Does the ancient Indian practice of Yagya reflect critical product design attributes? : A Designer's perspective

Abhishek Srivastava[1] and Sonal Atreya[1*]

[1]Department of Design, Indian Institute of Technology Roorkee, Uttarakhand, India

Abstract. Background: Yagya is recognized as one of the most valuable outcomes of Indian knowledge systems. It was a significant element of the Vedic period and remained an integral part of the everyday lives of kings, rishis, learners, villagers, and others who practised this tradition with entire commitment and to the best of their abilities. Problem: Yagya, as a concept and practice, is an appropriate and meaningful case study for a wide range of disciplines, and it is being investigated in a variety of domains including- management, medicine, environmental science, mathematics, and many more. However, its reflection from design perspective, which places a strong emphasis on attributes like creative thinking, problem solving, etc. remains unexplored. Methods: The study's takeaways are derived from a review of the content from various mediums available on 'Yagya,' specifically *vāṃgmaya* 25 - 'Yagya ka Gyan Vigyan,' authored by Pt. Sriram Sharma Acharya. Results: The paper discusses Yagya and its association with various disciplines with a focus on attributes relevant to design. From this perspective, Yagya appears to depict certain critical design attributes including- creative problem-solving mindset, need-based and purpose-driven solutions, multi-sensory experience, and scalability, that are vital to (product) design. Conclusion: The practise of Yagya reflects critical product-design attributes. The evidence presented in the paper emphasises the importance of studying ancient knowledge traditions and highlights the need to incorporate them into current educational curriculum to familiarise learners with ancient India's rich and refined knowledge systems.

Keywords. Ancient Indian, Designer, Indian Knowledge Systems, Product Design, Yagya

*CORRESPONDENCE
Department of Design, Indian Institute of Technology Roorkee, Uttarakhand, India
sonal.atreya@design.iitr.ac.in

Introduction

The Vedas, Puranas, Upanishads, Ramayana, Bhagavad Gita, and other ancient texts have all extensively discussed the value and significance of Yagya. With such tremendous and equivocal acceptance of Yagya, the practice of Yagya remained an intrinsic part of the Vedic period. The following verse from Shatpath Brahman provides a clear explanation of the significance of Yagya [1].

यज्ञो वै श्रेष्ट्रतम कर्म।

Meaning - Yagya is the best auspicious work in the world.

However, in due course of time along with civilizational and regime changes, the practice of Yagya got limited to certain festivals and events like- kathas, marriage, death ceremonies etc. But with the efforts and support of some organisations like All World Gayatri Parivar, Yagyavalkya Center for Yagya Research, National Botanical Research Institute, Central Pollution Control Board, etc. as well as few enthusiastic and interested individuals, the research on Yagya and its relevance in the modern context has taken pace with scientific experimentation and studies being conducted and published in reputed journals.

Yagya can be understood and interpreted under different dimensions and one can have multiple takeaways by deciphering its physical, philosophical, and subtle dimensions. Thus, we can see the impact of Yagya on varied disciplines including management, medical, environmental science, mathematics, and many more. The study on Yagya from the aspect of design has been rarely investigated and the findings available are mostly on varied shapes, and sizes of yagya kund [2], however, a deeper look at Yagya and its practice reveal highly intriguing findings which are detailed in further sections.

Methodology

The study analyses Yagya from the perspective of product design and present its conclusions. This required literature study on Yagya available in the form of varied mediums including books, ebooks, *vāṃgmaya* (complete works), periodicals, magazines, etc. In specific, *vāṃgmaya* 25 - 'Yagya ka Gyan Vigyan,' authored by Pt. Sriram Sharma Acharya has been thoroughly examined to derive the findings.

Meanwhile, keywords like 'yagya', 'yagna', 'agnihotra', 'havan', etc. were used to find relevant literature available on the internet from various disciplines and are cited in the paper. Certain key attributes in the product design domain were evaluated in Yagya's context and the ones that hold good are presented in the study with justification.

