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The production of knowledge, the technology and the culture: a brief analysis of their relationships

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Abstract: The production of knowledge, the technology and the culture, despite being phenomena that differ from each other are part of the same context and are involved in the process of human evolution. The objective of this article is to present a brief analysis that shows how these fields related to the evolution of society are linked. It started from the statement that the trajectories aimed at the development of these fields keep an interconnection that together are connected with the evolution of human being which can be explained by the birth of Society and the development that it has been experiencing.
Keywords: society, technology, culture, scientific knowledge.

1. Introduction

Scientific production is an activity that demands an understanding of its context and also the comprehension of historical aspects for a better perception of the relations between knowledge and society. Therefore, the knowledge producer and his production are being influenced by issues that involve the process of knowledge generation which experienced historical phases supported by two fields of social relations aimed to the evolution path for human existence: culture and technology.

Maybe they represent two aspects of the same interconnected phenomenon and require the need to better understand the evolution that man has been experiencing. These experiences have reflected the way how our ancestors lived, how we live today and how future generations will live.

In remote times, human curiosity already moved its intelligence to understand the functioning of the world and, at first, metaphysical and religious issues took over human consciousness. However, from the development of science, man broke away from supernatural explanations and began a process of knowledge generation with more systematization and organization, attributes of scientific knowledge.

In this line, Sequeiraand Marques (2016, p.42) say that "...it is mainly in the last centuries of human history that increasing importance has been attributed to issues related to a specific form of knowledge: Science". It was in rationalism, empiricism and positivism, Knowledge Theory schools of thought, that science came to be seen as the only way in which man is able to understand the functioning of the natural world.

From this perspective, the cultural character highlights more complex aspects of human relationships and is strongly stimulated by elements that are influenced not only by external variables, but also have a relationship with human being feelings, relating evolution and essence, a very subjective aspect.

When talking about culture, we refer to a symbology that tries to situate the individual in the world from an internal perspective, immersed in feelings, visions, fears, illusions, fantasies and dreams, and from an external perspective, in which time and space define the moment of lived experience.

For Martins (2012, p.67), "culture has two dimensions: the procedural, which includes the dynamic, creative, internal, immaterial element of rational reflection, and the external, based on the accumulation of the results of human action in time and space, known as material culture".

Therefore, culture can give different meanings to the same reality. For example, the cow has a religious meaning for Hindu culture while in Western culture this same animal is seen as a source of food. Martins (2012, p.67) also argues that "the rational authorship of culture, which becomes a reflective lens of nature, emerges from the direct lived experience of man in his world".

The technological character, on the other hand, is more objective and closely related to economic issues, although driven by social relations. The capitalism production system, which explains the social and economic prosperity and, according to Marx's historical materialism thinking, imposed an endless struggle for production resources, is reflected in new technologies and, consequently, in the lives of individuals of all times.

It is interesting to see how culture and technology are related to knowledge generation and how this is associated to scientific production, a fundamental factor for the development of science, technology, innovation and society itself.

Sequeira and Marques (2016, p. 45) state that "Marx emphasizes that it is essential to analyze the movement of History taking into account the structure of societies, the forces and relations of production and not the interpretation of men's way of thinking". Thus, technology becomes more objective and understandable as its development is focused on solving the problems we face on a daily basis.

As these problems must be well defined, consequently, the technology to be developed must be punctual and, therefore, objective. According to Silva and Botelho (2015, p.132),"heir to optimism with progress since the philosophy of the Enlightenment of the 18th century, technology materializes only in means to achieve certain ends".

Nowadays, technology is seen as fundamental for the development of society when analyzing the technological determinism that tries to explain social and historical phenomena from it. Therefore, technology is the stimulus for social change. For Neder (2016, p.5), "this notion underlies the Marxist vision, in the face of the technical phenomenon and capitalist progress, thus being a driving force of history".

Hence, for our analysis, the way in which knowledge is produced and the way in which it is materialized through scientific production is a reflection of the evolution of culture and technology.

2. An analysis of the relationship between knowledge production, technology and culture

Human development is the result of an evolution that is based on the development of the intellect which, in turn, is explained by the increase of rationality. It was knowledge that took human beings to a level of dominating the natural world in opposition to submissive behavior towards nature in past ages.

