Fifty years of the metric system in India and its adoption in our daily life

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Let me start with a small story. One of my younger colleagues invited me to have a look at his newly acquired apartment. One afternoon I reached his place and was really impressed by the layout of the flat and when asked he quoted its area in the units of square feet though he was not happy with the height of the roof that he quoted in feet. While accompanying me back to the bus stop, he expressed the approximate distance of his new residence from the main road in metres and the whole area of the housing project in cottah, a locally used unit for the measurement of land that equals to 720 sq. ft. or about 66.8902 sq. m. All these sounded quite normal to me as I also express different measurements in daily life in some sort of mixed system of units. For our daily use, it is by and large but not a fully metric system. And in this year (2007), India is completing fifty years of official adoption of the metric system.

India is one of the first countries in this region to adopt the metric system officially from 1 April 1957. We brought in 'naye paise' in place of the old 'paise' and the units like metres, kilometres, kilograms, litres, etc. entered into our parlance. As it happens, after fifty years we are having more people in our society who have adapted to this new metric system right from their childhood. Yet, it appears that some of the old units still exist, at least in a few situations. And there may be reasons for this.

One may find that we still like feet and inches in describing someone's height or the dimensions of a room or the height of a roof. The possible reason lies in the fact that there is not a suitable unit in the metric system that can replace our good, old and extremely handy unit of foot that is deep-rooted in our psyche. For example, one foot is 30.48 cm; if approximated to 30.0 cm, it introduces a deviation that is nearly equal to 1.575%. This is the same if one inch that is equal to 2.54 cm is made handy by taking it to be equal to 2.5 cm for our daily use. And this is not a negligible difference. However, we have been able to replace the concept of yard with metre for practical use not through any approximation, but finding the unit of metre quite handy. Since a metre deviates from a yard by more than 8.5%, there was not much scope for rounding-off and we had to discard one, and it was the yard. So the yard is out but not the foot. Similarly, we could accept kilometre replacing the mile by a simple conversion factor of 1.6, which when multiplied with the mile gives us kilometre. Once again not exactly. Strictly speaking, one mile range equals 1.609344 km or 160934.4 cm, and a difference of 0.58% creeps in if we take one mile to be equal to 1.6 km. This is nearly one-third of the deviation that gets introduced if we want the simplified and easy-to-handle values in the conversion of foot to centimetre or of inch to centimetres. Then how much do we lose when we use 1.6 as the corresponding conversion factor from mile to kilometre? Well, a mile becomes shorter by more than 9 m and that amounts to 9 km in the conversion of the distance of 1000 miles; but for practical use or as a thumb rule this conversion works. Interestingly, if one inch is taken to be 2.5 cm instead of 2.54 cm, 1 km gets shorter by 15.75 m. If using the same approximation one mile is converted into kilometre, we lose no less than 25 m. Incidentally, a person's height may become 165 cm in place of 168 cm because of rounding-off the centimetre corresponding to an inch. One can see this is a significant error not only in the matrimonial columns, but elsewhere as well. So a small approximation casts its appreciable footprint when the measured parameters are large.

Interestingly, litre has been accepted but the word 'pao' that essentially implies a quarter of a litre, still exists. Earlier this used to be the one-fourth of a 'ser', the unit that was in vogue for the measurement of volume. 'Ser' was also the unit of measurement of mass that was close to present-day 900 g. A closer look will reveal that this amount was close to two pounds in the British system of measuring mass. Incidentally a few commodities that are still considered to be typically British are connected with those units. Cake and tea leaves are two typical examples of this type of merchandise. You may still find people talk of the price of a pound of cake and tea leaves. Shopkeepers selling cakes prefer to use that unit of mass. However, the so-called one pound cake is actually only 400 g, nearly 50 g less than what is expected from a pound. Incidentally in our everyday life we still use some phrases that involve old units. We talk about the 'milestone' in one's career; strongly defend our stand declaring no intention of budging an 'inch'; like to use one single 'yardstick' while offering our opinion on different issues.

