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Global Framework for Sustainability in Manufacturing Sector: Lessons from Vedas and Upanishads

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Abstract

This paper deals with some of the spiritual and philosophical teachings from the ancient Indian texts and explores their interconnectedness and alignment with the objectives of contemporary sustainability frameworks. The authors highlight the urgent need for a balanced approach to resource utilization and argument favoring harmonious living and self-sufficiency in the context of rapid expansion of industrial needs and their environmental consequences. Hermeneutics, a qualitative research method is used to thoroughly study, understand and interpret the available literature, including the ancient Indian texts especially the Vedas and Upanishads. The available data from the secondary sources and their synthesis yielded a few core lessons which include living in harmony with nature; pursuing self-sufficiency and self-perpetuation; emphasizing holistic wellbeing (environmental, social, economic); practicing moderation and non-possessiveness; prioritizing community welfare, and committing to continuous improvement. The paper suggests that these ancient principles are already reflected in successful Indian sustainable manufacturing practices like SPPD, lean practices, agile customization, CSR initiatives, and robust performance metrics. By integrating these timeless teachings, manufacturing organizations globally can foster a culture that values interconnectedness, ethical conduct, and harmony with nature, leading to enhanced social image and long-term success.

Keywords: Vedic science, Vedas, Upanishads, sustainability, lean practices, sustainable manufacturing, CSR, agile initiatives, metrics

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Introduction

The Vedic worldview is characterized by an intrinsic respect for nature and an understanding of interconnectedness. Maharishi Vedic Science articulates the need for self-sufficient and self-perpetuating systems—an idea mirrored in modern sustainability science's emphasis on closed-loop systems and circular economy models (Fergusson et al., 2017). The principle that man must learn to live in harmony with nature directly aligns with the core objective of sustainable manufacturing to minimize environmental impact while maintaining productivity (Fergusson et al., 2017; Kaushalya, 2016).

The manufacturing is undergoing rapid transformation, with Industry 4.0 technologies and global governance initiatives seeking to balance productivity with sustainability (Gholami et al., 2021; Bleischwitz & Bringezu, 2008). In India, sustainable manufacturing practices (SMPs) are being empirically studied and implemented, reflecting both indigenous philosophies and modern frameworks (Gupta et al., 2018; Kumar et al., 2021).

It's essential to integrate spirituality with education, commerce, and business. We posit that individuals should cultivate their intrinsic potential, allowing this revitalized inner energy to inform and direct all facets of their existence, including professional endeavors, personal relationships, and socio-economic interactions. The positive impact of individuals who embark on constructive endeavors with this integrated approach will ultimately foster peace, prosperity, and bliss worldwide.

The needs and greed of individuals and corporations have recently expanded rapidly, exploiting the ecological system. Recent environmental problems including deforestation and climate instability alongside tsunamis acid rain and ozone depletion as well as the greenhouse effect and endangered species and species extinction and agricultural fertilization have become major threats to human survival along with all other living beings. Evolving world order has moved people towards materialism and sustainability still appears as a distant dream. There is an immediate need to maintain the balance between how nature grows and how we utilize the resources of nature. No other equation than equilibrium will be useful to handle this situation. Nature maintains the principle of equilibrium. Equilibrium is a state in which market demand and supply balance each other and as a result, market prices become stable.

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It is important for all to operate in a sustainable environment to bring more value to our stakeholders. Sustainability in the manufacturing industry is a multidimensional challenge, requiring integration of environmental, economic, and social considerations, including our lifestyles. As global manufacturing faces mounting pressures to adopt sustainable practices, there is growing interest in drawing from diverse philosophical traditions to inform robust frameworks. The Indian scriptures and texts, especially the Vedas and Upanishads, constitute the foundational texts of Indian philosophy, offer deep and practical insights into harmonious living, self-sufficiency, and respect for nature — the eternal principles which provide valuable guidance for creating an equilibrium in the ecosystem and a harmonious coexistence of all its stakeholders through innovative sustainability efforts (Kaushalya, 2016; Bhatia, 2023; Maheshwari, 2023). The Indian ancient texts like the Vedas and Upanishads, offer profound insights into sustainability that can be effectively integrated into modern corporate practices for envisioning and developing a more sustainable and ethically responsible business model, including manufacturing processes and practices. The philosophy and principles of the ancient texts foster a culture that values interconnectedness, ethical conduct, and harmony with nature, through which corporations can enhance their social image and ensure long-term success and sustainability (Sahu and Ranjan, 2019). Manufacturing organizations across the globe and corporations (MNCs) can adopt a holistic approach to business practices by considering the contemporary and anticipated environmental and social impacts of their operations. This includes sustainable sourcing, reducing waste, and harmonizing living in greater communities. Sustainability consists of more than just developing technology and using it efficiently while optimizing its operations. Technology provides essential tools which enable human values and practices to be implemented effectively. True sustainability demands a change in direction toward innovative methods together with a renewed focus on cultural and social principles. These principles will steer us toward a future that achieves coexistence between humanity and the natural world.