The physical aspect of Yagya (Figure 1) is about making devotional offerings (havan samagri) to the sacred fire (yagya agni) while chanting of vedic mantras. Here the offerings used are- havan samagri or havishya made from odoriferous and sweet substances like jaiphal, agar, sugar etc., healthy constituents like ghee, cereals, etc., along with medicinal herbs like giloya, baheda, mulhati, etc. on wooden (sandalwood, deodar, mango, etc.) fire [5]. As a result, many researchers refer to Yagya as an herbal fumigation technique, and numerous research papers on its efficacy during the covid -19 pandemic have also been published [6, 7].

Meanwhile, the scientific aspect of Yagya has been described in an elaborated form in the book titled 'The Integrated science of Yagya' [5] which explains how Yagya combines the two energy systems of heat (Yagya fire) and sound (chanting of mantras) for the benefit of physical, psychological and spiritual aspects. The book also presents scientific evidence on environmental purification and medicinal applications of Yagya.

Yagya – the physical and scientific aspect

The term 'Yagya' is made from 'yaj' dhatu meaning- worshipping divinity (देव पूजन), harmonious compatibility (संगतिकरण) and charity (दान) [3, 4]. In literal terms, it implies altruistic sacrifice for noble causes.

Figure 1: Yagya being performed.

Yagya and other disciplines

Many researchers and authors studied the literature on Yagya and presented their findings across multiple disciplines like management, medicine, mathematics, etc. Below is a brief summary of a selected disciplines.

Management

Yagya and its takeaways from the perspective of project management has been elaborately discussed in the book on the Indian Knowledge Systems by Prof. Mahadevan and team, in the book chapter titled 'The Vedic Corpus' [8]. The book addresses the efficacy of project management skills involved in Yagya's that varied in size and scale and could last several days, months and even years. Ensuring smooth and seamless continuation required a high degree of organisation and managerial abilities along with effective utilization of human and material resources. The view resonates with Pt. Sriram's discourse on 'Hamari Yagyiya paramara' [9], in which he highlights how several individuals come together to cooperate, contribute, share resources for the purpose of achieving a common objective of mutual benefit.

Medicine

Yagyopathy or Yagya therapy, is a field of medicine that focuses on healing through Yagya.

By appropriate selection of samidhā (wood), havan sāmagrī and mantras (chants), Yagya can act as an effective treatment for physical, mental, and psychosomatic disorders. This works on the principle of magnified potency of herbal medicines by subtlization and sublimation [4]. Encouraging and evidence-based results have been found in the treatment of pulmonary tuberculosis, sub-clinical hypothyroidism, management of epileptic seizures, management of symptoms associated with obsessive-compulsive disorder and polycystic ovarian disease, as well as supportive care, improved quality of life in cancer patients, among many more [10].

Environmental Science

There is a popular saying "Heal the atmosphere and the healed atmosphere will heal you", which is well suited for Yagya [11]. One of the prominent physico-chemical effects of Yagya is the purification of air [4]. This purified air is not only beneficial for human beings, and animals but also for plants by helping in plants' growth and offering protection against harmful organisms. Yagya is also seen as a solution to reduce indoor air pollutants specifically PM (particulate matter) and CO2. Case study experiments conducted by researchers found a decrease in PM 2.5, PM 10, and CO2 after performing Yagya inside the residences [12].

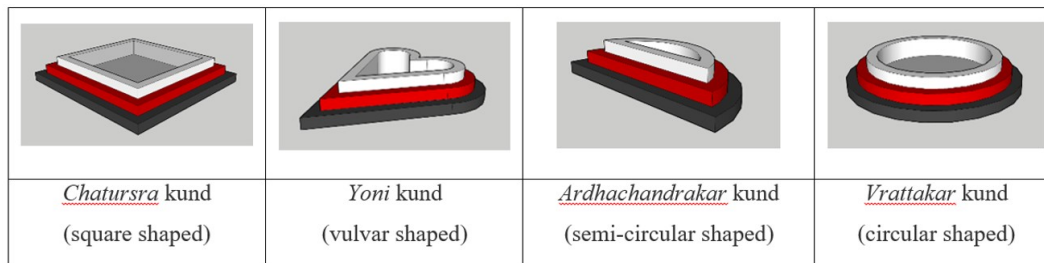|			
Chatursra kund	*Yoni* kund	*Ardhachandrakar* kund	*Vrattakar* kund
(square shaped)	(vulvar shaped)	(semi-circular shaped)	(circular shaped)

Figure 2: Yagya kund in varied shapes.

