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AN ESSENTIAL HANDBOOK
FOR SMALL AND MEDIUM
ENTERPRISES

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Frugal, Friendly And Flexible

Anil Gupta, professor, IIM Ahmedabad, and executive vice chair, National Innovation Foundation

Many people around the world feel excluded from the fruits of development. While there is much that modern science, technology, and innovative systems offer, there is still a lot to be done. Corporations and other agencies are looking to transcend the frontiers of frugality so that access to affordable goods and services expands. How do we link frugality with affordability? If we define innovation as having at least one of three dimensions — material, method or application, then exploring innovations may become easier.

Every organisation has people who are creative and innovative. But it is the working or thinking context that makes all the difference. Once we change the context, the content gets changed automatically. The long tail of innovation may move many innovations down the tail, because they meet the unmet needs of people occupying a specific and often a small niche. But if those needs were not met, the affected people may feel excluded. By blending modern science and technology, design and new materials, one can move innovations from tail to peak.

There are several levels at which frugality can be achieved. The *material* can be economically used, or economical material can be used. Mehtar Husain, Mushtaq and Ahmed from Assam made a windmill of out bamboo for about Euro 70. They used

it to irrigate paddy fields by running a hand pump. When this was modified for pumping brine to make salt in Gujarat, it was made of iron and the cost went up to Euro 1,200.

Dr R.A. Mashelkar calls it "More with less for more people". Frugality is achieved at both ends, i.e., at the choice of material level and its use in an efficient and frugal way. Material choice may determine the durability of a product. Sometimes, one-time use may make it very frugal. There are many products with short life that cost less (materially, but ecologically the cost may be high if producers have not chosen eco-friendly, disposable materials). The locally made clay cup for tea is an example of one-time use but is extremely low-cost and environment-friendly. However, the disposable ball-point pen is an example of the opposite.

Functionality influences frugality. Sometimes a single-function product or service costs less but when various related functions are added separately, it ends up becoming expensive. Multi-functionality can thus reduce per function cost a great deal. Simplicity is another way of being frugal. A mobile phone or a Microsoft word processor programme has hundreds of features while we use only 25 of them at the most. Yet we pay for all features. How silly. Frugality goes out of the window. It would be more inclusive to switch on various bundles of features with the payment of a small additional fee. Then more people can afford the basic software programme and add features according to their needs. Bundled features instead of blended make products more adaptable, i.e., they can be redefined and redesigned in the hands of users. *Autopoiesis* is another feature that can make products more frugal. Autopoietic products learn, they grow and they adapt themselves over time within the given context.

Multi-functionality has not yet been utilised in a way where it could lead to beneficial outcomes for many. We have many mobile apps today. Most are just enjoyable ways of wasting time. Do we really need *more* enjoyable ways of wasting time? Why not install a feature in mobile phones that emits say, UV rays safely to purify water and make it suitable for drinking? Almost 60 per cent of all diseases are waterborne. Frugality is also achieved when we learn from nature, which never wastes anything. Nature, as Konrad Lorenz said, is very parsimonious. It has a few designs and plays with them all the time. For frugality in design, it is a mantra one has to remember all the time.

"Gandhian engineering" (as Dr Mashelkar puts it) or frugal engineering or design draws upon the philosophy of the Honey Bee Network (a grouping of like-minded individuals in 75 countries). All facets of grassroots innovations are designed by

common people. But, a private company or state government can also pursue frugal design.

Frugality will require a new approach to regulation of technology, services and products. Safety yes, but it is not necessary to insist on new parts. After all, don't we allow organ re-transplantation in human beings? Why not then in machinery. Different components have different fatigue factors and need not be junked at the same stage. That's why an airline in Europe allowed airplane seats which may have a life of 200 years to be taken out of an old airplane, which had a life, maybe of 25-30 years. These seats were rejuvenated and sold in the market. This is also frugal engineering.

Frugal innovation is a transformation of the whole mindset. It is certainly not tinkering on the margin as some authors have implied and certainly not *jugaad*. It is not just getting around a problem, as *jugaad* implies, but it is getting over the problems by smarter, more subtle and sustainable heuristics.

When the Honey Bee Network started as an open innovation platform 25 years ago, did we envisage the force with which the world would start moving towards open innovation? But the reciprocity towards the informal sector remains to be properly institutionalised. Economic opportunities the world over will expand by harnessing the power of youth. That's what Techpedia, an initiative at SRISTI, aims to do by putting the problems of micro, small and medium enterprises on the agenda of young technology students.

It is helping companies to throw technological challenges to students to address these as part of their curriculum. In the summer vacation after third year, students go to various industrial clusters, informal sector and other places to look for technological challenges. They then try to address these in their final year project. Imagine, if in future, India becomes a global hub of high tech outsourcing unlike in IT sector where it got low-tech outsourced challenges. Indian tech youth will offer solutions at a cost nobody could imagine.

Distributed learning offers a frugal model of problem-solving apart from capacity-building among youth. The tragedy is that none of their solutions would scale up because Indian Inclusive Innovation Fund being set up by National Innovation Council (of which I am a member and have expressed my dissent on this policy) will not invest in early stage proof of concept ideas. They would like to invest in existing companies, which would have attracted private venture funds as well. The most risky stage for a startup is the early proof-of-concept stage at which it would need risk capital at concessional terms.

I had reviewed about 6,000 patents by Indians in India during 1998

-2008 when we had organised, along with other colleagues at IIM-A, four Inventors of India workshops. Many innovations were identified which deserved support for scaling up. But venture funds had never approached them for possible support. Dr Bhave in Pune had developed needle for Rs 200 needle to heal spinal injuries which would cost five days of hospitalisation and about $5,000 in the US. In India, it could be done in Rs 5,000 with just one day of hospitalisation. I call it a Factor of Fifty.

How can companies engage with the Honey Bee Network? This includes:

a. Herbal leads for cosmetics, vegetative colours, anti-oxidants, nutritional supplements, drugs for animal or human applications, traditional knowledge based food products, herbal shampoos, skin creams for eczema which can be taken up for joint product development or licensed for commercial frugal and eco-friendly applications;
b. Farm machinery, multi-functional devices, energy technologies, utilities such as pressure cookers based on the low-cost coffee-making machine, mosquito trap, etc., can be taken for further development;
c. The open innovation platform can be developed drawing upon Techpedia so that low-cost solutions can be developed;
d. A company can learn at four levels:
   1. The basic level is the artefactual level, i.e., adaptation of form, features, and functions of a product, process, service or institutional design.
   2. Next is the analogic/metaphorical level implying learning by approximation. It is not the exact concept but its derivation in some form or function is drawn upon. For instance bio-mimicry has been applied for self-cleaning surfaces like the lotus leaf.
   3. Learning can also take place through heuristics/principles underlying an innovation. This kind of rule of thumb learning can be used in far wider domains. For example, any plant that is not eaten by cattle or other animals could be a source of herbal pesticides.
   4. On a gestalt/configurational level, learning requires looking at a combination of factors responsible for an innovative situation. Such factors could be technological building blocks, institutional arrangements and cultural values. In some parts of the world, people make a bridge by joining roots of the trees

growing on two sides of the river. This technology of bridge making requires collective action in the local cultural context. Learning on this level requires a unique combination of different factors contributing to a viable solution.

There are many ways companies can join hands with the Honey Bee Network or identify other opportunities for co-creation in a responsible and reciprocal manner. Honey Bee ensures that innovators in the informal sectors get their share in the benefits with complete ethical and social disclosure and accountability. The time has come for partnership between formal and informal sectors for transcending the frontiers of frugality through creative, collaborative and compassionate innovation.