Monika Staniszewska
Research and Innovation Centre Pro-Akademia, ul. Innowacyjna 9/11, 95-050 Konstantynów Łódzki
University of Lodz, Centre for Doctoral Studies in Sociology, ul. POW 3/5, 90-255 Łódź
monika.staniszewska@proakademia.eu

EVERETT ROGERS' DIFFUSION OF INNOVATION AND THE POSSIBILITY OF ITS APPLICATION IN THE DISSEMINATION OF RENEWABLE ENERGY SOURCES

Abstract
The author of the diffusion theory of innovation is Everett Rogers - an American sociologist, who in 1962 published a book entitled "Diffusions of innovations", presenting the issues related to the dissemination of a new solution within the market. The presented concept of diffusion of innovation is still current and can be applied to almost every sector that brings a new product to market.

Key words
Innovation, diffusion of innovation, renewable energy sources

The concept of diffusion

The phenomenon of diffusion is seen in many fields including physics, chemistry and social sciences; however, it originated in the realm of science. In physics, diffusion means "the penetration of molecules of one substance within the other (during their direct contact) caused by the inertia of the molecules" [1]. Social sciences have adapted this concept from physics; for example, in anthropology, diffusion refers to cultural exchange. The concept of cultural diffusion was introduced by E. Tylor, and meant the penetration of elements from one culture into another. "The process of creation of cultural similarities in different societies through the propagation of the elements of a given culture and a takeover of these elements by another culture; it is done through borrowing, migration or imposition of foreign cultural elements" [1]. The subject of diffusion can be either material, such as goods, or immaterial, such as ideas and viewpoints. Such diffusion can be seen as a spatial and temporal process. It is worth noting, however, that this process does not necessarily have to involve representatives of different cultures - it can take place in a single, culturally diverse society.

The exchange of goods has always accompanied humanity and has led to its development and the increase of its civilizational diversity. As Diamond stresses, [2], diversity in the development of individual parts of the world is due to the barriers encountered by the diffusion of innovation. According to the author, the geographic location of a continent and the obstacles associated with it are of great importance. "The history of the peoples was not uniform because of the differences in the environments in which these peoples lived, not because of the biological differentiation of the people themselves" [2]. Although Diamond is accused of geographic determinism, it is impossible to undermine his theory that spatial barriers (e.g. mountains or deserts) have significantly influenced the development of the societies separated by them.

The traditional concept of cultural diffusion, as understood here, refers to the phenomena located within geographic space. New light on the idea of diffusion of innovations was shed by E. Rogers when he published his theory, presenting the assumptions of the diffusion of innovation, in which space is not its essential characteristic.

Diffusion of innovation according to E. Rogers

Diffusion of innovation refers to the process of introducing a new solution to the market, which can be both a product and/or a service. Rogers defines innovation as an idea, solution, service or object that is new to a given user [3]. Thus, innovation does not have to be a global new invention, hitherto

unheard of in the world, but a new solution in the subjective sense. For Rogers, "Diffusion is the process by which innovation is communicated, through channels defined over time, among members of a social system. This is a special type of communication in which the message relates to new ideas. Communication is a process in which the participants create and share information with each other in order to achieve mutual understanding" [3]. The essence of such diffusion is:

- Communication - having a processual nature, leading to the formation and sharing of information by individuals in order to achieve mutual understanding.
- Communication channels - the means by which information is spread.
- Time - considered as:
    - The period necessary in the decision-making process, which results in acceptance or rejection of innovation;
    - The speed at which an entity or system adopts innovation, compared to other members;
    - Innovation's rate of adoption - the speed with which members of a social system adopt innovation, measured by the number of members of a given system, who adopt innovation over a certain time.

As M. Muras and W. Zabłocki [4] think, "The key word in the definition of diffusion of innovation is "communication". The diffusion of innovation involves sharing information, as well as communicating feedback among social groups. Another important feature is that this communication is supposed to concern products or ideas that the individual perceives as new". The concept of diffusion of innovation presented by Rogers differs significantly from diffusion in the anthropological sense. J. Mikolajec [5] points to two fundamental differences:

- First of all, "Diffusion in the understanding of the anthropological school of thought occurs between many cultures. Most often it is oriented from a more developed culture towards a less developed culture. Modern theory of diffusion of innovation explores the processes that take place within a single developed or developing culture".
- Secondly, "Diffusion in the understanding of the anthropological school of thought (...) is essentially a spatial, geographical phenomenon. Meanwhile, the spatiality of the diffusion of innovation is not an essential, foremost characteristic".