Methods

This research employs a hermeneutic qualitative research methodology. Hermeneutics, as defined by (Ricoeur, 1981) involves the systematic process of understanding and interpreting existing literature, including the ancient Indian texts especially the Vedas and Upanishads and related discourses synthesizes data from recent research to identify philosophical and practical lessons from the Indian texts like Vedas and Upanishads that can inform a globally applicable

sustainability framework for manufacturing. The findings, insights and interpretations are drawn from different secondary sources including different websites that deal with Indian scriptures and scientific literature published in research journals and books. The approach used here does not fit into the frame of any 'systematic literature review' but a rigorous study of the full texts available in open sources to develop the conceptual framework as a guideline for the corporate organizations and for the future researchers to revisit, examine and suggest critical reviews, improvements and development of improvised conceptual and practical guidelines.

Review of Literature, Data Synthesis & Discussion

The purpose of reviewing here is not just to study the scope and contributions of different scholars and their studies, and understanding the research gaps, but to develop a comprehensive understanding through reading of original ancient texts and their interpretations, empirical evidence, thoughts and views of eminent scholars and researchers. In their article, Talwar & Sharma (2004) presented some of their insights from a book '*the Rigvedadibhashya Bhoomika'* (published in 1872) written by Swami Dayananda Saraswati and advocated that the teachings from the book can profoundly guide organizations attain manufacturing excellence through integration of modern technology and Vedic studies.

Harmony with Nature

The Vedas emphasize living in harmony with nature, advocating for a balance between human activity and ecological systems (Fergusson et al., 2017; Kaushalya, 2016). Panchal (2023) has critically reviewed the philosophy behind *'purusartha'* and its implications in human life and business. She (ibid) points out that the four aims of '*purusartha*' in human life (*dharma, artha, kama and moksha*) can provide a framework for ethical business practices. The principle of '*dharma*' guides ethical conduct, righteousness, and moral duty. The ten principles of *dharma:* fortitude, forgiveness, restraint, stealth, purity, restraint of the senses, patience, knowledge, truthfulness, and freedom from anger are the ten characteristics of righteousness are the characteristics of *dharma* (Manusmṛti, 6.92). In an organizational context, *dharma* connotes certain set of principles and ethical norms, a profile of dos and don'ts which together provide a framework for human behaviour (Panchamukhi, 2000). In the context of a business, it translates to fair practices, honest dealings, and treating stakeholders with respect. '*Artha*' refers to wealth and prosperity. It is true that commercial establishments strive for financial success, *dharma-*

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driven *artha* means pursuing wealth through ethical means and contributing to the well-being of society. *Kama* involves pleasure and desire, including the satisfaction of needs and desires. In business, it can be understood as fulfilling customer needs and providing enjoyable experiences. However, *kama* should be pursued responsibly and not at the expense of *dharma*. While moksha, which signifies liberation and ultimate spiritual attainment, does not directly apply to business operations, yet it encourages a long-term perspective and a focus on sustainable practices, recognizing that businesses are part of a larger, interconnected system (Panchamukhi, 2000; Talwar, 2014). In addition to the above, we find some important references from the *Yajurveda* which guide us to worship trees and forests through the following texts.

नमो वृक्षेभ्य: । namo vṛkṣebhya: (Yajurveda 16.17)

वनानां पतये नम: । vanānāṃ pataye nama: (Yajurveda 16.18)

औषधीनां पतये नम: । auṣadhīnāṃ pataye nama: (Yajurveda 16.19)

वृक्षाणां पतये नम: । vṛkṣāṇāṃ pataye nama: (Yajurveda 16.18)

रण्यानां पतये नम: । raṇyānāṃ pataye nama: (Yajurveda 16.20)

The above texts mean that trees and forests are the sources of oxygen, so they are considered as the source of *prana vayu (*breathing air*)*. Trees and plants absorb the carbon dioxide and other pollutants from the air, so their protection and care are said to be the duty of mankind in the ancient Indian literature (Agrawal & Siddiqua, 2015).

Self-sufficiency and Self-perpetuation

Vedic philosophy promotes self-sufficiency at both individual and community levels, aligning with the concept of self-perpetuating systems central to sustainability (Talwar, 2014; Fergusson et al., 2017). Within the framework of Vedic philosophy, business is considered an integral and inseparable component of societal well-being and it's primary function is believed to be wealth for society through activities such as manufacture, domestic trade, foreign trade, and finance. It emphasizes to work for an economic structure based on wellbeing of all stakeholders (*Sarva loka hitam*) (Talwar, 2005).

