

System Thinking Approach to Deal with Sustainability Challenges

Anoop Pandey¹, Anuj Kumar²

¹dr.anooppandey@gmail.com, ²anujsmooth@gmail.com (Corresponding Author)

^{1,2}BVIMR, Delhi, India

Abstract - In this research paper the authors will test the relevance of system thinking approach in dealing with the complex problems. System thinking is different in comparison to traditional thinking because it focuses on the inter relationship between the different components used in the system. The authors will test the relevance of system thinking approach in dealing with the problem of obesity. Now-a-days India, UK, Australia and several other countries are facing obesity problems in children. Obesity is a root cause for many other diseases in the system. This is an alarming situation and traditional approaches are failed to find solution of this problem. In this paper the authors will check whether system thinking approach will be beneficial in sustainability challenges or not. United Kingdom is effectively using system thinking approach and its example will be discussed in this research paper.

I. INTRODUCTION

A system is set of separate parts interrelated with each other to work towards a common goal. In this essay the author will critically discuss the argument whether system thinking is useful in developing solution of sustainability challenges. The author will support the argument favours the argument that system thinking is useful in dealing with wicked problem. System thinking focuses on the individual parts and the interrelationship between those parts to produce solution for the problems. The author will also discuss the applicability of system thinking in dealing with the problem of obesity. Both developing and developed countries are facing the problem of obesity. The obesity problem is increasing at rapid pace in children of America and other European countries. Obesity is considered as a wicked problem because there is no definite solution of this problem. Some researchers have also concluded that system thinking is a very time consuming process and it is not easy to understand. The authors will also discuss the counter arguments against system thinking approach in the last part of research paper.

II. SYSTEM THINKING APPROACH IN DEALING WITH SUSTAINABILITY CHANGES

System thinking approach is very useful in dealing with the problems of sustainability because this approach looks the things from a macroscopic rather than seeing a shorter picture. Now-a-days system thinking has been used by various

academicians and practitioners [15]. System thinking has been founded by Professor Jay Forrester in 1956. There is a significant difference in the traditional thinking approach and system thinking approach. Traditional analysis approach focuses on what is being studied while system thinking approach looks for an interrelationship between the different constituents of the system. It can be denied that world is pacing towards industrialization and globalization. In this globalized era, the world needs to face several complexities in coming year. System thinking will help in dealing with those complex problems. System test is an essential application of system thinking approach.

The three important parts of system test are purpose, elements and functions [1]. First part is system test; it describes the purpose for which system thinking has been adopted. The second part works on different elements of system thinking. Finally, there is need to see the interrelationship between different elements. One can say computer and informational technology have made a transformational change to the sustainable society. Computers and technology have provided computational solutions to the most complex problems of the world. Sustainability challenges need to be solved in different manner. A system approach is helpful in finding an interrelationship between technology, human behaviour and environmental impacts. In modern society there is a shift from computational thinking to system thinking [7]. Computational thinking involves the use of programming and algorithms to find the solution each complex problem. There is one restriction or limitation with computer thinking that the computer professionals try to solve all the problems with the help of algorithms. There are certain problems which can't be understood through algorithms. For those problems complex system thinking has been evolved.

System thinking focus on how one constituent of system will interact with another constituent of the system. The nature of system thinking makes it enable to solve complex problem faced by the society. For e.g. System thinking is very useful in dealing with the problem which involve interrelationship between different actors to solve the complex problems, recurring problems which

have not been solved even after the past efforts [2]. Sustainability challenges are also called the adaptive challenges because already established protocols and procedures can't be applied to such situation [10]. There is no unified procedure or approach to deal with most wicked sustainability challenges. System thinking can be useful in changing our previous mental models to deal with the problems of sustainability because it contains process, technologies and set of skills. [18] has argued that the mental models using system thinking involves certain steps:

1. Framing the issue using dynamic thinking and system as cause thinking
2. Building understanding using operational thinking, scientific thinking and generic thinking
3. Communication using emphatic thinking

III. OBESITY PROBLEM

Obesity is considered as the wicked problem because obesity has all the features of a wicked problem. Wicked problems are not stable, no clear solution and socially complex in nature [3]. Obesity rated as a complex problem because there are numerous interconnected variables and elements attached to it. The increasing obesity rates are equally affecting both developed and developing countries. Now obesity is affecting the health of young children and adults. Obesity problem causes severe effects on the human body. For e.g. high blood cholesterol, pregnancy complications, mental stress, low self-confidence, hirsutism and psychological disorders. The total economic cost associated with obesity is \$117 billion [5]. America is most severely affected by obesity problem in last few years. World Health Organization has announced obesity as one of the greatest public health challenges of 21st century.

A joint study by International Association for the study of Obesity and World Health Organization has estimated that approximately 1.7 billion people are overweight or obese. The WHO study also concluded more than 2.5 million deaths per year including 3 lakh deaths in USA [6]. Obesity problem occurs when energy intake of the individual is more than the energy expenditure. The high energy intake and lower energy expenditure creates energy imbalance. The people are categorized overweight when their body mass index is more than equal to 25 kg/mm and obese when their body mass index is more than equal to 30 kg/mm. The two major concerns related with obesity are; it is increasing at rapid pace and there is no well-defined solution to this problem.