Mathematics

The method of yagya kund (altar) construction was based on minute dimensions and volumetric calculations. According to research published by Jairam M. [2], Vedic texts incorporated mathematical knowledge from numerous domains such as astrology, geometry, trigonometry, etc. in the construction of Yagya kund. A similar use of mathematics and dimensioning is evident in the construction of the Yagya mandap [13]. Ancient scriptures like Kundasiddhi, Kundark, Kunddarpan, Kund-rachana, Kund mandap darpan, etc. discusses varied types of mandaps along with their construction method, dimensions, and architectural elements like- pillars, roofs, shikhara etc. and their placement [13].

Design and Yagya

Design has been a field which has found its inspiration from many aspects. Biomimicry is an excellent example of inspiration from nature which holds enormous potential in addressing problems by looking at nature and its processes [14]. In fact, ancient Indian practices under Indian Knowledge Systems also hold a significant wealth of knowledge from which design and designers can have many takeaways in terms of design practice and the design process. One of the spectacular offerings from Indian knowledge systems is Yagya. Yagya and its practice, when examined through the lens of design, provide some extremely fascinating and crucial aspects of product design.

In practice, designers follow a design process whether designing a car, vehicle, appliance, furniture, mobile app, etc. The process helps them come up with a research-driven user-centred solution while meeting business needs. Some of the popular Design models are- Design Thinking model by Stanford d. school, five phases of the Design process by IDEO, the Double diamond model by the UK Design Council, and many more [15]. While all these models follow some key steps, the intent remains to come up with a human-centred solution. However, this notion of human centric design has even been questioned by many environment enthusiasts, designers, etc. to reorient its focus towards planet-centric design [16].

Yagya and its practise, reflect certain key characteristics of a product design approach, like- 1) Creative and problem-solving mindset, 2) Need-based and purpose-driven solutions, 3) Multi-sensory design, 4) Scalability of product

Creative and problem-solving mindset

One of the key skills required by a designer is to have a creative and problem-solving mindset. Whichever subset of design (like- furniture, aerospace, web, product, etc.) one belongs to, coming up with an innovative solution requires a creative mindset, meanwhile making a utilitarian product requires a problem-solving approach that enables them to address a need. In fact, these are among the top competencies which are expected not only by students in the 21st century [17] but employees, professionals, and leaders too. It is this mindset that helps one to come up with ideas and solutions even when confronted with adversaries and constraints.

Ben Orlin, author of 'Math with Bad Drawings', rightly says-

"Creativity is what happens when a mind en-

counters an obstacle. It's the human process of finding a way through, over, around, or beneath. No obstacle, no creativity."

It's remarkable to see how this fundamental skill manifested itself in the conception of Yagya. A few instances are presented below reflecting the attribute of creative and problem-solving mindset which guides on substitutions in the lack of vital ingredients of Yagya. The first evidence, is from a conversation between Rishi Yājñavalkya and King Janaka [3], where the king enquires about various constraints in performance of Yagya using hypothetical scenarios and is responded to by the Rishi [18].

'यत्पयो न स्यात् केनं जुहुयात्।' 'व्रीहियवाभ्यामिति ।' 'व्रीहि यवौ न स्यातां केन जुहुयात्?' 'या अन्यां ओषधय इति।' 'यदा ओषधयो न स्युः केन जुहुयात् इति?' 'या आरण्या ओषधय इत ।' 'यदि आरण्या ओषधयो न स्युः केन जुहुयात् इति?' 'वानस्पत्येनेति।' 'यदि वानस्पत्यं न स्यात् केन् जुहुयात्?' 'अद्भिरिति।' यदापो न स्युः केन जुहुयात् इति?' नवाऽइह तर्हि किंच ना सीदथैतद हुतैव सत्यं श्रद्धायामिति।'

Translation in English: If the milk or ghee isn't available, use 'dhaan' or 'jau'; if they are not available, use other aushadhis, in absence of that use *jangali anaj*, in the latter's unavailability use *vanaspati*, if that too is not present, use water, and if water is also not available, perform a symbolic yagya with your truthful feelings as samagri into the devotional fire.

