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SYMBIOTIC RELATIONS: A NEW THEORY CONTRIBUTION TO ORGANIZATIONAL MANAGEMENT

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Abstract

Aim: Collaborations established by living things belonging to different species in nature are considered as "Symbiotic Relations" in Biology. The purpose of this research is to determine whether similar relationships exist at the healthcare, maritime and other industries and organizational level.

Methods: The research was handled in a descriptive type. In this context, the conceptual framework of the subject was created by examining the Management and Biology literature.

Results: In addition, whether the defined symbiotic relationships exist in existing industries has been exemplified by making inferences from observations and reports.

Conclusion: As a result of the research, it was determined that healthcare, maritime, tourism, textile, food, universities and technology industries mainly developed mutualism, partially commensalism and parasitism in a limited number of their relationships.

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INTRODUCTION

In the Industry 4.0 and post-modern era we are in, organizations have developed different strategies, ways and methods in order to survive, gain competitive advantage and achieve their goals in a sustainable structure. Similar to the way in which some creatures belonging to different species act together for reasons such as survival or gaining advantage for habitat or food sources. The physical movement of two organisms or the fact that one organism depends on another organism is considered as a "Symbiotic Relationship" in the science of biology. The growth and development of two different organisms that lead a life dependent on each other constitute the basic parameters of a symbiotic relationship (Köksal, 2011; Zaccaro & Horn, 2003).

The applications of symbiotic relations, which are discussed in the science of biology, are also found in the ecosystem of the organization. Because in today's conditions where uncertainty, risk and the intensity of competition increase, organizations need to enter into symbiotic relationships with organizations belonging to different industries in order to survive and operate in a sustainable environment. In this context, some organizations establish new industrial areas by establishing symbiotic relationships such as mutualism and commensalism with organizations in different industries. Within the scope of this research, the symbiotic relationships established by organizations will be discussed in the conceptual framework. The aim of this study is to present a new perspective and paradigm that examines the behavior patterns of organizations in this post-modern era.

1. BACKGROUND

The Concept of Symbiotic and Definition: The concept of symbiotic is used to describe the relationship between two different creatures that live close to each other and are connected in certain ways, each providing certain benefits to the other (Oxford Learners Dictionary, n.d.). Types of symbiotic relationships are classified in three different ways in biology (Önal, 2021):

1. **Mutualism (+/+):** It is a relationship in which two or more species benefit mutually. All parties involved in this relationship ultimately benefit. The relationship between the crocodile and

Egyptian plovers can be given as an example of a mutualism relationship. In this relationship, the Egyptian plover cleans the crocodile's teeth and feasts on the leftover food, whilst the crocodile's teeth are cleaned. Another example of mutualism is the relationship between sea coral anemone and clownfish. With its burning tentacles, the anemone protects the mucus-skinned clownfish from its enemies. Clownfish also keep anemone-feeding fish away from the anemone.

2. Commensalism (+/0): One of the two cohabiting species benefits from this association (guest) while the other species (host) is unaffected. The classic example of commensalism is the relationship between pilot fish and sharks. Pilot fish move in with sharks and consume the leftovers from their prey. While the pilot fish benefit from this union, the sharks neither benefit nor harm. Another example, sucker-mounted remora fish cling to the shark and live without harming it. The fish is displaced by the shark's movement and feeds on its food scraps.

3. Parasitism (+/-): While one of the living things acting together in the parasitism relationship benefits, the other is harmed. In this union, the damaged creature is called the "host", and the harming organism is called the "parasite". Tapeworms, pinworms and ticks living in the bodies of animals such as horses, sheep and dogs can be given as examples of this type of relationship. While the parasite benefits in this relationship, the living things that act as hosts are harmed. Another example is plasmodium, a one-celled parasite, transmitted to humans by the female Anopheles mosquito. After passing into human blood, it develops in the liver and spleen. By passing into the blood, spores multiply rapidly in the red blood cells. Spores burst red blood cells, causing malaria attacks.

