Symbiotic Plant-Ant Mutualism: Biomimetics ideas for Outsourcing in Biz Management

S. Paulraj*

Problems faced by the present day business organizations in outsourcing are analyzed and attempts have been made to find solutions through Biomimetics. The symbiotic mutualism existing between Bull-horn acacia *(Acacia cornigera)* and the tree ant (*Pseudomyrmex ferruginea)* provide biomimetic solutions for the problems faced in outsourcing business.

Biomimetics, Biomimicry or Biomics is the developing science of taking inspiration from Nature to find practical solutions to problems encountered in the human world. The name comes from the Greek words, bios (life) and mimeses (imitations). Scientists have sensibly realized that nature has a lot to teach us. By opening their eyes to the wonders around them they have found some innovative solutions where life imitates nature (Dop, 2010).

Applying the biomimetics in various fields has been documented with example by Kennedy, (2009). But, no example for its application in business field has been cited by him. Only recently Elliott, (2009), Paulraj (2010) and Richerdson (2010) attempted applying the concept of biomimetics in business. Richerson, (2010) explained how the principle of symbiosis are applied in business by formulating a symbiotic matrix. He concludes that by applying biomimetics to business partnership, it is possible to identify the type of partnership, the life-strength of the partnership and to finally define the naked strategy for the business. For his analysis of symbiotic, he has taken into account all six types of symbiosis relationships ranging from mutualism to antibiosis.

In the present paper attempts have been made to show how the symbiotic mutualism type of association existing among plants and animals could be developed as a biomimetic model for providing principles for business outsourcing and for suggesting solutions for the problems faced in the outsourcing business.

Method

The plant – animal relationship developed between the Bull-horn acacia (*Acacia cornigera*) and the arboreal ant (*Pseudomyrmex ferruginea*) is taken up for the biomimetics studies. The bull-horn acacia is best known for its symbiotic relationship with the ant that lives in its hollowed-out thorns. The natural principles behind this mutualism type of symbiotic association have been found out using the studies available on this plant and animal (Armstrong, 2010).

Observations

Unlike other acacias, the Bull-horn acacias are deficient in the bitter alkaloids usually located in the leaves that defend against ravaging insects and browsing animal. Instead, this tree makes use of the services of the acacia-ants for their defense.

The acacia-ant acts as a defense mechanism for the tree, protecting it against the harmful insects, animals or humans that may come into contact with it. In return, the tree provides home in the hollowed-out thorns for which the tree is named and also supplies the ant with nutrient rich protein-lipids nodules called Betain bodies from its leaflet tips and carbohydrate rich nectar from glands on its leaf-stalk base.

These Beltain bodies have no known function or use to the plant other than to provide food for the symbiotic ants. The aggressive ants release an alarm pheromone and rush out of their thorn "barracks" in great numbers. The browsing livestock can apparently smell the pheromone and avoid these acacias day and night. In addition, getting stung in the mouth and tongue is an effective deterrent to browsing on the tender foliage. The worker ant also clear away other competing plants from the acacia's vicinity – plants which could otherwise over shade the acacia, which need direct sunlight.

Janzen, (1983) who gathered most of early evidences regarding this symbiosis, believed that the Bull-horn acacia shoots must be occupied by the *Pseudomyrmex* ants for a substantial portion of its life in order to survive and reproduce, just as the acacia-ants depend on its shelter and Beltain bodies to compete with other insect species.

Rehr et al., (1973) produced evidences in favour of the hypothesis that, originally, the chemical defense had been existing in these acacias and has been subsequently lost in the ant-acacias, possibly because maintenance of both and chemical defense places an unnecessary metabolic burden on the plant.

The activity of the acacia-ants increases shortly after a disturbance of the host and can be viewed as an inducible response that could reduce defensive cost (Cronin, 1998).

Results

The various biological facts about the Acacia's and ant's activities reveal the involvement of several natural principles. The principles concerning outsourcing arrived at from the biological facts are as follows:

1. In spite of possessing strong thorns, the Bull-horn acacia failed in its defense strategy of its own. Therefore, outsourcing the defense work became mandatory for its survival.
Principle: The real reason for outsourcing lies in the quest for finding people who can do the work better than you.

2. The partner chosen by the acacia is a tiny ant but it is very effective only in protection works. This will ensure that the partner will not interfere in any other activities of the host.
P*rinciple: Choose the partner who should be an expertise only for the chosen work and not any other works that are carried out by the host.*

3. The bullhorn acacia lost its costly alkaloids production activity as it find it no more useful after establishing the association with ant that suffice the protection needs.
Principle: Avoid the activities once the partner is found thoroughly fit enough to perform the same in a cost effective way.