A few other examples depicting problem solving mindset could be seen in ancient scriptures such as Mandan, Bodhayana, and Shatpath Brahman, which are mentioned in *vāṃgmaya* 25 [3]. The *ślokas* from Bodhayana are as below:

यथोक्तवस्त्वसंपत्तौ ग्राह्यं तदनुकारियेत्।
यवानामिव गोधूमा व्रीहीणामिव शालयः।
आज्यद्रव्यमनादेशे जुहोतिषु विधीयते।
दध्यलाभे ययः कार्य मध्वलाभे तथा गुडः।
घृत प्रतिनिधिं कुर्यात्पयो वादिधवा बुधः।
आज्यहोमेषु सर्वेषु गव्यमेव भवेद् घृतं ।
तदभावे तु माहिष्यं आजमाविकमेव वा।
तदभावे तु तैलं स्यात्तदभावे तु जार्तिलम्।
तदभावे तु कौसुम्भं तदभावे तु सार्षपम्।

Translation in English: If the object pre-scribed in yagya is not available, then work with a similar substitute. For example, if barley is not available, use wheat, and *Vrihi* (good rice), if they are not available, use *shali's* rice. In the absence of *kushas*, use *kans* or *durva*. Milk, in the absence of curd, jaggery in the absence of honey, milk or curd in place of ghee. Ghee here refers to cow ghee, but if it is not available then use that of buffalo, goat or sheep, if that too is not available then do 'homam' (Yagya) with sesame, *kasum* or mustard oil, etc.

Similarly, another example from Mandan suggests :

घृतार्थे गोघृतं ग्राह्यं तदभावे तु माहिषम्।
आजं वा तदभावे तु साक्षात्तैलमपीष्यते॥
तैलाभावे ग्रहीतव्यं तैलं जर्तिलसम्भवम्।
तद्भावेऽतसीस्नेहः कौसुम्भः सर्षपोद्भवः॥
वृक्षस्नेहोऽथवा ग्राह्यः पूर्वालाभे परः परः।
तदभावे यवोव्रीहिश्यामाकान्यतभोद्भवः॥

Translation in English: Cow's Ghee is best in Yagya. If it is not available then take ghee of buffalo, in its absence, that of goat, if that is not available then take pure oil – *Jirtil, Teesi, Kasum* or Mustard. If that too is not available, then work with gum or lube of barley, rice, etc.

The preceding examples reflect a creative thought process on how to operate in constrained circumstances, as well as a problem-solving strategy that guides in coping with adverse situations.

Need-based and purpose-driven solutions

The design solutions are successful when they are need-based thereby fulfilling a requirement, and what makes these solutions meaningful is the quality of them driven by a purpose. Charles Eames, an American architect, and designer, and one of the authors of the 'The India Report', articulated the importance of understanding user need in his statement-

"The role of the designer is that of a good, thoughtful host anticipating the needs of his guests."

The Yagya's are performed in Yagya kunds or fire altars. Typically, we've seen a Chatursra kund i.e., square-shaped kund, and the reason

for its popularity is that it was meant for universal purpose or everything, which is also evident from the verse [3] below.

सर्वसिद्धिकरं कुंड चतुरस्त्रमुदाहृतम् ।

Meaning- Chatursra (square-shaped) kund can be used for all kinds of works or purposes.