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Holistic Wellbeing

After reading through the writings of Kak (2022) and Maheshwari (2023) it is understood that a proper understanding of consciousness, its practice and integration into our functional aspects of life, including different commercial and production activities, may help us to interpret and lead the transactions between the mind and the material world. Because the state of consciousness empowers human beings to understand their 'mind' and its components like ego, intellect and memory. A true consciousness protects an individual from being surrendered to his/her ego and thus brings harmony to his/her eternal journey and living. The concept of 'holistic living and wellbeing' is possible if there is mutual respect and spirit of 'co-existence' between humans and other worldly affairs. Artificial intelligence (AI) and machine learning have already created fear and anxieties among humans. The leadership and management of organizations are facing unprecedented opportunities and challenges due to the emergence of new technologies and innovations in the industries. The authors (Kak, 2022; Bhatia, 2023; Maheshwari, 2023) believe that a proper understanding of self-awareness through attaining a higher level of consciousness may resolve all our dilemmas and anxieties. Through the teachings of Vedas, we can integrate physical, social, and spiritual wellbeing, paralleling the triple bottom line of sustainability (environmental, social, economic) (Kaushalya, 2016; Fergusson et al., 2017). One of the key Vedic principles is '*Sattva*', which is the balance between the material and spiritual aspects of life. Spirituality is associated with consciousness, and it creates the space for harmonious coexistence of ecosystems, environment and the industries, including manufacturing, business and different commercial operations.

To elaborate the above points, some of the Vedic literature which links to environmental protection includes:

a) ***Vaastu Shastra***: According to the Vedic system, houses ought to be built in harmony with nature. It ensures no destruction takes place in the surrounding ecosystem and allows free flow of natural energy. It is applicable for building structures for optimal utilization of energy.
b) ***Charak Sanhita***: As per this literature, Vedic texts emphasize the profound connection between humanity and nature. Specifically, the Vedas assert that the destruction of forests

is akin to the destruction of the state itself and underscore the protection of animals as a sacred duty. These learnings must be incorporated a part of the CSR requirements for companies.

c) ***Padma Purana***: As per this literature it states that "a person who is engaged in killing creatures, polluting ponds, wells, and tanks and destroying gardens, certainly goes to hell.". We see massive industry expansion by destroying natural resources. Moral lessons from 'Padma Purana' guide oneself.

d) ***Bhumisukta of Atharva Veda***: As per this literature it says, "may that Mother Earth, like a Cosmic Cow, give us the thousand-fold prosperity without any hesitation, without being outraged by our destructive actions.". Manufacturing industry to work keeping in mind replenishment of mother earth resources over a period.

e) ***Bhagavat Gita / Mahabharata***: It states that the universe and everything within it are believed to be interconnected and created by a universal force, and individuals should be mindful of their roles in relation to all others. In relevance to business, Bhagwat Gita teaches us the following for encouraging sustainability.

(i) Honour Existence

ज्ञेयं यत्तत्प्रवक्ष्यामि यज्ज्ञात्वामृतमश्नुते |
अनादिमत्परं ब्रह्म न सत्तन्नासदुच्यते || 13||

jñeyaṁ yat tat pravakṣhyāmi yaj jñātvāmṛitam aśhnute

anādi mat-paraṁ brahma na sat tan nāsad uchyate

Ishavasyam is the lesson in the Bhagavad Gita (7.19, 13.13) that the supreme divinity is omnipresent and is one with earth. Hindus worship and accept the presence of divinity in nature. This principle has historically fostered a reverence for nature within Hinduism, manifesting in practices such as the worship of specific trees (e.g., mint) and animals (e.g., cows) as divine entities. Considering river Ganges - as goddesses. The business which comprises individuals should also respect them as divine. Destruction of trees, killing of animals, polluting of rivers should be avoided by the manufacturing industry.

(ii) Mutual Dependence

देवान्भावयतानेन ते देवा भावयन्तु वः|

परस्परं भावयन्त: श्रेय: परमवाप्स्यथ || 11||

devān bhāvayatānena te devā bhāvayantu vaḥ

parasparaṁ bhāvayantaḥ śhreyaḥ param avāpsyatha

The concept of mutual dependence was imbibed in our ancient tradition and culture. Our ancestors were able to live in unison with nature. In the current world order, we have tended to ignore the principle and chosen to follow the western tradition of exploiting nature for more. Mutual dependence is critical in many aspects of life. Whether a parent-child relationship, manager – subordinate or husband-wife relationship, the first principle that we learn is the principle of mutual dependence. Even subatomic and cosmos works with the same principle. The man and nature, Living and Non-Living have a strong relationship of mutual dependence. The fundamental purpose of technology is to harness nature, providing information, values, and comfort to human beings. Ecological degradation is not an inevitable consequence of technology and development. The true hazard lies not with technology and science themselves, but with the waste materials generated by technological and scientific processes. When spiritual and human values are disregarded, technology leads to pollution and destruction instead of comfort. To foster a deeper connection with and care for the environment, we need to cultivate compassion and empathy within ourselves. Human greed and indifference are the primary causes of pollution.