Whether or not an innovation is accepted depends on its characteristics [3]:

- Relative advantage - this refers to the extent to which an innovation is perceived as superior to existing solutions. This characteristic does not refer to the objective advantages of a given innovation but to the subjective perception of its superiority by the individual.
- Compatibility - this refers to the extent to which innovation is perceived to be in line with the values, standards, and needs of potential adopters in a given society. The higher the degree of innovation compatibility, the faster the rate of adoption.
- Complexity - determines the extent to which innovation is perceived as difficult to understand and apply. As the degree of complexity increases, the innovation is slower to be adopted by individuals.
- Testing possibility - related to the degree to which an innovation can be tried and tested. Making a given product or service available to potential customers can significantly influence the rate of adoption.
- Observability - characterizes the extent to which the effects of a given innovation are perceivable to others. If the application of a given solution can be observed by other people, people will become familiar with it and implement it more easily themselves.

The characteristics mentioned above have an impact on the development of the innovation process and on the rate of its adoption. When a new solution is seen as superior to the previous one it is characterized by a lower degree of complexity, it is easily observable and it is possible to test it: the

chances of its rapid adoption by individuals increase. Rogers distinguished five categories of adopters, characterizing a given individual's approach to innovation [3]:

- Innovators - a small group of people who like risk (about 2.5%) and are open to novelty. They are individuals who are enthusiastic about new solutions, make contacts with other representatives from this category and actively seek information on novelties. They are characterized by a high socioeconomic status and higher level of education as compared to the other categories of adopters.
- Early adopters - a group of about 13.5%. They play a significant role in shaping the public opinion. They are more cautious about innovations than the innovators, but they are open to new solutions. They act as opinion leaders for the next groups of buyers.
- Early majority - this is a group of about 34%. They are characterized by a practical (pragmatic) approach. They are critical of new solutions. They need more time to adopt innovation than the two preceding groups.
- Late majority - this is a group that is as large as the early majority - approx. 34%. They are characterized by skepticism. The decision to adopt innovation can be made under the influence of social pressure or economic necessity. They accept only those innovations that are proven and not risky.
- Marauders - a group of about 16%. These people are reluctant to innovate, they stay away from novelties, they are afraid of change. They are the last to adopt innovation - when it becomes necessary or commonplace.

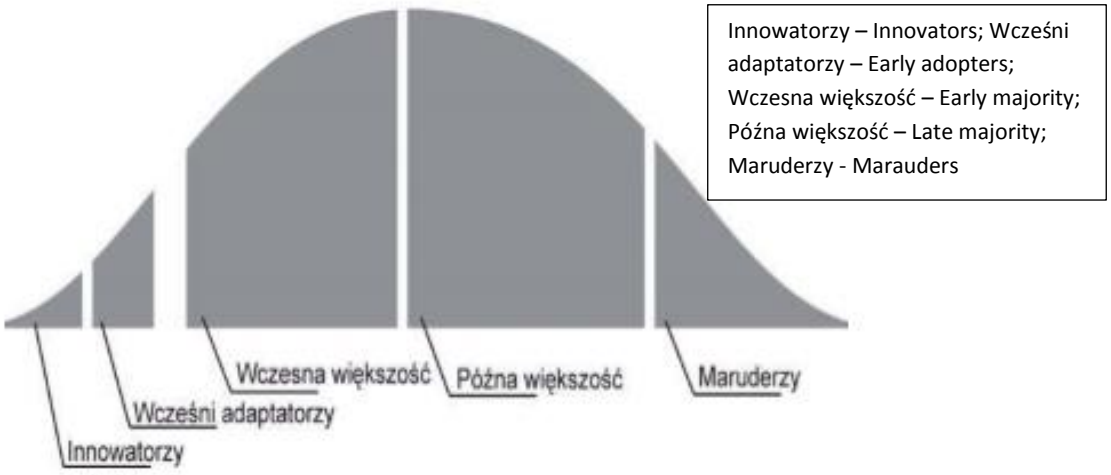


Figure 1 The life cycle curve of technological innovation
Source: [4]

