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Biomimicry – from Product to Process Innovation Nature creates Conditions Conductive to life - Can Businesses do the same?

Rathi Guruswamy SRM School of Management, SRM University

Dr. K. Prabhakar SRM School of Management, SRM University

ABSTRACT

This paper focuses on creating awareness about Biomimicry. Biomimicry is not a new concept. Though lots of product innovation has been demonstrated and tested for better product solutions – in terms of resource efficiency and effectiveness very few developments have been seen in the process side of businesses. This paper tries to capture and highlight the research done on the bio-inspired process innovation. It also mentions about the need for bio-inspired solutions in both product and process innovation. The aim of this paper is to enhance and inspire more research on the process side in order to provide meaningful sustainable business cases and strategies.

KEYWORDS: Process Innovation, biomimicry, CSR, bio-inspired

1. What is Biomimicry?

Biomimicry (bios, meaning life, and mimesis, meaning to imitate) is the design discipline of finding solutions from "Nature". The term "Biomimicry" first appeared in scientific literature in 1962 and grew in the usage in the 1980s (especially in material sciences). People have been inspired by nature to solve problems for millions of years. For example, in 1941 Velcro was invented by a Swiss engineer George de Mestral who got inspired by the burrs that often got stuck to his dog's hair. Hence, biomimicry is relatively an old concept which has been revamped by "Janine Benyus" - biologist, innovation consultant, and author of six books, including Biomimicry: Innovation Inspired by Nature.

2. Why Biomimicry?

It is very evident in today's world that human development is going tangential with nature. The world is changing and every business needs to comprehend the global trends to remain workable and survive in the future. The current business ecosystem breathes on

1. Population explosion – growing inequality, aging population, health challenges
2. Scarcity of resources – rising cost, migration of population
3. Biodiversity – extinction of species
4. Transparency and Awareness– People see what business do
5. Changing values – declining trust
6. Lack of skill[1].

Biomimicry is considered to be an emerging discipline that seeks sustainable solutions by imitating nature's design and processes. This report will try to highlight the distinguishable triumphs that biomimicry has created in production innovation and how the concept is penetrating into process innovation.

3. Biomimicry and Product Innovation (examples)

Many designs and ideas inspired by nature have led to dramatic product innovations. Lot of activity has been recorded in Universities or corporate laboratories and mainly in the field of robotics and material sciences (GreenBiz, 2013). Nevertheless, a substantial number of innovations are also seen in areas like architecture, transportation and energy sector. Some of the latest innovations are listed below.

1. The cheetah: Boston Dynamics, a private company based in USA, has made the world's fastest four legged land robot. This project was bio-inspired by the African Cat. It set the speed record for robots at 28.3 mph (faster than the world's fastest human). These all terrain robots would be of great advantage to military (esp in hazardous work like disaster recovery and medical rescue)
2. The leaf: A team of scientist at Princeton University designed a flexible plastic solar cell with 47% more electricity generation. This was achieved by mimicking the wrinkles of a typical leaf. This bio-inspired approach not only enhanced the energy generation but also reduced the cost. U.S. Navy and U.S. Air Force have provided funding in support of this research.
3. Shells: Architect Tonkin Liu and structural engineer Ed Clark at Arup created a new form of construction derived from planar surfaces due to the bio-inspired study of forms of Shells. This solution was tested and proved to be more resource efficient.
4. Shark Skin: Bio-inspired swimsuits based on shark skin (have a very rough skin texture that creates a more streamlined surface) were successful in allowing swimmers to move faster through water[2].
5. Termite: Micke Pearce an architect of Eastgate Centre in Zimbabwe studied the termite dens. Termite dens looks odd but they are astonishingly very comfortable places to live, as they maintain a temperature comfortable for the termites to live even when the outside temperate rockets up. Micke Pearce applied the lessons learnt to the 330, 000 square foot Eastgate Centre – which now uses 90% less energy to heat and cool than traditional buildings[3].
6. Birds: The V shape use by birds have been able to increase the distance that they fly by 70%. A group of eminent researches in Stanford University are formulating an idea by mimicking the birds, to realize fuel savings in passenger airlines.

The list can go on. The examples cited above clearly shows that by mimicking nature the products and their designs have been able to enhance the effective and efficient use of resources and also have been able to reduce waste.

4. Biomimicry and Process Innovation (examples)

Does biomimicry stop with products? As we have seen in this paper there is a clear association with products – ranging from architectural designs to efficient energy. Recently, Biomimicry and nature's principles have also been applied at the business processes level, i.e. giving solutions to how to run our businesses in a meaningful way. Few noteworthy concepts are listed below.