(iii) Pancha Mahbhutas

प्रकृते: क्रियमाणानि गुणै: कर्माणि सर्वश: |

अहङ्कारविमूढात्मा कर्ताहमिति मन्यते (Bhagavad Gita: 3.27)

prakṛiteḥ kriyamāṇāni guṇaiḥ karmāṇi sarvaśhaḥ ahankāra-vimūḍhātmā kartāham iti manyate

भूमिरापोऽनलो वायु: खं मनो बुद्धिरेव च |

अहङ्कार इतीयं मे भिन्ना प्रकृतिरष्टधा (Bhagavad Gita: 7.4)

bhūmir-āpo nalo vāyuḥ khaṁ mano buddhir eva cha

ahankāra itīyaṁ me bhinnā prakṛitir aṣhṭadhā

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Every work is governed by nature itself, but it is only the arrogant people who deny it. The Bhagavad Gita elucidates that the Universe comprises eight fundamental elements: Earth, Water, Fire, Air, Ether (Space), Mind, Intellect, and Consciousness. Furthermore, human existence is characterized by five interconnected and interdependent layers: the environment, the physical body, prana (life force or energy), the mind, and consciousness. This inherent interconnectedness is celebrated as the bedrock of our relationship with the natural world. We are part and parcel of the universe/nature. Indirectly, it leads to saying that if the environment is affected so are we. This reveals that in the Vedic period humankind had a clear concept of surroundings. It is crucial to understand that businesses operate within society. Regardless of size, every business that prioritizes ethical practices and social responsibility is more likely to achieve long-term survival.

(iv) The Principle of Karma

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन। मा कर्मफलहेतुर्भूर्मा ते सङ्गोऽस्त्वकर्मणि (Bhagavad Gita, 2.47)

karmaṇy-evādhikāras te mā phaleṣhu kadāchana mā karma-phala-hetur bhūr mā te saṅgo stvakarmaṇi

The current business world's sole focus on maximizing profit is challenged by Hindu mythology. The goddess Lakshmi, who represents wealth, is worshipped on numerous occasions in India. Instead of advocating the pursuit of money, Hindu mythology teaches one to become so attractive to wealth that it naturally flows to them. Indian mythology is also based on the principles of karma, where every action has unforeseen consequence. The present-day business world’s sole motto is earning profit for the organization. This is challenged by Hindu mythology. As exemplified by Mahatma Gandhi's philosophy of Ahimsa (non-violence), inflicting harm upon any living being is considered negative karma, thus encouraging a commitment to non-violent conduct. Similarly, in business, engaging in corporate environmental responsibility will eventually yield positive returns. As every species on this planet is interconnected and dependent on each other, one may have to bear the consequence of not living in harmony with natural orders. Historically, also if we evaluate, we find that when the culture was created, nature was destroyed, but eventually, nature survived.

त्रिविधं नरकस्येदं द्वारं नाशनमात्मन: |
काम: क्रोधस्तथा लोभस्तस्मादेतत्त्रयं त्यजेत् || 21||
tri-vidhaṁ narakasyedaṁ dvāraṁ nāśhanam ātmanaḥ
kāmaḥ krodhas tathā lobhas tasmād etat trayaṁ tyajet

Lust, greed, and anger are the gateways to hell (self-destruction). These are the root causes of virtually every single problem in human life. The needs and greed of individuals and corporations have recently expanded at such a rapid pace, exploiting the ecological system. Recent environmental problems such as deforestation, unstable climate, tsunamis, El Niño, acid rain, ozone depletion, the greenhouse effect, species loss, and agricultural fertilization have not only jeopardized the well-being of all creatures, including humans, but also their very survival. There is an immediate need to balance how nature grows and how we utilize the resources of nature.

(v) The Principle of *Dharma*

श्रेयान्स्वधर्मो विगुण: परधर्मात्स्वनुष्ठितात् |
स्वधर्मे निधनं श्रेय: परधर्मो भयावह: || 35||
śhreyān swa-dharmo viguṇaḥ para-dharmāt sv-anuṣhṭhitāt
swa-dharme nidhanaṁ śhreyaḥ para-dharmo bhayāvahaḥ

It is far better to perform one's own natural, prescribed duty, even if it has flaws, than to perform someone else's. In fact, it is preferable to die while fulfilling one's own duty than to follow another's path, which can be dangerous. According to Bhagavad Gita, it is considered Dharma of everyone to protect the environment. Many rural communities have continued to live by these traditions, engaging in conservation-oriented practices as an expression of Dharma.

A notable historical example is the Chipko Andolan or movement in the 18th century, where people from 84 Bishnoi villages in Rajasthan actively resisted deforestation by embracing trees. This movement, culminating in a royal decree in 1873 that prohibited tree-cutting in Bishnoi villages, has become a powerful global symbol of non-violent resistance and collective action. Women, disproportionately affected by the scarcity of firewood resulting from deforestation, were the driving force behind this movement.

The movement gained such prominence that it received the Right Livelihood Award in 1987.

