our entire existence limits us since humans can only fathom what their senses and capabilities enable them to do. The universe hosts unlimited resources that we cannot tap into, since we do not possess the adequate capacity to perceive its existence. We do not know what we do not know. We design using

a resource based on how we can perceive it. Maybe metal was not meant to be molten and reshaped, but serve as something completely different with a greater purpose. The design would be on another trajectory if our understanding of the world had been different. A honey bee sees the world much differently due to its capability to see the UV range of the light spectrum. Their capability paints a drastically different picture of a flower unseen to man.

Physical manifestations of ideas have always been largely defined by the behaviour of the material being used. A physically synthesized object is bound by the constraints inherent to the properties of the medium used. This aspect has either limited humans or has been driven by it to search for a medium that breaks these constraints. In this quest to realize an idea at its best, humans have, over history, either discovered newer materials or synthesized them, intentionally or even by accident. As the knowledge of chemicals and materials increased, humans started bending the properties of naturally occurring materials to suit their specific needs.

Availability of resources has driven designs in different scales and, in some cases, to the extent that civilizations and communities have built their identities and cultures around the exclusive availability of it. Assam is recognized for its scenic grandeur, its tea, and for being a biodiversity hotspot for endangered species popularly. But the natural resource that bears geographical identification in Assam is the Muga Silk, which forms a critical pillar in the Assamese identity. There are communities in the state, like in Dhakuakhana, which make their livelihood through rearing Muga silkworms, and then there are places like Sualkuchi, which are recognised globally because they weave magic with silk. In this village, almost the entire population is involved in creating marvels in looms. The gorgeous and sophisticated designs have their

mentions even in Kautilya's Arthashastra , and patronized by rulers later, Sualkuchi took shape as a weaving village. The village was filled with rhythmic sounds of the flying shuttles and the looms, used to weave fabrics with motifs of the flora and fauna of Assam, and the jaapi for the royalty in golden zari. But today, this fabric, which is soft yet durable, and with an incomparable golden sheen that gets glossier with every wash, is getting mixed with imported yarns due to a decline in muga silk's availability. A village shaped around a resource, which birthed the identity and culture of a community, is struggling today due to the lack of the same resource. A resource made exclusively available by suitable ecosystems in the floodplains of Assam is declining in availability due to unfavourable conditions induced by humans.

In the beginning, designs were driven by what was readily available in nature. Humans utilized what they could perceive with their senses. Bones, fibers, feathers, animal hides, and clay were used to make shelters, jewellery and weapons. As humans started using stones and eventually started sharpening them, agriculture began to develop, and humans became better hunters. This marked the Stone Age, and as humans discovered gold, copper and silver as materials, and started experimenting with them for ornamentation and decoration, humanity progressed into the next phase. These metals were too soft for any large-scale applications initially, but it was learnt that they could be beaten into shapes and melted and poured into intricate forms. By chance or by experimentation, humans created a harder and more durable material by adding other materials into molten copper, leading to the creation of the first metal alloy, Bronze, a technological advancement that marked the beginning of the Bronze Age. Iron had not been made useful till this age, but soon humanity could reach higher temperatures in furnaces, which opened new avenues. Beyond metallurgy, porcelain

and ceramics came into being. The development of lenses meant that humans could now see things beyond their normal range of vision, into the ever-expanding universe or the magnificence of the micro-world. Humanity developed acid batteries, plaster, vulcanized rubber, coloured photography using silver, and the first solar cells, which influenced how physical entities were designed. During the early 1800s, Aluminum utensils used to be unique and only honoured guests were served in them, while the rest were served on Silver plates, owing to the rarity of the metal. Its value and perception drastically dropped from precious to an everyday commodity when researchers developed new ways to extract this metallic resource, and Aluminum became abundant. Throughout history, the discovery of a new material resource has shaped the physical world along with it. Silicon and crystallography similarly marked the Information Age and the Silicon Age, where computational devices were born. This age started a cycle where crystallography enabled capable computers, which helped develop crystallography through faster and more complex calculations and helped develop better computers.

A resource becomes more complex in its composition and constituents over time. A natural resource such as zinc was used for medicinal values and direct usage until humans learned to smelt and developed new resources such as brass, which as an alloy, had its applications throughout human evolution. From being a natural resource, zinc also manifested as galvanic cells, which, again as a resource, paved the path for electrical batteries. Batteries as a resource also continued a network of diverse electrical applications.

