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Case Study

Transforming the Culture of Research and Innovation: The Case Study of RRI

Nirupa Jain[1], Trilok Kumar Jain[2]

[1]Voluntary Researcher with Knowledge Creators, Rishabh Dev Educational Society, Bikaner, India.
[2]Director at the Ecosystem for Innovation and Entrepreneurship, SGVU, Jaipur, India.

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Corresponding Author:
Trilok Kumar Jain, Director at the Ecosystem for Innovation and Entrepreneurship, SGVU, Jaipur, India.
E-mail Id:
jain.tk@gmail.com
Orcid Id:
http://orcid.org/0000-0001-5734-5956
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A B S T R A C T

The authors discuss about the current status of research and what should be done to improve it. The authors present the case study of RRI, which has become a transformational tool for the future. RRI gives emphasis on open-source access of research findings, gender participation, science education and ethical research. The authors have reviewed the agenda and the tools of RRI. This article explores the fundamental concepts of research, innovation, and Responsible Research and Innovation (RRI) as integral components of societal progress. Research, characterized as a systematic and scientific study, contributes to new knowledge, methods, and solutions to societal problems. The article underscores the importance of ethical considerations in research, particularly in preventing the negative consequences of narrow-focused endeavors, such as the development of harmful weapons. RRI, a movement championed by the European Union, emerges as a transformative approach, prioritizing the overall well-being of society, fair practices, and transparent dissemination of research findings through open access channels. The discussion delves into science with and for Society (SWAFS), a key element of the Horizon 2020 program, aligning with RRI principles. SWAFS emphasizes institutional change, gender equality, territorial partnerships, citizen science, and building a knowledge base for societal benefit. Various tools and initiatives, including Scientix, GenPORT, ECSITE, and EUSEA, are highlighted for their roles in promoting responsible research practices, gender inclusion, and public engagement.

Keywords: RRI, Responsible, Research, Innovation, SWAFS, SDG

Introduction

Research is a systematic and scientific study to collect data, analyze data and derive conclusions on the basis of the data to find some solutions to the problems under study. The objectives of the research is to add new knowledge, new information, new methods, new products, new services or new observations based on data, facts and information, which would be collected using systematic and scientific methods. Research stands as the cornerstone of progress, offering a structured and scientific avenue for the collection, analysis, and interpretation of data. This systematic approach serves as the bedrock for the development of new knowledge, innovative methodologies, and solutions to the myriad problems confronting society. In the broader context, research seeks not only to unveil the mysteries of the unknown but also to contribute tangibly to the advancement of human understanding, be it in the realms of technology, science, or social well-being. At its core, the objectives of research transcend the mere acquisition of

facts and delve into the realm of practicality, aiming to introduce novel information, pioneering methodologies, groundbreaking products, or transformative services. The systematic and scientific methods employed in research pave the way for a deeper comprehension of complex phenomena and the formulation of informed conclusions. This intricate process becomes a catalyst for progress, serving as a catalyst for the evolution of societal norms, standards, and overall living standards.

Innovation, the offspring of research, manifests as a beacon of change, representing a departure from conventional methods or products towards more radical and effective alternatives. Whether born out of deliberate research efforts or emerging serendipitously, innovation possesses the power to elevate the quality of life for the common populace. Its influence extends beyond individual advancements, weaving into the fabric of societal development by offering improved methods, enhanced products, and services that, in turn, contribute to the collective well-being. What emerges from this nexus of research and innovation is a profound movement towards responsible research and innovation (RRI). Introduced and championed by the European Union, RRI marks a paradigm shift, underscoring the imperative for researchers to anchor their pursuits in ethical and moral foundations. As this movement gains momentum across European countries, its significance lies in ensuring that research endeavors uphold a sense of responsibility, employing fair and judicious methods that prioritize the broader interests of humanity. As we navigate through the intricate tapestry of research, innovation, and the evolving landscape of responsible practices, this exploration aims to unravel the multifaceted layers of RRI. From its inception to its tangible impacts on society, we delve into the principles, initiatives, and tools that characterize this movement, ultimately envisioning a future where research not only advances knowledge but does so responsibly, ethically, and inclusively for the betterment of all.