However, the ancient scriptures like Bhavishya Purana and Kund Mandap Siddhi, mention a variety of them which served different purposes. This has been explained in detail by Jairam [2] in his publication on the shape and size of Yagya kund. According to the scriptures, different shapes are prescribed for specific spiritual and material objectives, and ignorance of them might lead to the nullification or lowering of the desired result [2]. Jairam, further mentions that, *Chatursra* (square shaped) kund is used for everything, *Yoni* (vulvar shaped) kund for progeny, *ardhachandrakar* (semi-circular shaped) kund for welfare, *vrattakar* (circular shaped) kund for peace, and many more [2]. These specific shaped kunds (Figure 2) are used to perform the yagya in conjunction with specific mantras and methods for the intended results.

Likewise, the naming of Yagya was also done as per the intended purpose as we had- Vājapeya (वाजपेय) yagya for maintaining harmony in the state, Rājasūya (राजसूय) yagya for a strong kingdom, Aśvamedha (अश्वमेध) yagya for power, Putreṣṭi (पुत्रेष्टि) yagya for child, and many more [3]. Hence, it is clear how the Yagya, with its varied typology and versions, stands valid in the attribute of need-based and purpose-driven solutions.

Multi-sensory design

Any design of a product engages with its user through the senses. The more the sensory touch points, the stronger is the engagement. A complete multi-sensory experience engages all our five senses i.e., vision, touch, sound, smell and taste; and is critical in appealing to consumers' minds and their hearts [19]. One of the best examples of a strong engagement is 'food', we see, touch, taste, hear and smell it while consuming it [20]. Although a complete multi-sensory experi-

ence can be challenging in the use case of a physical or digital product, the more sensory touch points there are, the higher the user engagement. The same has found more relevance with growing popularity of practises such as 'Sensory branding' - a sort of marketing that appeals to all senses with respect to the brand [21]; and 'Universal Design' referring to Design for all, hence making the design more accessible [22].

"A wonderful spatial experience is born only after all human senses are unconsciously mobilised". This quote by Sou Fujimoto, a Japanese architect, appears to be true in the context of Yagya.

The Yagya in its practise, acknowledges the role of senses as well as has a multi-sensory experience for the performer too. In the initial steps of the performance of Yagya, one of the steps is *nyāsā* within *paṃcakarma* (the five rituals) in which the fingertips of the right hand are soaked in water and touched on all sense organs from left to right. The mantras of *nyāsā* [23] are -

ॐ वाङ्मे आस्येऽस्तु। (मुख को) ।
ॐ नसोर्मे प्राणोऽस्तु। (नासिका के दोनों छिद्रों को) ।
ॐ अक्ष्णोर्मे चक्षुरस्तु। (दोनों नेत्रों को) ।
ॐ कर्णयोर्मे श्रोत्रमस्तु। (दोनों कानों को) ।
ॐ बाह्वोर्मे बलमस्तु। (दोनों भुजाओं को) ।
ॐ ऊर्वोर्मे ओजोऽस्तु। (दोनों जंघाओं को) ।
ॐ अरिष्टानि मेऽङ्गानि, तनूस्तन्वा मे सह सन्तु। (समस्त शरीर को) ।

The objective here is to awaken the divine consciousness in each part of the body and to infuse them with sentiments of purity. The performer needs to focus on the idea that all their organs and senses are absorbing divine traits as a result of the mantras' influence. The *paṃcakarma's* purifying procedure indicates that only those with sincerity of body and mind are suitable of *deva pūjana* (worshiping the God) [24]. The step clearly indicates the importance given to the sensory organs and the kind of devotion one needs to inculcate while performing the holy act of Yagya.

Considering the experiential aspect while performing Yagya, we touch the offerings ie. havan samagri, samidhā (wood), along with the

various tools, we see the entire process, we hear the chants of mantras, we smell the fire offerings and even taste enriched water (*ācamana*) in the beginning of yagya and usually end by eating prasad. With such multiple touch points, one becomes completely immersed and absorbed in the yagya process and hence relishes the process to the core by experiencing divinity within.

Thus, Yagya demonstrates the attribute of multi-sensory design through awareness and purification of senses, as well as experiential aspects too. Analysing Yagya form this point of view can help product as well as Experience designers while they aim for immersive experiences in physical as well as digital landscapes like- 7D experiences, virtual reality, metaverse etc.

