Natural Relationships

Introduction

Partnerships and alliances between organisations are common place in the business environment. They can take many different forms ranging from tightly coupled joint-ventures to more loosely coupled preferred supplier relationships. Within the organisational boundaries of a business there can be partnerships and alliances that take the form of relationships between aligned business units, communities of specialists, close-knit teams and manager-employee. In fact, without relationships, both within the organisation and between organisations, they would not thrive. As we enter a period of increased volatility in the business environment it is important to ensure business relationships provide resilience to your business in these uncertain times. Nature can provide immense wisdom on which types of relationships can survive stress as well as providing key examples and inspiration for transformation of your business. This paper explores some of the different relationships nature has evolved, from partner to parasite, to enable survival and draws parallels to business organisational structures.

The Interplay of Nature

School textbooks simplify that, in terms of energy generation and material flow, plants = producers, animals = consumers, and microorganisms (fungi and bacteria) = decomposers. It is largely so but, alas, too simplified.

We humans (unlike some animals) do not consume all plants that surround us. We consume selected parts of chosen plants and only at the right time of maturity. Those plants and parts that we do not use do still have value to us, because they form part of complex, interdependent networks of partnerships, whose contribution to the whole in turn creates value for us.. Intensively mass-produced plant crops grown and harvested through monoculture farming have been proven to provide less goodness and flavour than those grown in a more natural environment. Mmore and more external, energy-intensive additives (fertilizers, herbicides and pesticides, artificial or otherwise) are needed to maintain this unnatural unbalanced monoculture. A diversity of life forms and interplays of plants, animals and microorganisms that enhance the quality of the harvest, as well as improving the overall resilience of the ecosystem supporting that harvest, are needed to produce the optimal final outcome. It is less about the parts and more about the whole, which is comprised of myriad relationships between and among the parts. Small losses of individual yields are more than compensated by the gross revenue of the *whole* community.

Relationship Types: Partner, Parasite or Pest?

Different types of relationships, intended and unintended, lead to cause-consequence connections between organisms – plants, animals and microorganisms - which allow co-existence which benefits, mutually or detrimentally, each relation. The relationships between organisms are usually quite specific considering the number of possible random combinations. At one extreme, partners are an absolute requirement for completing life cycles. Orchid seeds, for example, cannot germinate without a specific fungus, which the plants maintain in their body and pass on to the next generation of seeds.

Many great plant-fungus relationships occur unseen, underground, around the roots of plants. The fungi colonises the plants' roots, making union of two partners or more if multiple fungal species are

involved, or a fungus connects multiple plant species through its mycelia network. The plants provide the fungi with the products of photosynthesis to feed on and in turn the fungi, with their underground network extending far beyond the reach of plants' root hairs, extract essential minerals (iron, phosphorus) more effectively passing them back to the plants. When such a relationship is established the plants become more resistant to challenges from pathogenic microorganisms and arthropod predators, and the fungi benefit even more by the healthy plants for this service. Mycorrhizal relationships occur in 80-90% of all plant species, in diverse ecosystems from wetlands to woodlands to alpine environments to dry deserts. Generally, the systems tend to become more complex with more participants when the environments are more challenging. This is an example of mutualism. The health of each partner contributes to the health of the whole so each benefit from helping the other – the common good through partnerships, giving to receive, leading to mutual reward.

A larger relationship grouping is demonstrated by legumes – a group of plants of mostly tropical, woody species as well as garden peas and beans which harbour bacteria (species of *Rhizobium*) that are specific to each legume species, in addition to fungi in their roots. Whilst the fungi contribute to the uptake of iron and phosphorus from below ground, the bacteria capture nitrogen (gas) from the air, transforming it to a chemical form that the plants can utilise (ammonium, NH_4^+) and pass this to the legume. Most interestingly, the bacteria only do this when in partnership with legume roots - not when living alone. Nitrogen is generally a limiting nutrientin soil, yet fundamentally important to plants' growth. But because of this important relationship it enables, compared to other plants, legumes to grow well on relatively poor soil and produce highly viable protein-rich seeds, purely as the result of partnerships consisting of members of three different Kingdoms: Plantae, Fungi, and Bacteria. This is an example of multi-stakeholder collaboration for the benefit of each and all.