E.g. of resources driving the design. When humans were using coal or dried dung cakes for fires, it was crucial to contain the fire, direct the heat, and protect it from the weather. This led to the design of fire pits, earthen chulhas, and metallic chulhas. When Gas

was discovered as a cleaner fuel source, the underlying principle of a flame stayed the same; what needed to be designed as a way to dispense the gas, light it and regulate it. This led to the design of a gas stove. So as the resource became available, the plan changed.

Manifestation of the Driver in the biological world

The Biological world can be viewed from a range of lenses. From the nano or micro-world to the flora and fauna level, or from a lens of an entire ecosystem. What is more naturally observable is from the lens of flora and fauna. In the biological world, design exists, unlike in the artificial world, wherein creation is natural or guided by natural processes. Within these processes, the design is driven by the resources available or the lack of one.

Plants originally used to photosynthesise using their stems and did not bear leaves. Leaves came to being forty million years after the leafless plants had colonized Earth due to a drop in carbon dioxide levels in the atmosphere. Depletion of the available resource led to this morphological design change in plants. Similarly, cactus leaves' design changed into spikes due to the lack of availability of water as a resource. Had the water been adequately available, preserving it and its retention would not have arisen, and leaves would have remained as flatter and wider entities on cacti. Morphological changes occur over prolonged exposure to a resource in both flora and fauna.

Another way available resources have influenced design in the biological world is how organisms use natural resources for creation. All species of fauna are creators in a way. Beavers build dams on rivers by felling large trees to create winter homes for themselves. These vertebrates can also waterproof their dams using mud around the rivers. Some birds use mud and dung to make their shelter, baked and hardened by the sun. In the insect

world, termites use chewed remains of wood, faeces, and mud to create mounds that can spread across acres. Australian leaf-curling spiders use a sustainable resource, a dead leaf, to build their shelter and a nursery for their offspring. Recently, these spiders have been seen using discarded paper scraps as a substitute for leaves.

As natural resources are depleted, and all new materials are introduced into the world with human interventions, man-made resources are so widespread that birds and animals have started to utilize them. It is now a common sight where birds make nests with straws and wires, and synthetic ropes. These artificial resources are now available resources to birds and animals.

How the driver could impact design in extended space and time

New material discoveries are still happening with advancements in technology, and humans are constantly gaining new knowledge. But more than naturally occurring materials, the future of resources is going to be driven by artificially synthesised materials. Humans will create materials that will fit exactly what the requirement is. The matter is going to be programmable, where one will be able to alter any potential property of the material with an interface. Any combination of the properties will be configured to fit the use case exactly. This will enable designs where the characteristics of a single material will change across an entire design. This material will become the basis of all humankind's creations, and imagination will be the only limit to the possibilities. This will be a material resource that will be infinitely customisable and with an infinite life cycle as the same building block could be utilized for a different application if the need ever changes. This resource can change its shape and size and duplicate itself or consume other matter. The

material will have a standard energy level when synthesized. With every duplication, it will lose half its energy to the second copy and will regain its energy when it consumes another copy of itself. It will gain energy from consuming other kinds of materials also. The level of energy it will achieve will depend on the type of material it consumes. To make room for newer and well-informed designs using this new building block, the existing materials which are going to become wastes will be converted into energy. This material will consume all the non-sustainable matter and gain energy from it, which it will use to make more copies of its programmable self. Eventually, the world will be built with a single programmable material. As this material evolves, it will also be able to mimic naturally occurring biological characteristics. With this, the natural world will be assisted in regaining the balance it has lost over millions of years. With the Age of this single base material world, humankind will do away with property ownership, since one material can be anything and everything.

Everyone will be able to use any amount of this material as and when required and reset it back when the usage is complete. Humans will still be able to keep making newer versions of the matter, but there will be no excess either since the resource will be able to keep consuming the extras. People will voluntarily keep a check on the amount of this matter. With decentralized unlimited help, disparity amongst humans will vanish. Mankind will move towards unity consciousness where the concept of self disappears, and the sense of oneness, respect, love, and compassion exists amongst all beings and existence.

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