Indeed, human knowledge is the engine of this evolutionary process. So, it can be said that knowledge was born when the human being became part of the natural world. For Sequeira and Marques (2016, p.42), "the search for understanding and explaining the laws of the world dates back to the existence of Man himself".

According to the evolutionary theory of species, this happened millions of years ago when he was already practicing his rationality even in a prehistoric way and began a process of unveiling the world around him. Even in a rudimentary way, the prehistoric knowledge was enough to solve the most emerging problems that ensured his survival.

Furthermore, it is due to this rational behavior that it was possible to perpetuate the human species by triggering the evolutionary process mentioned. Thus, one question emerges: how did human rationality through knowledge make such triggering possible?

The answer in our point of view is clear: through technology. For Karasinski (2013) technology is "the use of techniques and acquired knowledge to improve and/or facilitate the work with art, the resolution of a problem or the execution of a specific task".

The caveat in this concept is in relation to the term "scientific knowledge" because even in Prehistory, when it was not yet scientific, knowledge was enough to create technologies capable of supporting the evolutionary process of human beings. As stated by Kluge et.al. cited by Sequeira and Marques (2016, p.50), "the development of knowledge and its application are by no means exclusive to today's society". As an example of this situation there was the ax for hunting, an instrument that guaranteed for its creator the possibility of getting food, fundamental for life.

Human rationality was adequate to create useful and vital instruments, simply combining rudimentary materials such as a stick, vine and chipped stone in order to produce a hunting tool. This example helps to define that only man is the developer of technology because if technology is applied knowledge and it is unique and exclusive to human ability, then only man can generate technology.

And that was fundamental for his path to success when his own development is analyzed, transforming himself from an element that is submissive to nature to an element that dominates nature as said before. Additionally, it can be seen that technology is timeless since the appearance of humans. However, prior eras including glacial period must be disregarded.

Therefore, talking about technology is not only talking about modern times because the so-called modernity was always on the scene. To differentiate modernity from antiquity is just a matter of organizing space and time in which humanity itself has been included. This means that even in Prehistory man was modern as he experienced the evolution of that specific moment and revolutionized his way of living and the way of relating to natural world.

This can be explained by Figure 1 below (Hayne, 2004), which demonstrates the phases in which technology changes influenced technological progress. As noticed, it is related to the respective times in which it was developed.

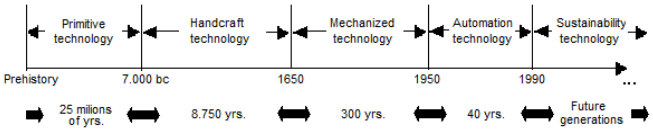

Figure 1 Phases of technology evolution

There is an understanding that the "modern man" is more evolved than his ancestors. However, this terminology only differentiates the space-time aspect because ancients were also modern and according to the concept of modernity, they were more evolved in relation to their ancestors and, from this point of view, future generations will be more evolved than the current one. That is, it is just a relative question.

Kluge, Stein, & Licht cited by Sequeira and Marques (2016, p.50) state that "the era of knowledge is, in fact, the result of our time and our progress". Thus, differentiating antiquity, modernity, post-modernity is just an artifice to organize the time and the space in which the same human being was involved. In short, we are part of the same story, the human history.

This story has been told through evolutionary phases since the appearance of man as showed in Figure 1 and has the human knowledge as the mainspring of this development, that is, the previous figure can explain this phenomenon from the point of view of the evolution of technology linked to the advancement of human knowledge.

It can be seen from Figure 1 that as time passed, human knowledge was more accelerated and, consequently, new technologies were generated in less time and in greater quantities and diversities. This is reflected in the lifetime of each of the technology evolution phases.

Hence, a new question arises: What is the influence of human development supported by technological development in the process of creating culture?

First of all, it is necessary to define culture. Simply pointed out, culture is "part of who we are. In it is what regulates our coexistence and our communication in society" (Tomaziet.al., 2000). Although simplistic, the concept brings a basic element that identifies culture as a part of human development: society.

Furthermore, it is implicit in the question raised, the statement that human knowledge represents the main aspect related to its development because if technology allowed man to evolve, human knowledge was responsible for the creation of technology.