Parasites, pests and pathogens on the other hand benefit from their host by taking what they need but without returning. Close observation reveals that, virtually all such challenging organisms are limited in their choice of host – an insect pest, a fungus or bacterium does not attack all plants or animals that they come into contact with. Epidemics of sudden oak death, horse chestnut blight and leaf miners will reduce the availability of hosts; complete loss of the hosts will lead to loss of habitat for the pests and pathogens which are wholly dependent on such, hence will be heading to mutual extinction, thus they often respect the host's needs and take only what is sufficient for them to live. A mistletoe can live on the same branch of a tree for years, without apparent damage to the host tree. Trees are large enough to afford a small loss by parasitic mistletoe (or is the host gaining something from the mistletoe unknown to us?). There are few examples of pests and pathogens wiping off host plants to extinction. There have been poor individuals that were killed off in a garden while some others were spared. Dutch elm disease is widespread but so far has failed to cause total destruction as there are still many examples of young elm in our hedgerows. What is clear is that self-centred, purely extractive organisms can appear to be benign but they invariably weaken the host, sometimes in a less than obvious way. In business it is necessary to be clear which parts of the organisation are merely there for the ride!

Over the millennia of evolution, plants have developed to co-exist and make use of the free services offered by insects and other animals,such as by pollinators, or as agents for seed dispersal; these relationships can be quite selective where one insect, for example, is a partner and another not as in the case of carnivorous plants. Carnivorous plants succeed in bogs where the soil is particularly poor, unable to support vast majority of plants. The visiting insects are a major source of nutrients. Evolutionary adaptation makes optimal use of the neighbourhood and environment, adapting relationships into those that are most beneficial for the situation.

In South Africa there grows a carnivorous plant *Roridula dentata*. It does not have digestive enzymes to eat the trapped prey on its sticky leaves. The plants have helpers of specialised hemipteran insects *Pameridea marlothi*, which consume the trapped prey and defecate on the plants' leaves. It is the droppings that are digestible to the plant as nitrogen-rich foliar fertiliser. Such indirect digestion of prey accounts up to 70% of the nitrogen the plant acquires. The helper hemipteran insects are not trapped by

the plant as they carefully avoid the sticky patches and tread safely; they benefit by using the plant as a supplier of otherwise difficult to catch insects, sometimes much bigger than themselves, or turning tables of predator-prey relationships. Pollination of *Roridula* is accomplished chiefly by the *Pameridea* too, so there is a tight one-to-one intimate relationship. Throw the spider *Synaema marlothi* into this relationship, and we have a cheater or thief. It, like *Pameridea*, enjoys a meal of the trapped insect (and too, occasionally, the helper hemipterans) but does not leave any reward in return. This disrupts the balance and constrains the maintenance of mutualism – the plant's access to nitrogen and pollination rate is reduced. The loss experienced by the plants is tolerated because their population growth is restricted as their habitat is limited to bogs, where inter-plant species competition is relatively insignificant for this perennial, long-living plant. As circumstances become more challenging the relationships themselves evolve in order to adapt to the environment – it is a case of adapt or die.

The Next Generation of Business Relationships

As seen in the examples above that the relationships themselves, as well as the organisms, often evolve to fit the changing landscape. Evolution can no longer be solely viewed as a competitive struggle for existence and dominance, but rather as a cooperative dance in which creativity and the constant emergence of novelty are the driving forces toward success.

This can also be true for the next generation of businesses if they wish to flourish in these transformational times. We believe that creating a working environment that is conducive to collaboration and creativity will become the strategic weapon for this decade as organisations enter a period of increased volatility and uncertainty. Such a collaborative environment is the key to managing dynamic change, driving *innovation* and increasing profitability. This work ethic must be linked to the culture and ethos of the organisation, not confined to just the organisational boundaries, but extending up and down the value chain, which is better referred to as the 'business ecosystem' in these increasingly interconnected times. Hence, allowing such a working environment to flourish and evolve across the organisation and business ecosystem of partners, customers and supplier will become a fundamental characteristic and pre-determinate of success as we enter this decade of volatility and may well be the defining characteristic separating those organisations that adapt and flourish in these uncertain times from those that perish.