(vi) Metrics

अन्नाद्भवन्ति भूतानि पर्जन्यादन्नसम्भवः । यज्ञाद्भवति पर्जन्यो यज्ञः कर्मसमुद्भवः ॥ 3.14

annād bhavanti bhūtāni parjanyād anna-sambhavaḥ

yajñād bhavati parjanyo yajñaḥ karma-samudbhavaḥ

Parameters pertaining to natural systems like rain are good measurements of sustainability. In Gita, Krishna also mentions the importance of rains and links it to the concept of yagna, thereby demonstrating how the operational framework of Yagna can indeed lead to sustainability. A living being existed on account of food, food is obtained from rain, rain from Yagna, and Yagna from the appropriate action.

(vii) Yajur Veda

"mātā bhūmih putruahan pṛthivyā:''

Nature is not seen as an external environment but as an own being. Yajur Veda talks about the conciliation and peace of all components of earth. Atharva Veda considers earth to be mother and creation are her offspring. Water is the milk of Mother Earth that fosters the growth of all its offspring and makes them pure. Rivers are a source of power for life and are a symbol of dignity. It is remarkable that people in the Vedic times regarded nature and environment in a holistic manner and revered each of its constituents and entities by carefully preserving them.

Do not harm the environment, water, and the flora; the earth is my mother, I am her son; may the waters remain fresh, do not harm the water. Tranquillity to be the atmosphere, to the earth, to the waters, to the crops and vegetation". This Vedic prayer invokes divine intervention to bless and protect the environment. This proves that Vedic society was the first environment protecting society in the history of mankind. In Vedas, whether living or non-living has life. The Environment Protection Act 1986 is a similar kind of protection act.

दशकूपसमा वापी दशवापीसमो ह्रदः।

दशह्रदसमः पुत्रो दशपुत्र समो द्रुमः ॥

dashakupasamaa vaapi dashavaapisamo hradah

dashahradasamah putro dashaputra samo drumah

(Vrksayurvedah-5) (Matsya Purana 154:312)

This basically means that 10 ponds are equal to one reservoir, the son is equal to 10 reservoirs. *Vṛkṣāyurveda* says that planting a tree is equal to having ten sons. It not only gives oxygen but also gives essential nutrients to the soil. A son lives for one generation; it is only the trees that pass onto to multiple generations.

ईशा वास्यमिदं सर्वं यत्किञ्च जगत्यां जगत्।

तेन त्यक्तेन भुञ्जीथा मा गृधः कस्यस्विद्धनम् ॥ (Ishopanishad, Verse 1)

īśā vāsyamidaṁ sarvaṁ yatkiñca jagatyāṁ jagat

tena tyaktena bhuñjīthā mā gṛdhaḥ kasyasviddhanam

Everything living or non-living that is there in the universe is controlled by and belongs to the Lord. One should, therefore, accept only those things necessary for oneself, which are set aside as his quota, and one must not accept other things, knowing well to whom they belong. Therefore, human beings are not the authority to rule the planet moreover they are no one to decide the relative importance of other beings. One should take what is required from nature and not be involved in any violence with nature. Living a life of contentment is the most important message from this sloka and it is relevant to businesses too. The power of being oneness is referred to as ―Divine Being in Yajurveda. The concept of being contended is beautifully explained in the Vedas.

वननिपरजाहितांड्रिवो | vananiparajāhitāṃḍrivo (Rigveda 8th Book, Shloka 1.13)

The advice given through this Veda is not to be involved in any kind of deforestation. Forest should never be cut. Today we are cutting down the trees for our living spaces, agricultural practices, World has witnessed the greatest fire in 2019 – the Amazon rainforest wildfires. Fires take place during the dry season. "Slash and burn" methods are used to clear forests to make way for agriculture, livestock, logging, and mining,

leading to the deforestation of the Amazon rainforest. Such activities are generally illegal, but enforcement of environmental protection has been lax. It has in fact played a significant role in global warming also. Businesses should therefore avoid deforestation activities to build up their business.

दया माँ लेखीरणतारीश मा हसी (dayā mā̃ lekhīraṇatārīśa mā hasī)

Yajurveda – 5th Book Sloka 43

This says please do not destroy the quality of the air. The reason that is given in literature is the following sloka,

वातवतुभेजंशंभुमायोभुनोहरदे परनायुंशितारिष

vātavatubhejaṃśaṃbhumāyobhunoharade paranāyuṃśitāriṣa

Rigveda 10th Book, Sloka number 186.1

This means that clean air which is pure is very important for our health, is a source of our wellbeing and longevity. Therefore, one cannot be involved in any kind of destruction or degradation of it.

Practical Applications in Manufacturing

Table-1 presents a comprehensive matrix to showcase the inherent linkages between different sustainable manufacturing processes and *Vedic* principles, and table-2 highlights some of the scholars' views about the level of adherence to Vedic principles by some Indian manufacturing organizations. The following sections discuss in detail about how manufacturing and business processes could be made sustainable by following principles of Vedas and Upanishads.