On the other hand, the concept of Industrial Symbiosis was explained by Van Berkel. Industrial Symbiosis, which is the business-to-business dimension of the Industrial Ecology concept, covers interactions between businesses. It is derived from the concept of "symbiotic relationship", which includes the exchange of energy and matter in order to create a common benefit among dissimilar species seen in nature. Businesses depend on the resources in the natural environment to continue their activities. At the center of Industrial Symbiosis studies is the recycling of waste produced by a facility and its use as a resource in other facilities (Van Berkel, 2009). In an ideal Industrial Symbiosis application, wastes and energy are used by other actors in the system; thus, the total raw material and energy inputs of the system and waste and emission

production are reduced (Chertow, 2000). Industrial Symbiosis, which is a concept developed to apply the efficiency of natural ecosystems to industrial systems, can also be defined as the establishment of mutually beneficial partnerships by industrial enterprises. This common use may include other resources such as energy, logistics, manpower, investment, water, etc., primarily wastes. Industrial Symbiosis applications provide benefits such as recycling of waste and by-products, reduction in resource use and environmental emissions, and efficient use of raw materials and energy. Eco Industrial Parks are an example of this collaboration. The Industrial Symbiosis model has been fully implemented for the first time in the Eco-Industrial Park in Kalundborg, Denmark. There was an exchange of groundwater, wastewater, steam and electricity as well as various other waste/residues between the main partners in Kalundborg (oil refinery, plasterboard plant, power plant, Kalundborg Municipality). Within the scope of this application, an average of 2.9 million tons of material was exchanged annually, water consumption was reduced by 25% and 5000 houses benefited from central heating operated with waste heat. This cooperation has significantly increased environmental and economic efficiency and has also provided benefits such as new employment opportunities, technological improvement, a significant reduction in waste management costs, and significant knowledge accumulation and sharing (EKOIQ, 2014).

The Concept of Organizational Symbiotic Relationship

Unlike biology, the concept of "Symbiotic Relationship" is defined in the organizational level as follows: Organizational Symbiotic Relationship represents the coming together of two or more industrial organizations that are physically close to each other and normally operate independently of each other. Symbiotic Relationship of organizations in the management industry is establishing long-term partnerships and working in solidarity that increase both environmental performance and competitiveness (Technology Development Foundation of Turkey, 2021).

Symbiotic Relations Detected at the Organizational Level

Within the scope of this research, organizations operating in various industries and their relationships have been examined and it has been determined that symbiotic relationships in the field of biology are also observed in the organizational ecosystem. Sectors that develop symbiotic relations at the organizational level are “healthcare, tourism, maritime and textile” organizations. These relationship patterns are given below.

Mutualism Relations in Healthcare Organizations

In "Mutualism", which is one of the types of symbiotic relationships, all parties that have different types and enter into a relationship gain equally to one another. This relationship is based on the win-win principle. Examples of organizational relationships developed within the scope of mutualism are as follows: Hospitals and hotels belonging to two different industry types as health and tourism, they establish a symbiotic relationship through the relationship and concept of "Health Tourism". Health tourism; is the visit of individuals to a country other than their country of residence in order to receive preventive, therapeutic, rehabilitative or health-promoting services (Tantuş, 2019). The symbiotic relationship established by health and tourism businesses through the "Health Tourism" activity is designed as follows: Before or after the treatment of a patient going from one country to another for treatment, tourism organizations also offer transportation, travel and hotel services. In this way, the patient both receives treatment in the visited country and can visit historical and touristic areas. As a result of this symbiotic relationship developed between the hospital and the hotels, the health institution in return for the health service it provides; on the other hand, the tourism business, generates income in return for the services it provides on issues such as accommodation, excursions, and transportation. Regarding health tourism, 662,087 people in 2019 and 388,150 people in 2020 came to Turkey from abroad for treatment, and it brought a revenue of 1.065.105 dollars in 2019 and 548.882 dollars in 2020 (Ushaş, 2021). This relationship, which the health and tourism sectors establish over the patient, can be evaluated within the scope of mutualism (win-win) relationship, which is one of the types of symbiotic relationships.

The symbiotic relationship developed by health informatics and biomedical institutions and textile enterprises through wearable health technologies is carried out as follows: Health institutions are developing sensors, software and other informatics tools to obtain data about the health of individuals. On the other hand, textile organizations produce textile products such as belts, socks, shoes, shirts, athletes, and baby diapers. These organizations belonging to both types establish a symbiotic relationship by combining the different products they have developed under the name of "Wearable Health Technologies" with a new concept such as "Smart Socks, Smart Shoes". In this way, both the healthcare and textile industry gains.