In spite of the seriousness of obesity problem the doctors and physicians are considering as simple problem and trying to change individual behaviour

to counter the problem of obesity. There are several therapies to deal with the problem of obesity which include behavioural, cognitive, surgical and pharmaceuticals therapies. The most common adopted by doctors and health care professionals to deal with the problem of obesity is to advise the people on regular diet and health education. In recent time Bariatric surgery and Pharmacotherapy have produced some excellent results to deal with the problem of obesity. The previous researches have also shown that physicians are not properly trained in obesity management strategies. Physicians and health care professionals recommend obese people to eat less but there are no absolute strategies to support their recommendations. The physicians are also facing structural problems while dealing with the problem of obesity. It is difficult to arrange appropriate size of equipment to deal with the problem of obesity in different people.

IV. APPLICATION OF SYSTEM THINKING TO DEAL WITH PROBLEM OF OBESITY

System thinking can provide ways to deal with complexity of obesity problem and it will be new beginning for the health care professionals [10]. The system approach has been very useful in dealing with various healthcare problems such as cardiovascular disease, mental health and tobacco control. This approach has a brilliant history of past 50 years. A system approach sees the problems from broader perspective to find out interconnection between different levels.

A system approach also considers the importance of circumstances and condition under which a specific decision and the impact of those circumstances during the implementation phase. While dealing with wicked problems under system approach even a small change in one element can make a big impact on the other elements. In dealing with obesity problem the first task of the physicians is to match capacity with complexity. Many physicians avoid discussion with patents over obesity problem because they have large patent load, less knowledge about the practices used for obesity problem and minimum resources. The physicians need to change their approach while dealing with obesity problem. Obesity is a complex problem and physicians need to have the information about best practices to deal with obesity problem. They need to counsel the obese people in effective and improved manner. Physicians can reduce the complexity of the obesity problem by focusing on the process rather than outcome.

Physicians need to improve their communication with the patients because many patents remain uninformed about the prevention techniques.

Physicians can access the risk, study the current behaviour of patients, convince them for a change in behaviour, set goals and help them in combating against the barriers. The main objective of system thinking approach is to create an atmosphere which encourages communication, feedback and improvement. A health literacy team consist of experts can take the responsibility to increase the awareness about obesity in the minds of people.

The Foresight group in UK has adopted system thinking approach to deal with the problem of obesity [9]. Firstly the group has searched for various factors responsible for obesity based on scientific evidence. In the second step group members have identified the relationship between different factors and the effect of changing the value of one factor over another. In the third step the group has analysed the future levels of obesity and the most effective responses. The Foresight group has designed a map which has showed the interrelationship between different contributors to energy balance. System thinking argues that there is need of integrated interventions between different levels of society which include family, individual, local, national and international level.

Physicians and health care professionals should focus on long-term behavioural change in obese people. Only the implementation of policies is not important but the evaluation of those policies is also important. A system thinking approach also helped various stakeholders and decision makers to think about the future of various approaches base and potential costs associated with them based on what if scenarios [16]. System dynamics modelling also helped United States in dealing with the problem of obesity. System thinking argues that we can't put the entire responsibility of weight loss on the shoulders of patients. The food production companies also need to understand the problem of obesity. Similarly families, school, communities all need to come together to work together to get rid of the obesity problem.

We need to make an informative environment which will see obesity as a wicked problem rather than considering it as simple problem [12]. System of system methodologies presented two dimensions to understand obesity problem. The first dimension talked about nature of system which is changing from simple to complex and second dimension talked about relationship between the participants [8]. On the basis of overall analysis it can be system thinking approach has provide multiple methodologies to generate knowledge, finding interrelationships between different elements and reducing the impact of obesity problem.

There are some arguments which oppose the relevance of system thinking approach. On one

hand experts are suggesting the use of system thinking to solve wicked problems on other hand some researchers argued that system thinking shared the ideology of planners, technical efficient persons and planners [13]. It is difficult for a health care professional of physicians to fit him in the dimensions of system thinking. Another criticism of system thinking approach is that it is a time consuming process [14]. System thinking is trying to make an interconnection between all the microscopic elements. Many physicians remain due to heavy patient loads and their other responsibilities. It will be challenging for all the physicians and health care professional to give enough time to implement system thinking approach.

System thinking has been applied to those problems which have no definite solutions. It is easy to work on the problems if the boundaries of problem have been decided. The third criticism of the system thinking that there is no certain boundaries of the system thinking. Physicians need to think about too many things in limited time. Firstly the problem is complex secondly there is no defined solutions of the problem. Fourth criticism about the system thinking is that it is considered equivalent to the cybernetics. As argued by [4] system thinking perceives the world as a computer and cybernetics was considered as another extension of mechanistic and reductionist model [17]. It is true the system thinking talks about interactions between different elements but the system philosophy doesn't specify nature of interactions and interdependencies [20]. In this essay the author has argued that system thinking is used for complex and wicked problems. But it is very complex for people to understand the mathematical models and tools used in the system thinking.