S.No.	Design attributes	Evidences from literature
1	Creative & problem-solving mindset	a) Conversation between Rishi Yājñavalkya and King Janaka on constraints in performing Yagya and its remedies. b) Usage of substitutes in the absence of main ingredients while preparing for Yagya.
2	Need-based & purpose-driven solutions	a) Varied shapes of Yagya kunds addressing specific needs. b) Typology of Yagyas (like- Rājasūya, Aśvamedha, etc.) with intended purpose
3	Multi-sensory design	a) The ritual of *nyāsā* in the *paṃcakarma*, b) Performer's sensory engagement while participating in Yagya
4	Scalability of product	a) Measurement (size) of yagya kund based on the count of offerings. b) Count of Yagya kunds based on the number of participations.

Table 1: Design attributes and evidences from literature

Scalability of product

A product may be designed well, but to sustain it must breach into diverse groups of users. Scalability basically is about growing up or down scale efficiently and meeting users need [25]. This attribute is often considered a significant factor while evaluating a start-up and its business proposition [26]. Scalability is directly related to the market value and hence becomes a critical component, as also evident in the quote by Craig Sherman, Managing Director at a leading digital media and services company-

"Focusing on the long term and building a great product that is scalable ultimately leads to a great company".

Yagya, when evaluated under this attribute of scalability seems to hold good as evident from the shape of Yagya kund, which is dependent on its purpose, as well as the size of kund which is dependent on the number of offerings to be given [2]. According to the Kundsidhikar [3] -

शतार्धेऽरनिः स्याच्छतपरिमितेऽरनि–विततं
सहस्रे हस्तं स्यादयुतहवने हस्तयुगलम्।
चतुर्हस्तं लक्षे प्रयुतहवने षट्करमितं,
ककुद्विर्वा कोटौ नृपकरमपि प्राहुरपरे॥३४॥

The above *śloka* states that if fifty or hundred offerings are to be made, then make a kund of measurement from the *kuhni* to the *kanishthika*, for a thousand offerings, use one *hastapraman*, for ten thousand offerings, use two *hastapraman*, for a lakh offering, use four haath, for ten lakh offerings use six *haath* and for crore offerings, use measurement of eight *haath*. Here, it's critical to note that the measurement presented is not the length but the area or volume, which is a unit required for the kund construction.

Besides, Kundsidhikar, many other ancient scriptures like Bhavishyottar puran, Sharda tilak, Skand puran, etc. too mentions the relationship between the number of offerings and the size of kund.

Another aspect of scalability is evident from the count of kunds in the mandap. A basic prin-

ciple as per *vāṃgmaya* 25 [3] is that 5 kunds are sufficient when the number of participants is 100; 9 kunds for 300-400 participants; considering approx. 9 participants per kund. If the participant count increases, one can plan Yagyas with 21, 25, 51, 101, 108 kunds, and further [3].

Thus, Yagya represents this attribute by being scalable in terms of size and the number of kunds.

Conclusion

The paper discusses the takeaways of Yagya from the perspective of a designer. These four listed attributes (Table 1) may be seen as a few selected ones among the many.

It's also crucial to note that every individual has a point of view and likewise, every designer has its own perspective and viewpoint. Hence, there is a significant possibility that we see more takeaways from Yagya in the broader context of design.

From a design standpoint, some potential areas of research on Yagya may include- Ergonomic study of individuals while performing Yagya, Study of design of various instruments/ tools used in Yagya, Study of material used in the construction of Yagya kund, Analysing Yagya from sustainability standpoint, and many more.

With increasing research efforts and scientific validation, the practise of yagya is now gradually being recognised and accepted by the intellectual masses. Besides analysing the scientific aspects of yagya in the fields like health, environment, etc. we must also analyse it from other creative disciplines like- design, arts, linguistics, grammar, music, etc. This kind of study shall help in understanding yagya from a creative field and shall benefit creative courses by integrating the contributions of Indian knowledge systems in the curriculum besides wider reach of this ancient treasure.

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