4. Bullhorn acacia offer its less useful thorns for providing shelter and provide food through its unused Beltain bodies to the partner ants.
Principle: Find out materials that are less used or not used by you and make use of them effectively for meeting the cost of engaging the outsourced partner.

***Chennai Snake Park, Rajbhavan Post, Chennai – 600 022, India. Email: paulrajifs@gmail.com**

5. The Bull-horn acacia grows well and concentrate on its core-function of reproduction as, it gets more energy out of the savings from the stoppage of costly alkaloids production.
Principle: Outsource non-core works and concentrate on core-activities for better growth.

6. The acacia established its association with the ant strong enough so as to make it a part of its life.
Principle: Treat your outsourcing partner as a trust worthy person so as to make him a part of your team.

7. The acacia provide good shelter in its succulent thorns and offer sufficient and enriched food from protein-fat rich Beltain bodies and carbohydrate rich glandular secretions. Reciprocally, the ants not only protect the plant against the browsing animals but also clear the dominant ground growths that are considered competitors for the growth of the acacia.
Principle: Higher the benefit you offer the higher the expertise you get from your partner.

8. The acacia does not expect the service of the ant continuously. It requests the protection from the ants only at the time of getting affected by sending chemical signal to the ant.
Principle: Don't expect too much from your partner for the minimum cost you have paid to him. Conserve energy by avoiding activities when not useful or not needed.

9. The mutualism type of association developed between acacia and the ants is a win-win relationship that is considered as the most essential criteria for a successful partnership.
Principle: A win-win relationship between the service provider and the client is imperative for the success of an outsourcing initiative.

10. The ants while performing their duties, never do anything that are harmful to acacia particularly, they do not scare away the beneficial honeybees visiting the acacia flowers for pollination.
Principle: Ensure that the activities of the client do not hamper the service provider's activities any way.

Discussion

The Nature's principles behind the mutualism type of association developed between the acacia and the ant could be taken as a time tested and highly viable principles for this outsourcing business. Here, the Bull-horn acacia may be taken as the model organization that seeks outsourcing and the acacia-ants be taken as the client outsource service provider. The most successful organizations in the outsourcing business should be the one that fallows the various principles of Nature. Avagliano (2004) in his latest survey report study on outsourcing, highlighted top 10 reasons behind choosing outsourcing. According to the present study, the ten principles behind the association between acacia and the ant, are almost coincide with the top ten reasons for outsourcing. In spite of that, the present outsourcing business faces several problems.

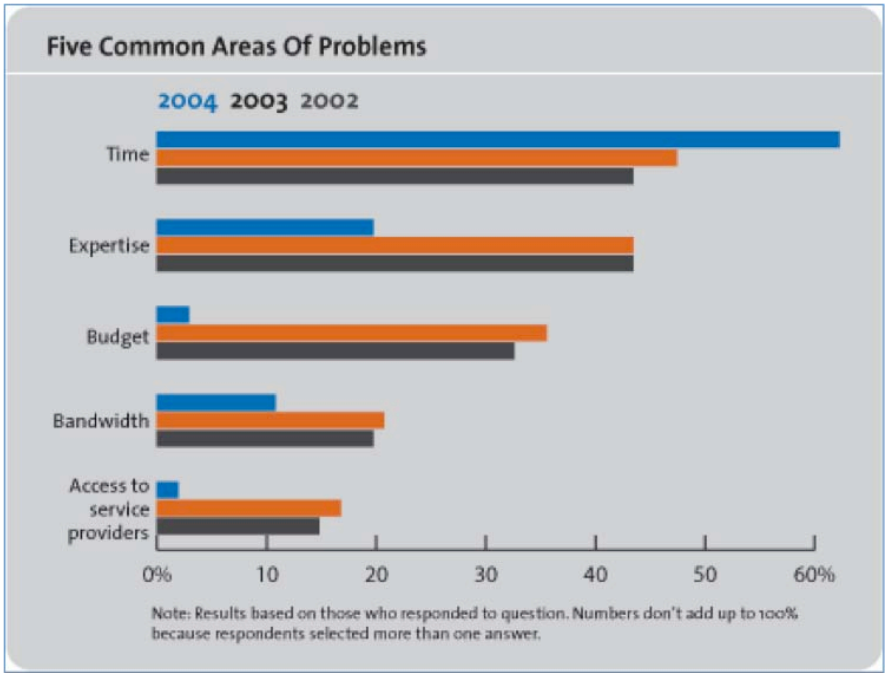

Fig. 1 (Source: 7th Annual Outsourcing Index, 2004. The Outsourcing Institute, NY., U.S.A.)

