A Comparative Study of Ancient Civil Engineering Indian Culture with Modern Civil Era

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Abstract: The purpose of this research is to demystify ancient Indian architect & civil culture. It will help to co-relate modern civil culture to ancient Indian civil culture to evolve Indian civil culture more efficiently. The research methodology adopted was primary the conversation with villagers and elders of the town and visitation to the monk, scholars and historians. We referred books on ancient history and articles by historians. The duration of my research was Aug 2015 to Jan 2016 in Maro, Devbarbija, Bhoramdev By understanding books on ancient history, Articles and elders & scholar of village and other evidence which all are already available it is clear that there is always a deep influence of Indian culture and tradition on Indian civil & architect. By which Indian civil has sparked with rich customs and traditions. Modern civil can be more efficiently applied by understanding our Indian traditions because they are always related to science and for welfare of human being. By studying ancient techniques and vastu we can easily understand different facts of science.

Keywords: Ancient Indian culture, modern civil culture, ancient history, Indian traditions

1. Introduction

From the Stone Age to the modern age we have come to know that the human being is reflective, curious and inventor Means explorer. In modern civil engineering science has done never to be forgotten progresses and made dreams come true which was beyond of our imaginations. At present science has uncovered secrets. Even everything is before us but it seems that there is body but not the spirit. There is an adage “Old is Gold”. Today after uncovering secrets, using modern machines we could not rise civil engineering to the point where our ancestor had left. Despite of reaching to the highest point in the field of architecture still we found ourselves speechless watching the ancient structures. So many question rises even about the gratefulness or in the context of firmness or strength or in the context of lively instantiation. As the law is incomplete without evidence in the same way our memory is incomplete without history. History means our past.

2. Analysis

Science has accepted that the human DNA is continue from one to another human being that’s why human is curious and the ancient architecture is a sign which proves that we had knowledge of science and architecture. But in which form? In ancient time the same science was linked to culture, society, civilization and religion by our ancestor. It won’t be hyperbolically to call them “Arya”.

For example:
• In Indians our elders always told us not to sleep with our head in south direction. Whereas dead body is kept in that way. Now the science behind this is that the earth acts as a magnet.
• in villages elders advised children not to go near ficus and banyan tree sometimes elder scares kids saying ghost are there, but science says these trees produces Co2 at night which is not good for health
• It is told to Indians that keep your face in north direction. now scientific reason behind this is that magnetic waves flow from north to south direction. this magnetic energy activates the brain cells and increase the memory power.

So our tradition and science both mean same to protect human beings and to ameliorate but their way is different our ancestor selected the way so we Indians and all the peoples of our community of different classes even if they are illiterate or literate, rich or poor, can easily understand and that was our culture but now we think it is limitation or obstacle for us.

It is well acknowledged that we were familiar to science just time is changed and the same thing is in front of us in new form

Our ancient saint and scholars were able to measure the distance between the sun and earth which is written in the “hanuman chalisa” as जुग सहस्त्र योजन पर भासु (jug sahastr jojan par bhau)[1] which is proven right by “Nasa” and whole world then accepted

The concept of zero, square roots, cube roots, values of π were known to Indians. A book “vimanastraam” shows the procedures to make an aeroplane. some other facts are:

• The iron pillar of delhi is famous Indian place it has 99% resistance to corrosion and almost 1600-1700 years old. A study concluded that a corrosion-resistance agent iron hydrogen phosphate was applied on it which shows advanced chemical knowledge of our ancestors.[2]
• Harappa and mohanjo-daro are best examples of this architecture and mature urban civilization. in Harappa civilization the underground drainage system was from...
small to big sewer then to channel and then channel to river. It has also a remarkable town planning system. better system then this has never seen till today [3]

- Now we have done so many researches and brought so many relevant facts .example- how many gallons of water is needed for a village but the problem of drainage is still there. We know that we are surrounded by population and pollution and other problems but I believe that before science these all problems are negligible.

- Ancient fort and huge bath and bawadiya etc. are very attractive .one of the most beautiful example of patterns in architecture it is chand bauri well in rajasthan which is 100 feet below the earth level.[4] mughals have done changes in architecture, the use of marbles shows that we had good knowledge of geology too.

- Jagghanath temple: the shadow of the main dome is not visible whatever be the time it shows architecture feat. Also the sudarshan chakra on the top seems always facing you. Irrespective of wherever you stand. When you enter the temple by singhdwara after first step you cannot here any sound of ocean but when you exit it can be clearly heard.[5]

- The narayan pal Vishnu mandir of Alora caves is carved from a massive rock structure. The whole rock is cut by manpower.

- Now these facts prove that our ancestors had knowledge of civil and science in fact their technology was highly advanced than of the modern.

We were known to the building construction and modern techniques which were used with some other names or forms and are as follows

**Soil Testing**

Purvarn bhumirn parikseta pascat vastu prakalpayet

Translated as – First test the earth (site); after that plan the construction.

Valmikena samayukta bhumirasthiganaistu ya II

Randhranvita ca bhurvarjya gatighesca samanvita II

Translated as – Land with anthills, skeletons, full of pits and craters should be avoided.

