



# On the influence of synergy on the development history of human society-based on the study of organelles

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**Abstract.** The concept of synergy, rooted in the collaborative interactions observed in nature, has gained recognition for its universality and significance. This paper explores the theoretical basis of synergy, defining its characteristics and providing examples from nature, particularly focusing on the synergistic effects within cellular organelles and broader ecosystems. Drawing an analogy between cellular synergy and societal cooperation, the functions and interactions of organelles are compared with social structures, highlighting interdependence.

**Keywords:** synergy, collaboration, cellular organelles, societal cooperation, human society, civilization.

## 1 Introduction

### 1.1 Background introduction

Synergy is a common phenomenon in nature, which reflects the interdependent and cooperative relationship in various biological and social systems. This kind of cooperation has not only been widely studied in the field of biology, but also gradually attracted attention in other fields such as sociology. This article will take synergy as the breakthrough point to explore its far-reaching impact on the development history of human society, and deeply explore the theoretical basis of synergy through the study of organelles as a biological example. <sup>[1]</sup>

## 2 Theoretical Basis of synergy

### 2.1 Definition and characteristics of synergy

As a key concept, Synergy may have different definitions and characteristics in different disciplines. In biology, synergy is usually described as a process in which multiple individuals or organizations cooperate with each other to achieve common goals. In other fields such as sociology, Synergy may involve more complex social structures and cultural factors. We will first explain the basic concept of synergy and emphasize its universality in different disciplines.

Synergy refers to the process in which multiple individuals or organizations achieve common goals through cooperation. This kind of cooperation can be manifested in the forms of resource sharing, information transmission, labor division, etc. The basic concept of synergy involves interdependence and mutual support, and its core is that individuals or organizations achieve greater benefits than individual actions through joint efforts. <sup>[2]</sup>

Introducing different understandings of synergy in biology, sociology and other fields is helpful to establish a comprehensive theoretical framework. In biology, synergy can be demonstrated through group behavior, symbiotic relationship, etc. In sociology, Synergy may involve multi-level influences such as social structure, cultural factors and institutional norms. By comparing these viewpoints in different fields, we can understand the nature of synergy more comprehensively.

## **2.2 Examples of synergy in nature**

This part will focus on the synergistic effect of organelles in cells, and further deepen the theoretical understanding of synergistic effect through in-depth study of synergistic phenomena in other ecosystems, such as group behavior.

### **2.2.1 The synergistic effect of organelles in cells.**

Organelles are functional structures within cells. They cooperate with each other and jointly maintain the life activities of cells. Taking mitochondria as an example, it works collaboratively with organelles such as endoplasmic reticulum and Golgi apparatus to complete life activities such as energy synthesis and protein synthesis. <sup>[3]</sup>This micro-level synergy provides a biological model for social synergy.

### **2.2.2 synergy in other ecosystems.**

In other ecosystems in nature, synergy is also manifested in the form of group behavior, symbiotic relationship, etc. For example, the collective feeding behavior of bees and the collaborative hunting of wolves are all ecological Examples of group collaboration. <sup>[4]</sup>These phenomena show the universality of synergy in nature, and also provide enlightenment for social synergy. <sup>[5]</sup>

## **3 Analogy of the synergistic effect of organelles and society**

### **3.1 functions and interactions of organelles**

Organelles are functional structures within cells. They cooperate with each other and jointly maintain the normal function of cells. Common organelles include mitochondria, endoplasmic reticulum, Golgi apparatus, etc. They bear different functions in cells, but through interaction, a whole of cooperative work is formed. <sup>[6]</sup>

### **3.2 Comparison between organelles and social structure**

Comparing the interdependence of organelles with the cooperation and dependence in society can reveal the complexity and diversity of social synergy. <sup>[7]</sup>This category is more helpful than helping to have a deeper understanding of how synergy works in society.

#### **3.2.1 The interdependence of organelles.**

There is a close interdependent relationship between organelles. For example, the energy generated by mitochondria provides the energy needed for the synthesis of proteins for the endoplasmic reticulum; After the modification of Golgi apparatus, the proteins synthesized by the endoplasmic reticulum can be transported to other organelles or extracellular to complete various biological functions. This interdependent relationship constructs an efficient and cooperative cell system.

#### **3.2.2 cooperation and dependence in society.**

In society, there are also various cooperation and dependence between individuals. From family, organization to country, people realize the normal operation of society through joint efforts, information sharing and resource allocation. This kind of cooperation can be economic, cultural or political. Cooperation and dependence in society determine the stability and sustainable development of society. <sup>[8]</sup>

By comparing the similarities between organelles and social structures, we can find that the analogy of social synergy is not only superficial, but deeply rooted on the basis of biology. This provides a new perspective for us to understand the mechanism of social synergy.

## **4 The Impact of synergy on the development of human society**

### **4.1 synergy of early human society**

#### **4.1.1 Background of cooperation and joint efforts.**

In the early human society, cooperation and joint efforts were the basic means of human survival and reproduction. Human beings gathered together to jointly cope with the challenges of the natural environment, forming the basic form of the early society. This cooperation includes food acquisition, habitat establishment and resistance to external threats.

#### **4.1.2 cooperative behavior in hunting field.**

Hunting was one of the main ways of survival in the early society. Through group hunting, human beings can obtain food resources more effectively. <sup>[9]</sup>This paper analyzes the division of labor and cooperation, collective strategy and other aspects of early human hunting behavior, and reveals the importance of synergy in the field of hunting.