According to the recent survey report made by the Outsourcing Institute (Avagliano, 2004) five common areas of problems are identified that are responsible the failures in outsourcing. They are Time, Expertise, Budget, Bandwidth and Access to service providers. If we find out how these problems are tackled by the Nature, then, the same could be tried for solving our outsource management problems.

Of the five areas of problem mentioned in the report (Avagliano, 2004) only the following three are consistent in all three years of survey (Fig. 1). They are the Time, the Expertise and the Bandwidth (resource needed to complete a task or project). Therefore, only these three common and persistent problems are taken up for finding solutions.

Time related problem: Bell (2006), while analyzing solutions for this time related problem indicated that this is mainly due to the client's unpreparedness at the time of offering the outsourcing service. In other words, the client start working on designing the project work only after getting the job work. If critically analyze the issue of time factor in the acacia and ant association, it is revealed that the ants that are given the work of defense, are always at the disposal of the service provider acacia with their already developed expertise and, there is no preparation time for starting the assignment. Here, three factors are involved in the timely execution of the work. 1. Preparedness to execute the work any time required by the host, 2. Effective communication and 3. Closer Vicinity for immediate delivery. Therefore, the outsourcing parties may get the solution to the time related problem by adopting the system followed by the acacia and the ants.

Problems related to Expertise: The selection of expertise by the acacia is considered very creditable. The protection expert ant is a simple animal but, it is has got an effective attacking system. The acacia needs only that and does not concerned about other abilities. This expert (ant) finds no better host than the acacia as the host provide all essential needs of the ant. This sort of liberal service by the acacia made the expert to be very loyal to the host and be always at the disposal of the service provider. This sort of relationship between the service provider and the expert may be helpful to solve the problem of expertise in outsourcing.

The third problem is connected with the bandwidth that is, the resources needed to complete a task or project. As far as the acacia is concerned, it effectively utilizes its idle resources such as, succulent thorns and the Beltain bodies for the use of its client's (ant) service. It also saved considerable energy by stopping the costly production of alkaloids for defense purpose once it got an effective alternative from the ants. As far as the ant is concerned, its defense activity increases shortly after a disturbance of the host and it is viewed as an inducible response that could reduce defensive cost (Cronin, 1998). Thus, one could find economy in resource utilization in both partners that makes the association viable and strong. The outsourcing business organization should think of such effective utilization of their available resources for solving the problems connected with bandwidth.

Conclusion

Studied the possibility of applying biomimetics in solving the problem faced in the business outsourcing taking the example of symbiotic relationship found between the bullhorn acacia and the acacia ants. Most of the manmade principles of outsourcing are in agreement with the Nature's principle of symbiotic relationship. But, the problems faced by the partners in business outsourcing are not seen in Nature's partners in symbiosis. Therefore, the following biomimetics solutions for the problems in outsourcing, derived from Acacia and ant relationship, are suggested.

1. Choose the expert service provider who are already equipped with the expertise in the area of your requirement and make available at your disposal all the time. This will solve time related problems.

2. Choose your client for your outsource work who should possess the expertise only in the areas of your need. This will ensure that your client will concentrate only on your assigned work and also, your client will get opportunity to specialize more and more in the areas of your need. This will solve your problem concerning the selection of correct expert.

3. Sort out untapped and under utilized resources with you and put them in use effectively. Find out better alternatives for costly activities and stop doing them once you get the right alternatives. This will solve the problems related to resource crunch.

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Biodiversity Conservation Knowledge Centre at Wildlife Trust of Bangladesh

Wildlife Trust of Bangladesh (WTB) and the Zoological Society of London (ZSL) have collaboratively developed a biodiversity conservation knowledge centre in Dhaka. Secondary school and university students have explained to us that they would really like a central hub in which they can learn and talk about conservation, and also work together to develop innovative projects. The centre has been set up with this in mind; we want to help equip students with the skills they need to face the environmental struggles of their country. The centre will offer services including: access to international journals for the latest innovative approaches to conservation, core text books to provide foundational knowledge, regular events (debates, filmshows, seminars) to help develop informed opinion about conservation, classroom aids, and support for the development of conservation projects in their own communities.

The idea for this knowledge centre came from the late Dr. Noazesh Ahmed, an eminent photographer and geneticist, also the founding vice chairman of WTB. Remembering his dream, his close colleagues - Mr. Enayetullah Khan Chairman, WTB and Anwar Islam are now making it a reality. The centre has been duly named after Dr Ahmed as Noazesh Knowledge Centre. This first centre is only the beginning and if it is a success, then we would like to replicate it to help develop other young conservationists across the country.