Now the edible oil is also sold in litres though the earlier practice was to sell it by mass, i.e. the unit involved was kilogram. Incidentally people still get confused about this and occasionally think that the price of the edible oil has come down. But a little attention tells us that one litre of oil is about 900–920 g, depending upon the density of the oil. The amount is definitely less than 1 kg and hence appears to be cheaper if one compares the price keeping the previous pack of 1 kg in mind.

The occasional use of the dozen has also remained. The number involved in a dozen being 12, it does not fit in the metric system. However, a large number of merchandise sold by numbers are now packed in boxes containing ten and not 12 pieces. You will find boxful of ten pencils or pens or balls on sale everywhere. However, bananas are still sold on the railway platforms in dozens, because that is the railway passengers' preferred unit. Otherwise, the number ten has replaced dozen in several cases, and that is definitely a victory of the metric system.

A significant shift to the metric system has taken place in the measurement of temperature. Several people all over the country come to know about the temperature through weather bulletins. The consistent mention of temperature in degrees Celsius has now made us to realize that 40°C indicates a reasonably hot day, and we can forget those hot days when the temperature rose to 108 degrees, albeit in Fahrenheit. Kelvin, the British scientist might have remained in the confines of the laboratories and physics books, but his Swedish counterpart so to speak, has been able to penetrate the common mass with

100 divisions of the fundamental interval of the Celsius scale that was introduced much before the metric system came into being. However, the Fahrenheit is far from being out of reckoning, when it comes to the measurement of body temperature. This Poland-born German physicist not only built the first mercury thermometer, but gave the first temperature scale named after him way back in 1714. We tend to worry when we come to know that someone's temperature has shot up to, say, 103.6°F, but possibly can react only after a mental conversion is made if the reported temperature is 40°C.

For expressing something big we psychologically look for bigger numbers or larger units. We cannot handle all big numbers. And that is why we do not like our average life span to be expressed in seconds and the distance between say New Delhi and Hyderabad in centimetres. This has quite silently introduced the SI prefixes into our jargon and we are using them with base units both to express big and small quantities. Earlier we used to talk about megawatt in connection with power production, and kilograms and kilometres in connection with masses and distances. Now we use gigabyte, thanks to the memory of the hard discs of our computers. We also talk about micrograms while talking about pollutants in air or water and, of course, nanometre while describing the wavelength of visible light, and micron or micrometre to describe the thickness of the plastic bags used in shops and markets. These are all contributions of the metric system.

Yet a few areas have still remained untouched by the metric system. In the land-measuring system in India, possibly one of the most complex and archaic systems, we follow different sets of measuring units and systems in different parts of the country. Different State governments have tried to standardize this by introducing a suitable metric system through which official transactions take place and official records are kept. But the land dealings are still done in a number of archaic units. It appears that people are satisfied and comfortable with them. In the measurement of floor areas of buildings, since one square metre is actually equal to 10.7639 sq. ft.[1], one may have to quote the area up to the second decimal place while using the square metre. But while quoting in square feet, one may ignore the discrepancy of a couple of square feet. Since people are more conversant with numbers without the decimal, particularly when the fraction cannot be seen, they prefer rounded-off numbers without any decimal.

Finally I need to touch upon two things. First, science books in schools are still using a set of mixed units at a number of places. Numerical problems given in physics books contain units like foot, pound, horsepower and even ounce. Some of the old popular books are being published without incorporating any correction or updating to metric units. And a significant number of students use these books. Moreover, the cgs system exists along with the SI system in virtually all the books. It has also been observed that scientists, while delivering popular talks, use units like miles per hour, to communicate with the general audience. Since in science SI is the only recommended system of units to be used, we should try to be more serious in sticking to this system. After all, we should remember that the so called 'naye paise' of 1957 became old enough in just seven years and was renamed as 'paise' and lost its 'new' adjective. This is the same name we had before the introduction of the metric system. People became quickly conversant at least with the significance of the paise and came to know it as one hundredth and not one sixty-fourth of a rupee, as it used to be. Secondly, after fifty years of introduction, it appears that our metric system is old enough to be adopted fully. With more conscious efforts we can actually smooth out the areas that have not yet surrendered to the metric system.

1. Kaye, G. W. C. and Laby, T. H., *Tables of Physical and Chemical Constants*, Longman, London, 1986, 15th edn, pp. 9–10.

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