Varnagandharasakaridasabas parsanairapi I

Pariksyaiva yathayogyam grhnyad dravyamuttamam II

Translated as – After examining the color, smell, taste, shape, sound and touch (of the soil) buy the best material as found suitable.

Yavattatra jalarn drstarn khanettavattu bhutale II

Translated as – Till water is seen there, (one) should dig the ground.

Ratnirntramadhe garte pariksy a khatapurane II

Adhike sriyamapnotti nyune hanir saman II

Translated as – It (soil) should be tested by digging a pit of 1 arm length and refilling it (with the same soil). If (soil is) more, one will beget prosperity; if short, one will beget loss; if equal, it is normal.[6]

**Making of Bricks**

(ISTAKASANGRAHANAM)

Usaram pandurarn krsnacikkanarn tannrapullakarn II

Mrdcasatrasrastseva grhnitya tannrapullakarn I

Translated as – Salty, off-white, black and smooth, red and granulated, these are the four kinds of clay.

Asarkarasumulasthilostarn satanuvulakarn II

Ekavamam sukhasparsamistarn lostestakadisu I

Translated as – Then fill the clods of clay in knee-deep water; then having mixed, pound with the feet forty times repeatedly.

Ksrstrumakadambamrabhayaksa -tvajalairapi II

Triphalamubhirsaktva mardayensamasmatrakam

Translated as – After soaking in the sap of fig, kadamba, mango, abhaya and aksha and also in the water of myrobalan for three months, pound (the clay)

Catupaftaatalabhiratraistadhidhivigulaiyatayai:III

Vyasardhardhatribhagagaikatvra madhye parespare I

Istaka bahusah sosyah samadghadh punasca tahn II

Translated as – These (bricks) are in four, five, six and eight unit (widths) and twice that in length. Their depth in the middle and in the two ends (is) one fourth or one-third the width. Again these bricks should normally be dried and baked.

Ekadviticaturmasamatyaiya vicaksanah I

Jale praksipiya yatnena jaladuddhrtya tat punah II

Translated as – The experts, only after one, two, three or four months, again throwing (the baked bricks) in water, and extracting (them) from the water with effort, (will put the brick)[7]

**Mortar**

Paficamsarn masayusarn syannavastarnsarn gudarn dadhi II

Ajyam dyarnsarn tu saptaarnsarn ksiram carma sadarnsakam I

Translated as – There should be 5 parts extract of beans, nine and eight parts molasses* and curd* (respectively). Clarified butter (ghee) 2 parts, 7 parts milk, hide (extract) 6 parts.

* *Molasses - A thick treacle that drains from sugar
*Curd - Milk thickened or coagulated by acid

**Coconut two parts , honey one part. Three parts plantain are**

**Aajyam dyarnsarn tu saptaarnsarn ksiram carma sadarnsakam I**

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***Molasses - A thick treacle that drains from sugar**

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**Triphalarn dasabhagarn syannavastarnsarn gudarn sadarnsakam I**

**Ksiradrumkadarnbamrabhayaksa -tvajalairapi II**

**Translated as – After sooking in the sap of fig, kadamba, mango, abhaya and aksha and also in the water of myrobalan for three months, pound (the clay)**

**Catupaftaatalabhiratraistadhidhivigulaiyatayai:III**

**Vyasardhardhatribhagagaikatvra madhye parespare I**

**Istaka bahusah sosyah samadghadh punasca tahn II**

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Suktestoyarn ca dugdhara dadhigudasahitarn traiphalarh tat krarnaena
Translated as – In two parts of lime, (add) karaka, honey, clarified butter, plantain, coconut and bean. When dry (add) water, milk, curd, myrobalan along with molasses gradually.

Labhhe curne satarnesmsakiamidamadhuna canuveddhian prakuryadetad bandharh
drsatsadrsamiti kathitarh tantravidbhirmunindraith II
Translated as – Now in the powder (thus) obtained, grow one in hundred parts. It (the compound) is said by leading thinkers who know the technology as rocklike.[8]

Assembling Pillars

Svaryasaikarn madhyarnasikham mesayuddharn prakIrtitam
Svavyasakarnamadhyardhadvigunam va tadayatam I
Tryarnsaikam madhyarnasikham mesayuddharn prakIrtitam II
When there is a central tenon* (with a width) a third (that of the pillar) and a length twice or two and half time its width, this is Mesayuddha (mortise* and tenon) assembly.

*Tenon - The projection at the end of a piece of wood etc.

Svastyakararn trikhandarn syat satarnsesmsakarn trikhandarn I
Parsve catuhshkhopetam saubhadrami samjfitiam II
Translated as – In the Trikhanda assembly, there are three mortises and three tenons arranged as a Svastika, The assembly called Saubhadra comprises four peripheral tenons.

Ardham chitva tu mule Sgre canyonyabhinivesanat
IAdhapanirti prokto grhitaghanamanatah
Translated as – An assembly is called Ardhapani (scarf joint) when half the lower and half the upper pieces are cut to size according to the thickness chosen (for the pillar).