Sustainable Product and Process Design (SPPD): Empirical studies in Indian manufacturing highlight the adoption of SPPD as a key driver for sustainable outcomes (Gupta et al., 2018). The Rig-Veda describes a "cosmic order," asserting that both physical and moral laws govern the entire universe, and no transgression of these laws is permitted. Vedic philosophy posits that infinite creativity, action, and power are derived from these universal laws of Nature. While our ancestors benefited from these laws for thousand of years, modern society has often overlooked them in the relentless pursuit of financial gain, often at the expense of others. Organizations that integrate their operations with these cosmic laws are poised to achieve both

greater profitability and sustainable growth, as demonstrated by companies such as Toyota, Tata Steel, and Aravind Eye Hospitals.

Lean and Agile Practices: Lean practices rooted in minimizing waste and maximizing value resonate with Vedic principles of efficiency and non-excess (Gupta et al., 2018; Kumar et al., 2021). Vedic concepts like *dharma* (duty) and *karma* (action and consequence) can guide lean and agile practices. The following are the means for such practices: (i) **Kaizen and *Dharma*:** The principle of *Dharma* guides fulfilling one's duty and striving for excellence in all worldly actions. This aligns with the lean principle of continuous improvement (Kaizen), encouraging teams to constantly seek ways to enhance processes and outcomes, (ii) ***Vairagya* & Agility:** *Vairagya* (detachment or non-attachment) guides and inspires to perform without any fixed ideas and embracing change. This resonates with the agile principle of adaptability and responsiveness to changing requirements, (iii) ***Sangha* & Teamwork:** *Sangha* (community or association) shows the way of working together in harmony. This aligns with the agile principle of collaboration and shared responsibility. This Vedic principle fosters a culture of mutual support, respect, and successful teams, and (iv) ***Dhyana* & Flow:** *Dhyana* (meditation) cultivates mindfulness and focus, which are known to be effective for maintaining concentration during work. Flexibility and adaptability in manufacturing processes mirror the Vedic appreciation for dynamic balance and responsiveness to change (Gupta et al., 2018; Tripathy et al., 2023; Mohanty et al., 2024).

Corporate Social Responsibility (CSR): The World Business Council for Sustainable Development defines "Corporate Social Responsibility (CSR) as a business's ongoing commitment to ethical behavior and contributing to economic development. This commitment also involves improving the quality of life for their employees and their families, as well as for the local community and society as a whole. In Vedanta, business is viewed as an integral part of larger social system, and it is expected to create wealth for society through the right means of action. '*Sarva loka hitam'* in the Vedic literature referred to 'wellbeing of stakeholders' and that is the major ethical and social obligation of the leadership of any organization (Muniapan, 2010; Tripathy et al., 2023; Kumar & Anisha, 2025). Again, the phrase and its associated concept of '*Vasudhaiva Kutumbakam'* is found in the Maha Upanishad, part of the Atharva Veda, guides our thoughts and actions to consider that the whole world is a family and the interconnectedness of humanity is the essence of mutual existence and prosperity. This

interconnectedness and emphasis on ethical conduct is a recurring motif in Indian philosophy and spirituality. It reflects a broader philosophical tradition that prioritizes compassion (*karuna*) and the conviction that all living beings are interconnected. Consequently, it is deemed the inherent duty (*dharma*) of humanity, societies, and organizations to serve both people and the planet. Thus, we find that Indian industries, including manufacturing sector, integrate CSR initiatives such as poverty alleviation, healthcare, and sanitation—reflecting Vedic values of societal welfare (Gupta et al., 2018; Tripathy et al., 2023). Business is a means of creating '*artha'* or wealth in the form of profit or revenue. As per Vedic philosophy business principles need to be based on '*dharma*' and it extends beyond the legal obligations (Muniapan and Raj, 2014). Also, it is believed that CSR is rooted in organizations' ethical obligations towards society and that it shall continuously inspire the organizations across the globe to serve humanity and nature for ensuring a sustainable future. Even according to ancient Indian texts (*The Rigveda* 6.48.17 [ref. 68], *Atharvaveda* 19.2.1-2 [ref. 60], *Mundaka Upanishad* 1.1.1 [ref. 73], *Bhagwad Gita* 9.8 [ref. 61], *Mahabharata, Shanti Parva*, Sec 89 [ref. 50], Charaka Samhita), *Panch Mahabhutas* (*Jal*–Water; *Vayu*–Air; *Prithvi*–earth; *Agni*-fire and *Aakash*–ether) are also considered as the stakeholders of the larger societies, including business and manufacturing organizations.