A business 'shaped by nature' is one that fosters open, trustworthy collaboration amongst stakeholders within its business ecosystem. Dynamically evolving business landscapes require stakeholders, regardless of department, organisation or speciality to rapidly assemble in temporary optimized teams focused on the goals at hand; then disband back into the networked web after the goals have been achieved. Effective relationships between people thrive through interpersonal links founded on a co-operative approach to challenges and an attitude that you give first to receive as a result. This attitude amongst stakeholders emanates from a culture that is strongly bound to values of cooperation, harmony and creativity, accepting change and novelty as a part of life. Finding the right harmony between openness and control or creativity and focus, is the key. How to ensure a sense of bonding and sharing of attitude across the business ecosystem will be a key differentiator to business survival not only for the whole but also for the viability of the organisations that form integral parts within that business ecosystem.

Examples from Industry

Two very different examples of relationships based on collaboration in business are Akzo Nobel (a global chemicals company) and Adnams (a traditional brewery).

Akzo Nobel has evolved part of its product range to be more sustainable, referred to as 'eco-premium' paints. In order to develop paints that reduce their impact on environment and society in their production through to their use and disposal, Akzo Nobel engaged upstream with its suppliers and downstream with its resellers and customers. It also engaged with other organisations

(academia, research institutes, NGOs, etc.) in order to gain the full picture and develop the right solutions to meet the challenge. Thus, it worked to form collaborative relationships with its complete business ecosystem and in so doing enabled a more resilient business ecosystem to emerge. This more resilient ecosystem of effective relationships with customers, suppliers, partners, etc. has lead to significant cost reductions, risk mitigation, improved margins and improved customer loyalty – not to mention the environmental and social benefits realised.

Adnams has long been a values-based organisation and working with suppliers and customers as if they are all part of the same community is engrained within the culture of the company and its staff. From the farmers who supply the barley to the pubs who serve the beer, all are connected to the values which Adnams hold dear, those of sustainability and community living. This focus on working collaboratively with suppliers and customers has provided a more resilient business model which is fundamentally important in a low margin, cyclical business such as brewing, enabling Adnams to flourish whilst other traditional brewers have perished.

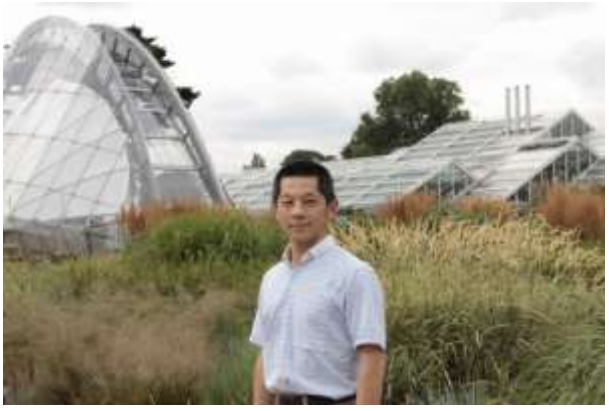
Summary

Nature provides many insights which can help the way our organisational cultures, ways of working and methods of production could adapt to ensure survival in these challenging times. This paper skims over the deep water of 'how nature does relationships' and draws parallels to the challenges organisations face as they seek to adapt to the twenty first century demands of an ever-changing business landscape. Those businesses that are able to learn from natures' examples and encourage creativity and collaboration by adopting evolutionary relationships across their business ecosystem will be better equipped to survive and prosper.

To meet the challenges businesses are facing, Biomimicry for Creative Innovation (BCI) and The Royal Botanic Gardens Kew (RBG Kew) have formed a unique partnership focused at helping organisations adapt to a more sustainable future, as 'Business Shaped By Nature'.

To find out more about how nature can help your organisation develop a culture that fosters creativity and co-operation please contact Biomimicry for Creative Innovation (BCI) or The Innovation Centre at the Royal Botanic Gardens, Kew.

Co-authors: Tetsuo Kokubun (Biologist at RBG Kew) and Giles Hutchins (Partner at BCI)



To learn more, visit our websites:
BCI: http://biomimicry-bci.squarespace.com/
Kew: http://www.kew.org/news/kew-blogs/business-shaped-by-nature-about-us.htm