Returning to the original idea that technology supported the human evolution, one can observe that it was only after social development that culture became part of the framework that structured the so-called Society.

This happened from the formation of the first communities after the development of agriculture. The establishment of the first societies was the result of the change observed in human behavior, moving from a nomadic individual to a sedentary one.

Society and culture are closely related and, nowadays, there is a symbiosis that no longer allows us to conclude whether society shapes culture or whether culture shapes society. In this sense, Martins (2012, p.65) states that "the concept of culture thus gains an autonomy of social meaning, in which the individual nature of the person passes into the background and the relationship with society takes on an instituting character".

Some classic philosophers in sociology have formulated concepts of society that internalize some differences that may be conditioned to cultural issues in addition to other ones related to temporal and geographic elements of their time.

For Durkheim (2012), "society is a set of rules and norms, standards of conduct, thoughts and feelings that do not exist only in individual consciousness; feelings are not in the heart, but in social existence, in institutions, which are responsible for establishing such values and references in individuals".

For Max Weber cited by Tomazi (2000, p.20) "collective ideas, such as the State, the economic market, religions, only exist because many individuals reciprocally guide their actions in a certain direction. In this way, they establish social relationships that have to be maintained continuously by individual actions".

For Karl Marx, the idea of society is oriented by a historical condition, which explains social evolution. This condition is linked to a material and, therefore, economic dimension of society. He argued that societies, in their respective times, are driven by material conditions that have led to a class struggle over the means of production.

Bruseke (2016, p.116), agreeing with Marx, argues that "[...] social progress would necessarily be linked to technical advancement, an assessment that consequently made it impossible to develop a critique of the productive forces".

However, even with different ways of thinking that led to different concepts, it is observed that there is something in common and that determines the position of philosophers. This something in common is linked to

culture, which both subordinates and is subordinated by society, that is, a culture that represents it or is represented by it.

But what can one really understand about culture in a world that has experienced a wave of radical changes and that has led individuals to be constantly under the influence of technologies that have destabilized a "certain or given order", especially from the mid-twentieth century?

Hall (1997) says that such changes forced a review of the understanding of what culture is. The understanding is that technological, economic, social and political revolutions led to cultural revolutions. According to this author, in the second half of the 20th century, there was a centrality of culture linked to the expansion of everything associated with it and also with its present role in all aspects of our lives.

This statement is in line with the argument contained in this article that technological revolutions based on human knowledge are responsible for human evolution in all aspects and at all times. For Martins (2012, p.66):

> "Historicity is inherent to the existence of the human rational agent, without whose insertion in time and space and without whose reflection on the experience lived in a given time and in a given space, there is no *raisonnée* appropriation, by and in culture, of lived time and transformed space".

The intensification of this evolution took place from the third industrial revolution or technological revolution in the middle of the last century and accelerated from the recent fourth industrial revolution or Industry 4.0, in which information and communication technologies are seen as the icing on the cake in this evolutionary process.

In this new revolution, knowledge becomes even more important, requiring a review and readjustment of models and everything related to them (Aires, Moreira and Freire, 2018, p.83).

For Hall (1997), there was a paradigm change when comparing culture and society related to a cultural turn that means "an approach to contemporary social analysis that began to see culture as a constitutive condition of social life instead of a dependent variable, thus provoking, in recent years, a paradigm shift in social sciences and humanities".

Finally, a link between the production of knowledge, scientific or not, and the understanding of what culture is necessarily involves a historical approach that explains human evolution itself.

Basically, we are referring to the same process that can be seen in different ways and that, in general, was articulated in different rhythms and intensities, but that, undoubtedly, is self-organized to guarantee that evolution continues.

3. Conclusion

The future still holds surprises that will continue to demand from humans the ability to adapt to the changes that have occurred in the course of their odyssey, guided by the development of knowledge, technology and culture, in which societies are increasingly oriented by frenetic rhythms.

Society is a living organism, full of movements and cycles that require adaptations as human beings advance in knowledge. The consequences of new discoveries are always in line with the change in paradigms that are directly associated with social structures.

It is expected that the ideas presented here can help in understanding the fundamental relationships among knowledge, technology and culture, and that this study will serve as a reflection to guide us in the search for a better understanding of the functioning of societies.

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