Green Human Resource Management (GHRM): The linkage of GHRM activities with ISO standards demonstrates practical alignment with holistic sustainability principles (Akdeniz, 2023). The consciousness-based approach in leadership and management can help an organization to lead innovation and creativity in a harmonic way. Lord Krishna says in the Bhagavat Gita (2.50): बुद्धियुक्तो जहातीह उभे सुकृतदुष्कृते । तस्माद्योगाय युज्यस्व योग: कर्मसु कौशलम् ॥ It means that men with wisdom shall continue to do good work for the welfare of mankind, and they have nothing to gain for themselves by such work. The core understanding here is that yoga is dexterity in action informed by consciousness – is used to cover the entire range of human action with equanimity in mind as the determining condition (Maheshwari, 2023; Tripathy et al., 2023). Achieving excellence in Human Resource management requires a balance between materialistic and spiritual endeavors through the application of two sets of Vedantic concepts such as four '*purusarthas*' (*Dharma, Artha, Kama and Moksha*) and three '*gunas*' (*Sattvik, Rajashik, and Tamashik*). Human Resource Development initiatives including training and learning processes need to be guided by Vedantic principles for

nurturing and developing their attributes and aptitudes of commitment, dedication, selflessness, duty-consciousness etc.to ensure highest levels of productivity and harmony in the society and environment (Panchamukhi, 2017). Only materialistic pursuits induced by attributes like '*rajashik*' and '*tamasic*' and guided by the principles of '*artha*' and '*kama*' hardly can ensure sustainability and make all green efforts successful.

Global Governance Mechanisms: An appropriate governance mechanism is meant to ensure effective management of resources, either private or public, through an open, transparent, accountable, equitable and responsive way for the welfare of stakeholders (Elahi, 2009). The rules of law, transparency, accountability and effectiveness of management are all essential components of good governance which is also an essential precondition for sustainable development and improves human welfare (Morita and Zaelke, n.d.). The teachings of Bhagavad-Gita universally guide us to turn governance into a pro-people and holistically purposive leadership system aimed at leading people in the right direction (Satpathy et al. 2013). Thus, international efforts should focus on resource management, transparency, and institutional mechanisms for sustainability and greater welfare. Global governance for sustainable resource management emphasizes systematic institutional mechanisms—such as transparency initiatives, certification standards, and resource efficiency programs—that can be informed by Vedic principles of integrity, stewardship, and holistic assessment (Bleischwitz & Bringezu, 2008).

Service-Oriented Sustainable Manufacturing: There is no common and unified understanding about the definition of sustainable manufacturing (Dornfeld, 2009; Haapala et al., 2013; Wang et al., 2016; Millar and Russell, 2011; Despeisse, 2013; Nakano, 2009). It might be either due to competition and rivalry among companies in the market or due to imbalance and in equilibrium between philosophy and practices (Moldavska & Welo, 2017). Mostly it might be due to short term orientation of the companies and their competitive profit motives. An empirical study by (Ihlen and Roper, 2014) concludes that corporations make no attempt to explicitly define the sustainability concept, thus pursuing related practices with ambiguous strategies. There are frameworks which emphasize adaptability, energy efficiency, and lifecycle approaches (Duin et al., 2023; Xu et al., 2014). However, sustainability can't be achieved only through environmental initiatives. Earth's atmospheric capacity is limited, and it can't absorb the emissions continuously produced by all the carbon-based economies

(Edenhofer et al. 2015). It requires some common or universal philosophical guidelines which can also govern and guide our thoughts, conduct and actions. The ancient Indian texts contain enough wisdom to resolve the inconsistencies in the concepts and practices of sustainable manufacturing. Vedantic philosophy contains deeper insights into guiding actions to ensure harmony with nature, resource conservation, and ethical practices. Concepts like *Ahimsa* (non-violence), *Aparigraha* (judicious possession), and the interconnectedness of all beings, found in Vedas can guide modern manufacturing towards more environmentally responsible and socially relevant practices. Service-oriented frameworks in manufacturing further reinforce adaptability and lifecycle thinking, which are compatible with the dynamic equilibrium promoted in Vedic philosophy (Xu et al., 2014).

Metrics and Assessment Tools: Performance metrics for sustainable lean manufacturing (SLM) and integrated assessment models are being developed for continuous improvement (Mahmoud, 2017; Kumar et al., 2021). Performance measurement is critical for continuous improvement in sustainability. In Indian automobile industries, specific metrics for social, economic, and environmental performance have been identified and validated through expert surveys (Kumar et al., 2021). These metrics (See Table-3) support a culture of ongoing refinement, deep rooted in the Vedic tradition of self-assessment and growth.

Table 1: Mapping Vedic Principles to Practical Sustainability Practices

Vedic Principle	**Corresponding Practice in Manufacturing**	**Data Source(s)**
Harmony with Nature	Sustainable Product/Process Design (SPPD), CSR	(Gupta et al., 2018) (Fergusson et al., 2017)
Self-sufficiency	Lean Practices, Resource Efficiency	(Gupta et al., 2018) (Kumar et al., 2021) (Moldavska & Welo, 2017) (Mahmoud, 2017)