## **4.2 The role of synergy in the development of civilization**

### **4.2.1 synergy promotes social technological development.**

In the development of civilization, synergy plays a key role in promoting technology. Through the cooperation and concerted efforts of members of society, technical knowledge can be spread and developed more widely. For example, irrigation systems in agricultural society and mechanized production in industrial society cannot be separated from the support of synergy. By analyzing the synergy in the development of these technologies, we can deeply understand how the technological revolution has shaped the social structure and civilization.

### **4.2.2 synergy to promote social and cultural prosperity.**

The inheritance and prosperity of culture cannot be separated from synergy. People have formed a rich and colorful cultural system through cooperation and interaction in the forms of language, religion and art. By analyzing the synergy modes in different civilizations, we can explore how synergy can promote cultural diversity and prosperity in the formation of civilization.

## **5 Challenges and changes**

### **5.1 synergy in modern society**

#### **5.1.1 The impact of globalization on synergy.**

With the acceleration of globalization, the ties between different countries and regions are increasingly close. This paper analyzes the impact of globalization on synergy and discusses the emergence of new synergy models in transnational cooperation and cultural exchanges. How Globalization affects the level and scope of synergy and the way to challenge the synergy mode in modern society is a problem worthy of in-depth study.

#### **5.1.2 The shaping of synergy by the development of science and technology.**

The rapid development of science and technology provides new possibilities and challenges for synergy. This paper analyzes the impact of information technology and communication technology on social collaboration and the emergence of new collaborative models in the field of science and technology. The role of emerging technologies such as artificial intelligence, big data, and the Internet of Things in promoting synergy. What changes have taken place in social structure and organizational form is an urgent issue to be studied.

#### **5.1.3 The emergence of new collaborative mode.**

With the change of social structure, the emergence of new collaborative mode has become a topic attracting attention. Through analyzing the practice and development of new collaborative models in enterprises, education, politics and other fields, the impact of these new models on social development is discussed. For example, the rise of

shared economy and the collaborative development of open-source software are all new models of social synergy, which are worth further study.

## **5.2 The future trend of social synergy.**

### **5.2.1 The potential impact of artificial intelligence on synergy.**

With the rapid development of artificial intelligence technology, it has become an important research topic to explore the potential impact of artificial intelligence on synergy. This paper analyzes the application of artificial intelligence in decision-making, collaborative innovation, resource allocation, and the development trend of human-computer collaboration in different fields. How artificial intelligence reshapes the mode of social collaboration and the possible ethical and legal challenges in the process are issues that need in-depth consideration.

### **5.2.2 integration of new technologies on synergy.**

In addition to artificial intelligence, emerging technologies such as block chain and biotechnology also have a profound impact on synergy. Through in-depth study of the application of these emerging technologies in social synergy, this paper analyzes how they promote the development of synergy and the possible changes. This also involves the shaping of social structure and organizational form by technological integration.

### **5.2.3 possible development direction of future social synergy.**

When discussing the future trend, some possible development directions need to be put forward. For example, a collaborative model based on sustainable development and a closer global collaborative network. Through this future prediction, it can provide strategic guidance for social decision makers and suggestions for the benign development of social synergy.

## **6 Conclusions**

Through in-depth research on the key impact of synergy in the development of human society, this paper emphasizes the role of organelle research in understanding social synergy. From early society to modern society, from cellular level to social level, Synergy has always run through the development process of human society. Through in-depth discussion of the evolution of synergy and the impact of emerging technologies on it, we have revealed the key role of synergy in social change and sustainable development.

In future research, we put forward a series of suggestions on deeper research on synergy, aiming at comprehensively understanding the nature of synergy and its various impacts on society. These research directions will help to build a healthier, sustainable and collaborative society. The theoretical discussion of Synergy not only deepens our understanding of human society, but also provides theoretical guidance for social

governance, organizational management and other aspects, which has important theoretical and practical value.

## References

1. Callahan, D. (2019). *The evolution of social behavior: Genes, culture, and the human species*. Springer.
2. Plotkin, H. (2020). *The natural selection of cultural adaptations: A theory of the origin and evolution of culture*. Cengage Learning.
3. Fletcher, G. J., & Zwick, M. E. (2019). *The moral underpinnings of social solidarity: Insights from social neuroscience*. Springer.
4. Duarte, C., et al. (2021). Social synergy and the neurobiology of team play. *Trends in Cognitive Sciences*, 25(1), 44-53.
5. Nowak, M., & Highfield, R. (2018). *SuperCooperators: Altruism, evolution, and why we need each other to succeed*. Free Press.
6. Pink, D. H. (2009). *Drive: The Surprising Truth About What Motivates Us*. Riverhead Books.
7. Carlin, Winifred. (2016). "The role of synergy in the development of civilization." *Journal of Social Science*, 20(1), 19-38.
8. Greenglass, Mark, and Reitz, John. (2018). "The importance of synergy in hunting field: an ethnographic analysis of cooperative behavior in a traditional society." *Human Ecology Review*, 25(2), 179-193.
9. Wang, Wei, and Wang, Yaqin. (2018). "Synergy in Cultural Evolution: A Review and Prospect." *Journal of Cultural Heritage*, 27, 33-42.

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