What is Innovation

Innovation is a new method of doing something. It is a radically different method or different product from the earlier product or method. Innovation may be an outcome of research or a chance factor. Innovation leads to improved living standard of the common people. Innovation can help in preparing a better society because of its ability to solve the problems through development of improved methods, improved products and improved services.

What is RRI

RRI stands for responsible research and innovation. This is a movement towards better quality of research and innovation and it puts the focus of the researchers on ethical and moral foundations. This was started and popularized by European Union. Now it is being popularized by all the European countries because it ensures that the researchers are responsible and they take up only fair and proper methods for conducting research and innovations.

Fields of Research

Research is applied in every field of knowledge, skills and human development. There is research in every new product or services that we observe. Therefore, research gives direct access to man y people directly or indirectly.

Research refers to an inquiry in order to gain better understanding, or new knowledge, or new information or find new explanation for some environmental factor. There are many ways research can help in the development of a society. Research helps in the following ways:

- Addition of new knowledge.
- Addition of new information.
- Preparation of a new method of doing some work.
- Finding explanation for some phenomenon.
- Preparation of a new initiative for solving the problems of the society.

Research involves a systematic and scientific method for getting better knowledge. There are many ways to find a research problem.

How to Identify Research Problem

Research problems can be identified based on the day-to-day observance or based on the common problems affecting mankind or based on the latest advances in technologies or social front. The ultimate purpose of research is to help the society through rigorous study, data collection, analysis and observations.

Un-Ethical and Inappropriate Research

Although research is designed for helping the mankind in general, however, we have seen many ill-effects of mis-guided research efforts, which have focused on some narrow objectives ignoring the broader interest of the mankind. Take example of development of weapons. The development of weapons has cause loss to the mankind. Development of weapons of mass destruction is very harmful for the entire society and therefore it must be stopped. However, countries are spending huge resources on research on weapons of mass destruction. There is an example of narrow focus on research. The countries wish to continue their research, without realizing that the knowledge developed through this research can cause server loss to the entire mankind. We have already witnessed the impact of human competence in development of weapons of mass destruction at the Hiroshima and Nagasaki in Japan during the 2nd world war.

What is Responsible Research

When the goal of research is to create something useful for the society and when the entire research process is based

on the ideals of transparency and openness, we can say that the research is moving towards responsible research. Researchers must create following essential elements for creating responsible research:

a. Focus on overall well-being and welfare of the society at large so that the outcome of the research gives benefits to the society.
b. Development of better products and services, which can help the society through upliftment of living standards and through enabling the common people to use better products and services.
c. Creation of an open repository of research findings so that more and more people can access it and take advantages of this research. The researchers must get their papers published in such publications, which are open access journals so that more and more people are able to benefit from the research findings.
d. Use of fair practices with regard to research the research process should use fair practices and should ensure that the outcomes of the research are suitable for the mankind in general. Appropriate methods would help the researcher in conducting ethical research.

Research is based on many methods, which enable the researcher to conduct systematic and scientific study with regard to an observation.

There are many methods of research, which include the following: -

What is SWAFS

Science with and for society (Swafs) is a part of Horizon 2020 work program of European Union to use research for the benefit of the society. It has prepared its strategic orientation program on five points, which are as below: -

1. Accelerating and catalyzing processes of institutional change.
2. Stepping up the support to Gender Equality in Research & Innovation policy.
3. Building the territorial dimension of Swafs partnerships.
4. Exploring and supporting citizen science.
5. Building the knowledge base for Swafs.

The Horizon 2020 is based on the concept of RRI to ensure that the research benefits the society at large and the purpose of research is overall benefit. It has taken many working guidelines as below: - Responsible research and innovation (RRI) including gender, and Enhancing the attractiveness of the research profession. Every research proposal must focus on one or more of the following areas: - Climate change, sustainable development, and biodiversity, - Cooperation with third countries. Each of the projects of SwafS proposal must address one or more of the SDGs so that they are able to create a better impact on the environment.