Holistic Wellbeing	Triple Bottom Line (Environmental/Social/Economic)	(Kaushalya, 2016) (Fergusson et al., 2017) (Bhatia, 2023) (Maheshwari, 2023)
Non-excess / Moderation	Waste Minimization, Lean Manufacturing	(Gupta et al., 2018) (Kumar et al., 2021) (Mahmoud, 2017)
Community Welfare	CSR Initiatives (Health, Sanitation)	(Gupta et al., 2018) (Morita and Zaelke, n.d)
Continuous Improvement	Agile Practices, Performance Metrics	(Gupta et al., 2018) (Kumar et al., 2021)

Source: By authors

Table 2: Key Sustainable Manufacturing Practices in India

Practice Area	Implementation Rate (exact % not specified)	Aligned Vedic Principle	Data Source(s)
Sustainable Product/Process Design (SPPD)	High	Harmony with Nature	(Gupta et al., 2018) (Fergusson et al., 2017)
Lean Practices	High	Non-excess/Moderation	(Gupta et al., 2018) (Kumar et al., 2021)
Agile Practice & Customization	Moderate	Continuous Improvement	(Gupta et al., 2018)

Sustainable Supply Operation	Moderate	Self-sufficiency	(Gupta et al., 2018) (Tripathy et al., 2023) (Mohanty et al., 2024)
Product Recovery/Return	Moderate	Circularity	(Gupta et al., 2018)
CSR Initiatives	Widespread	Community Welfare	(Gupta et al., 2018) (Muniapan, 2010) (Tripathy et al., 2023)

Source: By authors

Table 3: Performance Metrics for Sustainable Lean Manufacturing

Metric Category	Example Metrics	Relevance to Vedic Principle	Data Source(s)
Environmental	Energy use, Waste reduction	Harmony with Nature	(Kumar et al., 2021)
Social	Employee welfare, CSR activities	Community Welfare	(Kumar et al., 2021) (Gupta et al., 2018) (Muniapan, 2010) (Tripathy et al., 2023)
Economic	Cost efficiency, Productivity	Self-sufficiency	(Kumar et al., 2021)

Source: By Authors

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Implications and Future Scope

The synthesis of philosophical insights from the Indian Vedas when triangulated with Indian manufacturing best practices demonstrates that ancient wisdom can meaningfully adapted to modern sustainability frameworks. The emphasis on harmony with nature, community welfare, moderation, and self-sufficiency provide a strong ethical foundation for practical strategies such as lean manufacturing, CSR initiatives, and continuous improvement processes. Global frameworks often focus on institutional mechanisms and technical standards; integrating Vedic principles can enhance these by embedding deeper ethical considerations and holistic perspectives. For example, linking GHRM activities with ISO standards not only ensures compliance but also fosters a culture aligned with holistic wellbeing—a core tenet of the Vedas.

Philosophical lessons from the Indian Vedas — particularly those emphasizing harmony with nature, self-sufficiency, holistic wellbeing, moderation, community welfare, and continuous improvement — can inform the development of a globally applicable sustainability framework for manufacturing by providing an ethical foundation for practical strategies such as lean manufacturing, CSR integration, adaptive processes, and comprehensive performance measurement. Research from Indian manufacturing demonstrates that these principles can be operationalized through specific practices that align both with ancient wisdom and modern sustainability goals (Kaushalya, 2016; Fergusson et al., 2017; Gupta et al., 2018; Kumar et al., 2021). However, gaps remain in fully operationalizing these philosophical lessons at a global scale. While Indian manufacturing provides promising models, further research is needed to adapt these principles across diverse cultural and regulatory contexts.

Recommendations

- **Integrate Ethical Foundations**: Embed Vedic-inspired ethical principles into global sustainability standards to enhance their legitimacy and effectiveness.
- **Adopt Holistic Metrics**: Develop performance metrics that capture environmental, social, and economic dimensions—reflecting the holistic approach of the Vedas.
- **Promote Continuous Improvement**: Foster cultures of ongoing learning and adaptation within manufacturing organizations.

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- **Facilitate Cross-cultural Adaptation**: Conduct further research to adapt these lessons across different global contexts while respecting local traditions.

By drawing on both philosophical insights and practical evidence from the Indian context, global manufacturing can advance towards more sustainable—and ultimately more resilient—systems.

Conclusion

This research looks at how ancient Indian texts can guide modern sustainable manufacturing practices. Using hermeneutics as a qualitative research methodology it synthesizes insights from the Vedas and Upanishads. The central argument is that the spiritual and philosophical emphasis on peaceful coexistence, self reliance and interconnectedness in these ancient texts directly maps to modern sustainability frameworks. The authors highlight the need for a balanced approach to resource usage especially with the rapid growth of industrial demands and their ecological impact.

The research suggests that these ancient principles can be applied and effective to sustainable manufacturing practices like Sustainable Product and Process Development (SPPD), lean methodologies, agile customization, Corporate Social Responsibility (CSR) initiatives and comprehensive performance indicators. By integrating these timeless principles industrial organizations worldwide can create a culture that prioritizes interconnectedness, ethical behaviour and harmony with nature and hence social standing and sustained success.

Glossary of Terms

1. Dharma: Duty

2. Karma: Consequence and action

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