Stages of the decision-making process for adoption of innovation

E. Rogers distinguishes 5 stages of the decision-making process, undertaken by every decision-making body adopting an innovation [3]:

- Knowledge - at this stage, the user gets their first information about the innovation, its applications and characteristics. The mass media play an important role in communicating general information about the innovation. It is they who, on a wide scale, provide the consumers with insights into the emergence of the innovation on the market and its core attributes.
- Persuasion - at this stage, the user's attitude towards an innovation is shaped, whether positive or negative. An evaluation of its usefulness for the individual consumer takes place. The information obtained from mass media is insufficient at this point. The individual is seeking detailed information, based on the opinions of other users.
- Decision - at this stage the user chooses whether to accept or reject the innovation.
- Implementation - at this stage, after a positive decision, the user starts using the innovation.

- Confirmation - at this stage, the user evaluates the decision made, which may lead to:
    - Full adoption of the innovation;
    - Rejection of the innovation;
    - Abandoning the use of the innovation.

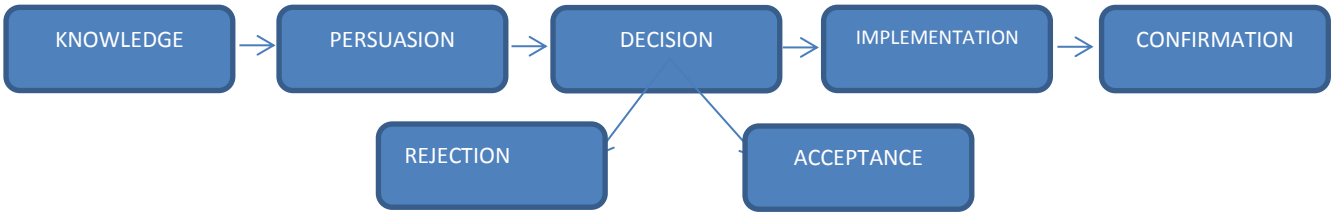


Figure 2 Etapy procesu decyzyjnego The stages of the decision-making process
Source: [3]

The essential elements of the decision-making process are both seeking and obtaining information (coming from different sources, depending on the stage), as well as processing of the information already obtained; therefore, an important element in the process of diffusion of innovation is the appropriate selection of the information channels and the content conveyed through them.

Incentives for adoption of an innovation

The incentives for adoption of an innovation play an important role in speeding up its adoption. They can take different forms. E. Rogers distinguishes the following forms of incentives [3]:

- Direct incentives versus incentives via intermediaries - an incentive can be given directly to the potential user or to an intermediary, the goal of which is to entice the entity to use a given innovation. This type of incentive may take a monetary form.
- Individual versus systemic incentives - an incentive can be passed directly to the potential user or to the social group to which they belong. It can take the form of discounts or rebates.
- Positive incentives versus negative incentives - most incentives are positive and involve rewarding positive responses to innovation. But there is also the possibility of using negative incentives aimed at depriving the individual of privileges or imposing sanctions on them for lack of interest in innovation.
- Financial versus material incentives - incentives may take the form of money or they may be objects that are desired by individuals.
- Immediate or deferred incentives - incentives may be given to the potential user immediately or may be postponed in time.

The choice of incentive form should be tailored to both the type of innovation and the target consumers, to which the new solution is addressed.