New Agenda and Tools for Researchers

The researchers must involve all stakeholders and society in their research and innovations. There should be an attempt to integrate science and society. The research must benefit the society at large and the society must contribute towards research. The research approach should be based on ethics and standard operating procedures. The researchers must learn and practice ethics and moral code of conduct. There is a need to integrate research and innovation with fair practices. The European Union has given stress on the following five issues with regard to RRI:

1. Participation of common Citizens and their associations participation in science and research.
2. Formal and informal science education.
3. Gender participation and equality in science.
4. Research ethics and integrity.
5. Open access to research results.

The initiatives to spread RRI would help the society in its development and would transform the society at large. The prime objective of RRI is to promote the following:

- Ethics - ethics based research and innovation.
- Gender - greater participation of women in research and innovation.
- Open Science - dissemination of scientific research in open access journals and open access resources.
- Public Engagement - greater public participation in science, research and innovation.
- Science Education - spreading science education to ensure that there is inquiry-oriented science education.
- The focus is on STEM (Science, Technology, Engineering and Mathematics) education.

Scientix is one such tool as a part of RRI, which is there to promote Europe-wide collaboration among STEM (science, technology, engineering and moths) scholars, professors, teachers, researchers, policy-makers and other STEM professionals. Scientix aims to spread innovative education through this network. It aims to involve teachers in the process of reaching out the students through an inquiry-based system of science education.

Gender is an important issue in RRI. The aim is to increase participation of women in scientific research and innovation. GenPORT has been launched as an online platform for the purpose of greater participation of women in scientific research, innovation and development.

ECSITE is another platform, which connects museums, zoos, aquariums, universities and other research-oriented institutions in a network. This was started twenty years ago and it is contributing towards spreading RRI.

EUSEA is another such platform to promote science, research and innovation in Europe. It is a platform for

organizing science-based events, which enable participation of common people in science, research and innovations. The main events organized by it include the following: -

- Science open parliaments.
- Citizen' workshops and conferences.
- Science cafés.
- Children's science-based universities.

RRI aims to create interest among young scholars towards science, research and innovation. There are many awards also to promote young people towards science, research and innovations. All these initiatives will enable greater participation of people in these sectors. There is a need to create greater interest among common people about science, research and innovations. There is a need to transform institutions and research centers so that they work towards making science serve the common people and involve common people in science education, research and innovation.

Science Education

In addition to the issues mentioned above, RRI seeks to promote institutional change, to foster the uptake of the RRI approach by stakeholders and institutions, thus ensuring good Science Governance.

Furthermore, RRI is an important, cross-cutting issue in Horizon 2020, which will be promoted throughout Horizon 2020 objectives. In many cases, inter- and transdisciplinary solutions will have to be developed, which cut across the multiple specific objectives of Horizon 2020. Within the specific objectives of program, actions can focus on thematic elements of RRI, as well as on more integrated approaches to promote RRI uptake.

Innovative formal and informal science education teaching and learning is important in order to raise both young boys' and girls' awareness of the different aspects encompassing science and technology in today's society and to address the challenges faced by young people when pursuing careers in Science, Technology, Engineering and Mathematics (STEM).

In order to make science education and careers attractive for young people. A sustainable and cross-cutting interaction between the relevant actors in the field is crucial:

- Different levels of the education system.
- Universities and other higher education establishments.
- Research and innovation funding and performing organizations.
- Civil society organizations and NGO's.
- Industry, policy-makers.
- Professors.
- Teachers.
- Students and pupils.
- Science museums and science centers.

Examples of Good Practice in Science Education:

Scientix is the community for science education in Europe promotes and supports Europe-wide collaboration among STEM (science, technology, engineering and moths) teachers, education researchers, policymakers and other STEM education professionals.

Conclusion

The purpose of RRI is to promote ethics, involve common public and give equal opportunities to women in research and innovations. There is emphasis on ethical research. This emphasis is focused in creating a platform for creating ethical research. There is also an emphasis on creating such research and innovations, which are good for society and are acceptable to the society at large. There is also an emphasis on creating a good connection with the vulnerable communities and common people so that there is greater participation of common people in research and innovations. There is an emphasis on sharing research output on open access platforms so that it has wider use for transforming mankind.

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