V. RECOMMENDATION

There is need to involve system thinking approach in the course curriculum of the higher education programmes. The inclusion of system thinking approach will enable students to see the complex sustainability challenges from complex and pluralistic views of the world [11]. The researcher needs to show the students practical application of system thinking by applying system thinking in design of course curriculum. In this paper authors have discussed about obesity challenges but sustainability problems are not limited up-to obesity problem. The world is facing global warming and environment change problems. The teaching of concepts of system thinking will help students in dealing with environmental problems.

VI. CONCLUSION

On the basis of above discussion it can be said that system thinking is very much useful in dealing with sustainability challenges. The traditional method used for dealing with the problem of obesity are not providing effective result, this problem is growing continuously at rapid pace. Physicians and health care professionals need to give their time and effort to develop various objectives for applying system thinking approach in dealing with the problem of obesity. Foresight group UK has successfully adopted the system thinking approach to deal with the problem of obesity. Foresight group has selected various factors and relationship between different elements to deal with the problem of obesity. Though people are using system thinking from last 50 still the critics said it is time consuming process with no limitations.

REFERENCES

- [1] R. D. Arnoldand, and J. P. Wade, "A Definition of Systems Thinking: A Systems Approach", *Procedia Computer Science*, Volume 44, pp. 669-678, 2015
- [2] D. Aronson, "Overview of Systems Thinking", [Online] Available at: www.thinking.net/Systems_Thinking/OverviewwStarticle.pdf
- [3] Australian Government, "Tackling Wicked Problems: A Public Policy Perspective", Australian Public Service Commission, 2007
- [4] M. Berman, "The Cybernetic Dream of the Twenty-First Century", *Journal of Humanistic Psychology*, Volume 26, Issue 2, pp. 24-51, 1986
- [5] T. Cole, "Obesity: A Chronic Chronic Disease", [Online] Available at: http://www.hosa.org/emag/articles/obesity_poverpoint.pdf
- [6] M. Deitel, "Overweight and Obesity Worldwide now Estimated to Involve 1.7 Billion People", *Obesity Surgery*, Volume 13, pp. 329-330, 2003
- [7] S. Easterbrook, "From Computational Thinking to Systems Thinking: A conceptual toolkit for sustainability computing", *Proceedings of Conference on Information & Communication Technologies for Sustainability (ICT4S'2014)*, Stockholm, Sweden, 24-27 August, 2014
- [8] M., Ferrari, "Avoiding Conflicting Health Promotion Messages between Eating Disorders and Obesity Prevention; Can Systems Thinking Act as a Mediator, and How?", *International Journal of Humanities and Social Science*, Volume 19, Issue 1, pp. 39-47, 2011
- [9] Foresight, "Tackling obesities: Future choice", Project Report 2nd Edition London: U.K. Government Office for Science, 2007
- [10] S. Froom, L. M. Johnston, Matteson, C. L. and D. T., Finegood, "Obesity, Complexity, and the Role of the Health System", *CurrObes Rep*, Volume 2, pp. 320-326, 2013
- [11] A. Gregory and S. Miller, "Using Systems Thinking to Educate for Sustainability in a Business School", *Systems*, Volume 2, pp. 313-327, 2014
- [12] T. K. A. Hamid, "Thinking in Circles About Obesity: Applying Systems Thinking to Weight Management", New York, Springer. Hawe, 2009
- [13] D. R. Hammond, "Toward a Science of Synthesis: The Heritage of General Systems Theory", UMI, 1997
- [14] M. C. Jackson, "Systems Thinking: Creative Holism for Managers. UK", John Wiley & Sons Ltd., 2003
- [15] S. Kim, "Can Systems Thinking Actually Solve Sustainability Challenges? Part 1, The Diagnosis", [Online] Available at: <http://erb.umich.edu/erbperspective/2012/06/04/systems-thinking-part-1/>
- [16] S. Kumanyika, L. Parker and L. Sim, "Defining the Problem: The Importance of Taking a Systems Perspective in Bridging the Evidence Gap in Obesity Prevention: A Framework to Inform Decision Making. Washington", National Academies Press, 2010
- [17] K. C. Laszlo, "Dimensions of System Thinking" [Online] Available at: http://archive.syntonyquest.org/elcTree/resourcesPDFs/Systems_Thinking.pdf
- [18] B. Richmond, "The Thinking in Systems Thinking: Eight Critical Skills", *Tracing Connections*, ISEE systems and the Creative Learning Exchange, 2010
- [19] C. Soderquistand S. Overakkar, "Education for Sustainable Development: A Systems Thinking Approach", *Global Environmental Research*, pp. 193-202, 2010
- [20] Somya, "System Approach to Management", [Online] Available at: <http://www.slideshare.net/17somya/system-approach-to-management>