The theory of diffusion of innovation and renewable energy sources

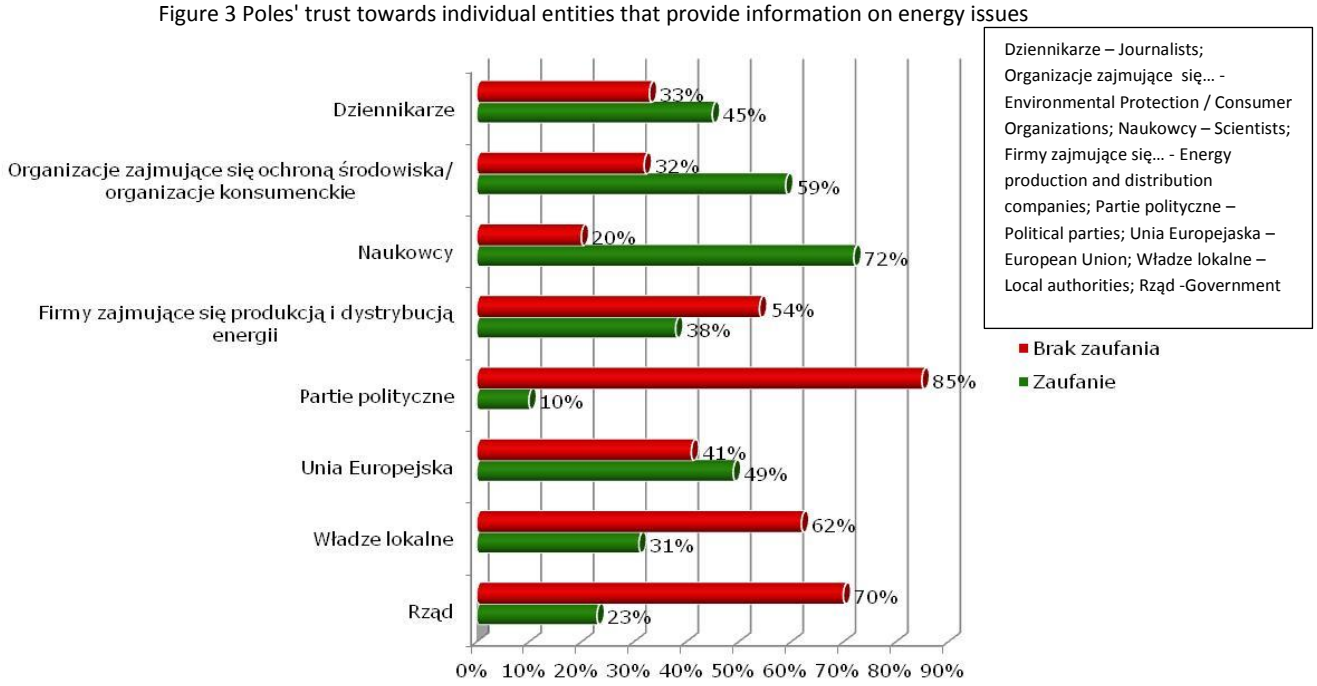
The use of renewable energy has accompanied humanity for millennia. Biomass, water and wind energy were used first and foremost. Thus, solutions related to the use of renewable energy sources (RES) are nothing new on a global scale. But they can be seen as an innovation within E. Rogers' understanding, that is, as a new solution for a particular user or social group. From this perspective, Rogers' diffusion of innovation theory can be of immense importance in the dissemination of renewable energy.

The decision-making stages distinguished by Rogers should be carefully analyzed by the people involved in the dissemination of renewable energy in society. Particularly, the first two stages, knowledge and persuasion, are crucial in building social acceptance for innovative solutions. In the

first stage, individuals should acquire (e.g. through information placed in mass media) a basic knowledge about renewable energy sources, their application possibilities and benefits. Then, at the stage of persuasion, this knowledge should be explored, and information should come from other users of a given technology (especially in the context of building a prosumer society and promoting home installations).

Knowledge of the categories of adopters and their opinion-making role in the society is also important in promoting renewable energy. Of crucial importance then are those who Rogers called early adopters, the individuals who enjoy social trust and who create the opinion of the local community regarding a given solution. According to the Eurobarometer survey [6], among the entities providing information on energy topics, the greatest trust of Poles is enjoyed by scientists and environmental and consumer organizations. Also interesting are the indications that political parties, the government and local authority are perceived as having the lowest level of trust.

Figure 3 Poles' trust towards individual entities that provide information on energy issues



Source: own study based on [6]

It is therefore important that those who enjoy the highest social trust are included in the process of informing the public about renewable energy. An underestimated element of building social acceptance for RES is also the system of incentives that could be used to accelerate the adoption of new solutions by society. An in-depth analysis of potential stakeholder groups and the specifics of the innovation offered will allow for the appropriate selection of tools to support the process of adoption of new solutions.

Conclusion

The theory of diffusion of innovation proposed by Everett Rogers can be applied in practice to the dissemination of solutions related to renewable energy. In essence, it can contribute to reducing the social resistance of potential customers and also increase the efficiency of the diffusion process itself; however, it must be borne in mind that like every theory, besides its advantages, it also has disadvantages.

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