Another example to be given to the symbiotic relationships that have emerged in the field of health in recent years is the city hospitals. City hospitals, which have especially successful examples in Dubai and then established in Turkey, meet the needs of many people such as healthcare services, hotel services such as food and accommodation, data processing, parking lot, market and textiles, due to their structure. In addition, since the city hospitals are built within the scope of private-public cooperation, the Ministry of Health carries out health services on behalf of the public, and the construction company, which makes the hospital on behalf of the private sector, carries out cleaning, security and other support services. In this context, it is seen that there is a win-win symbiotic relationship with both the construction and the current organization.

Mutualism Relations in Different Organizations

The maritime sector is the locomotive of international trade and the global economy. About 80% of world trade by volume and more than 70% by value is transported by sea (United Nations Conference on Trade and Development, 2018). Recently, the efficiency of the seas has increased dramatically, especially in economic terms, and world trade has become increasingly dependent on the seas (Çetin, 2009). It is possible to observe symbiotic relationships between organizations providing different services within the maritime sector, which is an international sector in the globalizing world. It is much more difficult to survive in the maritime sector, which requires a larger capital, than many other sectors. Since the stopping of the ship propeller harms both the ship operating companies and many sectors working with ship management, in order to avoid this situation, both a competitive environment and symbiotic relations are observed in the sector. The symbiotic relationships developed by maritime organizations within the ecosystem they live in are as follows:

Another example of symbiotic relationships is “Cruise-Sea Tourism”. The concept of a “cruise holiday” juxtaposed with a “cruise” is relatively new (Papathanassis, 2019). A symbiotic relationship is established between cruise ships, which are maritime operations, and hotels and entertainment establishments, which are tourism organizations, under the name of "Maritime/Sea Tourism". This relationship includes many different sectors such as transportation, food, textile, entertainment, travel agency, health, sports, hotel accommodation, aviation, photography, cosmetics, jewellery, spa/wellness, car rental, and multi-faceted symbiotic relationships are carried

out. For example, many sectors are included on board of a cruise ship so that a passenger can travel in comfort and style on the cruise to the port of destination and without getting bored. In this way, the ship owners both earn income from the passengers of the ship, and tourism businesses that provide on-board services also earn income in return for the services they provide in areas such as restaurants, spa, entertainment, textiles, tours and transportation on board. Many of the above-mentioned organizations generate income by making agreements with ship owner organizations, not by the ship owner, but by the companies serving in different sectors, by continuing their on-board activities. This relationship established by the maritime and tourism sectors over passengers can be evaluated within the scope of "Symbiotic-Mutualism". As a result of this relationship, all parties gain. Another example of a symbiotic relationship reflected on the organizational level is the establishment of a symbiotic relationship and acting together by organizations belonging to two different types, such as the health and textile industries, through "Wearable Health Technologies". Wearable health technologies are electronic devices that can be worn, worn or attached to the body, which can obtain and save data on health conditions such as fever, pulse, blood pressure and stress of individuals at home or from where the person is, without going to the hospital, and transmit the desired data to the relevant health institutions (Lee and Lee, 2020; Phaneuf, 2021).

Crew working on ships in the maritime industry; everyday people face the danger of medium and high-risk maritime accidents such as work-related accidents (such as injury, loss of limb and death), injuries, shipwrecks, storms and poisonings. With the increase in the world's commercial ship fleet, the need for the "Maritime Health" sector and the organizations serving this sector has increased. There is nothing more important and invaluable than human presence on board. Although the issue of occupational health and safety is very important in the maritime sector, problems that require urgent first aid are experienced due to the nature of the work. For the world maritime industry, the continuity of follow-up of work accidents, emergency response and chronic diseases is a matter of importance for seafarers who are sailing for months at sea and often stay away from land. In addition, emergency response, air ambulance services, e-health and tele-health services for the mental and physical health of seafarers, which have become very important in recent years, are provided by the relevant organizations. While these services are provided by private health institutions, they generate income from the maritime sector, and the maritime sector

also benefits from this service. This reciprocal relationship provides benefits for both species. This relationship established by the maritime and health sectors over the seafaring crew can be evaluated within the scope of symbiotic-mutualism. In today's world, shipowners are getting into different branches of maritime business and investing in port installations, warehouses, logistics organizations, freight forwarders and ship brokering.