Ardhavrttasikarn mahdye tammahavrttarnucyate
Vrtaaktisu padesu prayunjita vicaksanah smrtah II
Translated as – When there is a semicircular section tenon at the centre, the assembly is called Mahavrtta, the well advised man employs this for circular section pillars.[9]

In Modern civil engineering there is a step for construction:-

1. Survey
2. Design
3. Estimate
4. Construction
5. Structure
6. Super structure

Someone has greatly said “मेरे एक काम कर दे मेरे सचान को घर कर दे”

Vastu (Vaastu)
From the early decades in our hindu religious texts by considering the laws of magnetic flow, direction, air effect, gravitation, the vastu shastra formed. And was acknowledged that by following these vastu shastra human life can become more peaceful and meaningful. The science of Vastu aims at controlling the flow of these energies in a building by selecting proper Directions, Alignments and Orientations

Indian tradition and cultural if has any significant contribution in architecture that is Vastu .which is linked to knowledge vaastu is a vedic science and is derived from the word vasati which means gruhaor a palace of dwelling it is essentially a science of structure of and applicable to houses, industries, hospital, etc. vaastu science dates back to the ancient vedic times. Vaastu basically consider the five elements, viz fire, water, air, earth and sky. As per vaastu shastr the eight directions of the universe are presided over by eight deities. This deities have their own influence on the prospects of inmates.these are shown in figure (A).[10]

According to a survey 65% of buildings are rearrange with the principles of vastu after construction.

Vastu Facts:

- Older buildings in India had their kitchens in the East or North Easterly direction as well as a kitchen window opening out in the East direction. This arrangement is practiced even today in modern construction.
- The reasoning behind this is as follows. As with most kitchens cooking produces a lot of smoke that needs to be let out from the home and a window is the simplest form of doing so. The blowing wind takes out the acrid smoke through the window leaving the home fresh and healthy.
- Furthermore, the kitchen is the key room of the house that starts buzzing with activity at the break of dawn. As the day’s food gets preparation gets underway, the sun also rises in tandem in the East. Opening the windows lets the sun’s early morning rays grace the food being made and enriches it with nutrients and vitamins.
- Vasthu recommends that a house’s bedroom be placed in the South East side. The deeper explanation is that since the bedroom is a place where we spent a lot of time in our house, it needs to be fresh and ensured plenty of air

Figure A: S. Seetharaman “construction Planning”

3. Vastu Facts:

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- Vasthu recommends that a house’s bedroom be placed in the South East side. The deeper explanation is that since the bedroom is a place where we spent a lot of time in our house, it needs to be fresh and ensured plenty of air
circulation and the South East winds make sure there is plenty of freshly circulated air if the bedroom is placed in this direction. A room with good circulation improves intimacy and resolves any marital problems that couples have.

- The reason for temple or pooja ghar is in north-east direction is for easy access of vitamin-D by sunrays and good effect of magnetic energy.

- The earth is rotating and rolling towards the North-East direction, hence keeping heavy weight at that direction would strain its moment. So North, North East Corner, East and the center are the places in the Forward direction of the Movement (like the handle bar of a motorbike). Keeping any heavy weight in these places will obstruct the movement and create discomforts. Avoiding heavy weight in these areas make the life peaceful and prosperous[11]

4. Result and Discussion

In 4th semester when I made my first drawing and shown to my father .then he made me to understand vaastu .now a days we are making drawing with our own desire means there is no difference between an educated engineer and an 20 years old labour. We have to bring the difference we have to became an engineer who create or construct a home not just a house with a roof and walls. The culture and tradition made by our ancestors that science which is seen by us today in different way, if we understood our known knowledge and tradition then we will remain disciplined and the science which we are trying to understand will come into our behavior with ease if we understand the fact and secrets then the modern civil will be more brightened which will more better and pleasant.

5. Conclusion

The study of ancient civil, architecture, structure and culture and its combination with modern civil will lead to sparkle the modernity. Today we need to make a home not just a house. We have to accept the fact that our elders identified our DNA and present a frame work in which we can mold easily. if we want to understand science then we need to understand Indian tradition because our tradition our customs and practice is our science.

By understanding Ancient and old techniques vaastu etc. we can easily understand the facts of science. Otherwise the distance measured by our ancestors and nasa’s Distance won’t be almost equal. “Many of the advances in the sciences that we consider today to have been made in Europe were in fact made in India centuries ago.”

- Grant Duffs (British Historian)

““Whatever sphere of human mind you may select for your special study, whether it be language, or religion, or mythology or philosophy, whether it be laws or customs, primitive art or primitive science, every where you have to go to India. Whether you like it or not because some of the most valuable and most instructive materials in the history of man are treasured up in India and in India only”

- Max Muller [12]

References

[1] Goswami Tulsidas “Hanuman Chalisa”
[4] chandbaori.org

Figure: B Rajendra Kumar Dhawan “Bhavan Bhaskar”
Geeta- press, Gorakhpur

Orientation is important for building construction .the orientation of the house should be such that the effects of sun rays in midhours should be minimum. Because at that time the radioactivity of sun rays are at higher levels which is not good for health.