1. Bio-Teaming: Catering to the pressing needs to face the major challenge present in today's organizations with respect to speed and responsiveness of teams, Ken Thompson (a team dynamic expert) looked into nature for solutions. He has done an extensive research on understanding the methods of interactions and how teams achieve optimal co-ordination through non-verbal communication. According to him nature's team transmit required information relating to threats and opportunities in the surrounding atmosphere. For example, a honeybee does the waggle dance to indicate other bees about the presence of good nectar spot and each member takes independent actions to grab the opportunity.

Ken Thompson introduced the concept of bio-teaming, to produce high performing teams, by imbibing nature's most successful principles, namely

a. Self-managed teams
b. Non issuance of orders
c. Communication is on way[4]

2. Biomimicry Institute[5] and Biomimicry Guild[6] collaborated Designer's Accord to address the Biomimicry Challenge – "Could Biomimicry Build a Better Company Than Your Boss?" Few of the takeaways are listed below.

a. Richard Grave, vice president of community for the U.S. Green Building Council, said "One particular solution that stood out to him was an idea to signal the health of USGBC chapters that was inspired by a pink flamingo: The "health" of the flamingo--or how much shrimp it eats--is outwardly reflected in the shade of pink of its feathers. "Having a simple, clear characteristic that reflects the health of an organization would be very useful in the chaotic world we live in"

b. Erin Leitch, from Portland sustainable development company Brightworks, mentions that "The simple translation of money in a business scenario for nutrients in a natural system is a powerful way to shift the mindset of the working groups when looking to nature for design solution precedence. Everything about the analogy makes sense, especially the way changing environmental conditions relate to changing market conditions. It broadens the solution space from a business perspective"

3. Erin Leitch, Certified Biomimicry Professional and Biomimicry 3.8 staff person, obtained through AskNature[7] in search of nature's strategies that could be applied to tackle a down economy. The lessons learnt from analysing the nature's strategies are:

a. Develop a tailored strategy to create an affinity with the resources you need to attract.
b. Timing is everything.
c. Manage stocks and flows through a linked professional network. Acknowledge the importance of collaborators to growing and thriving with you and build resilience as a community through co-operative resource management.
d. Partner with a complementary product or service for your business instead of expanding beyond your core competency or acquiring such businesses.
e. Don't lose track of the good ideas and relationships that you still haven't been able to put into action.
f. Take low value or off-the-shelf assets and rearrange them is such a way that the emergent outcome is of higher value.
g. Find opportunities to piggyback on other efforts.

5. Way forward

Based on few of the examples it will be interesting to study on how businesses can take advantage of biomimicry in improving their management and how they can move towards calling themselves a "bionic enterprise". The examples also provides a hint that businesses can create conditions conductive to life or rather society by large. Further research and development can definitely bring break through solutions and strategies in

a. Human Resource Management
b. Integration designs
c. Project Management
d. Marketing, etc

On a tangential note, may be biomimicry can be one of the tools which businesses can use to enhance their corporate social responsibility model with significant business case?

REFERENCES

1. Rebecca Paul. (2010). Design Inspiration from Nature – Biomimicry for a Better Planet. Retrieved May 29, 2013, from http://inhabitat.com/finding-design-inspiration-in-nature-biomimicry-for-a-better-planet/ | 2. Business In the Community. (2012). Retrieved May 15, 2013, from http://www.bitc.org.uk/ | 3. Erin Leitch. (2013). What nature can teach us about doing business in a down economy | Retrieved May 16, 2013, from http://www.greenbiz.com/slideshow/2013/01/11/namib-desert-beetle-leverages-power-attraction | 4. GreenBiz. (2013). Retrieved May 29, 2013, from http://www.greenbiz.com/research/reports | 5. Ernst & Young in cooperation with GreenBiz group. (2012). Six growing trends in corporate sustainability. | 6. Tom McKeag. (2012). The year in biomimicry: Robots inspired by cheetahs and moon jellies. | 7. Tom McKeag. (2013) .Three ways to bring nature-inspired ideas to market. | 8. Michael Pawlyn (2010). Biomimicry in Architecture, RIBA Publishing | 9. Michael Pawlyn, & Robert Somerville. (2010). Biomimicry and Buildings: Innovation and Sustainability in Architecture | 10. Ken Thompson. (2013). Bioteams. Retrieved May 15, 2013 from http://www.mkpress.com/bioteams/ |