Examples of Organizational Commensalism Relation

While one of the two different species living together in the "Commensalism" relationship, which is one of the symbiotic relationship types, gains from this union, the other type (host) does not profit or suffer from this relationship. Examples of the commensalism relationship developed at the organizational level are as follows:

In the ecosystem formed around the health facility that serves the majority of the society, such as a hospital, businesses belonging to different types such as florists, taxi stands, canteens, restaurants, medical companies, and pharmacies are clustered. While there is no gain or loss for the health facility in this structure and relationship, businesses staying around the health facility benefit from this relationship by selling products and services to the patients who visit the hospital. Another example is, way stations and rest & service areas in which restaurants and other facilities located on the sides of intercity roads establish a symbiotic relationship with the bus companies that provide transportation services, allowing passengers to come to their own facilities. In this relationship, while the bus companies have no profit or loss, the way station facilities gain. Similarly, while peddlers and kiosks selling sandwiches and water near a football stadium are profitable, there is no gain or loss for the management of football stadium in this relationship.

Examples of Organizational Parasitism Relation

It is a union in which one of the living things benefits while the other is harmed. Although this type of relationship is maintained in other living things, it does not comply with ethical and moral rules at the organizational level. However, it can still be explained with the following example: The health sector and the medical sector are different industries. Instead of treating patients with medical supplies in their own institution, the doctor or other healthcare worker working in the hospital should direct patients to outside medical companies in unethical ways to earn more profits, and the fact that the doctor also receives a premium per patient from this relationship can be given

as an example. In this relationship, while the hospital suffers, the medical firm gains profit. In this relationship, while the hospital suffers, the medical firm gains profit.

Maritime piracy consists of any act of crime, violence, detention, rape or humiliation committed for private purposes by a private ship or its crew or passengers directed against another ship, persons or property on the high seas. Piracy may also be committed against a ship, persons or property outside the jurisdiction of any state; in fact, piracy is the first example of universal jurisdiction. It is known, although it is not explicitly stated, that maritime piracy is stronger than it states in piracy incidents occurring in certain parts of the world, or that there are intermediary institutions in the piracy market in some regions of underdeveloped countries and that they earn an income from it.

"Maritime Piracy", which sucks the blood of the maritime industry in a way, is the actions in which the ship's crew is detained for years, extortion events are experienced on the ship, the navigation devices are dismantled so that they cannot navigate in the sea, and the ransom is demanded, and all these actions take away the life, property and navigational safety of the ship crew. Maritime pirates earn unfair income from ship owners by using the ship's crew and a valuable asset, the ship. While one party benefits in this relationship, the other party suffers from it. This relationship established by the maritime and piracy industries over the maritime crew can be evaluated within the scope of "Symbiotic-Parasitism".

2. METHOD OF THE RESEARCH

This research was handled with a descriptive model. In this context, the related concepts of biological science and management science were handled comparatively and the definitions in biology were adapted to management science. Then, through this conceptual model developed, symbiotic relationships such as mutualism, commensalism and parasitism that emerged in industries such as health, maritime, tourism, food, education, and textile were discussed conceptually.

3. CONCLUSIONS AND RECOMMENDATIONS

The findings obtained within the scope of this research show that symbiotic relationships as a concept enter into different disciplines other than biology. Different sectors have emerged from the combination of many sectors that have chosen the path of solidarity to survive in the globalizing

world. It is possible to see similar relations in many sectors from international relations to the transportation sector. Based on a case study, Ashton (2011) explores how a cluster of several manufacturing firms achieves mutual benefits in terms of utilities sharing. For small businesses that adapt to the concept of symbiosis as a strategy tool, it can improve their performance (Rauch et al., 2016), survival rate, goodwill, growth potential, and reduce potential risks from firm size constraints (Banwo et al., 2015).

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