

Applying Systems-Based Approach to Sustainable Development Goals (SDGs)

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Abstract

As a result of achieving the 17 Sustainable Development Goals (SDGs) of the United Nations is a very complex program with many interconnected goals. It portrays sustainable development as the convergence of three interconnected systems' goals: environmental (or ecological), economic, and social. It demonstrates how each of the 17 SDGs can be defined as a primary goal attribute of the environmental, economic, or social system and how, as suggested by the systems approach, attempting to achieve all of these goals at the same time may involve significant trade-offs.

Achieving the United Nations' 17 Sustainable Development Goals as a coherent unit requires decision-makers to take a system-based approach, acknowledging that progress on one goal can undermine or enhance progress on others.

One of the best ways to approach sustainability development is to apply a systems approach.

Achieving the United Nations' 17 Sustainable Development Goals as a coherent unit requires decision-makers to take a system-based approach, acknowledging that progress on one goal can undermine or enhance progress on others. System complexity might vary. It is a method for comprehending how a system's essential parts interact. A system is a group of components that cooperate to produce something more than the sum of its parts.

This paper investigates the relationship between the systems approach and Sustainable Development Goals (SDGs). It attempts to address sustainability goals by linking them as a system.

Key Words: Systems Approach, Sustainable Development Goals (SDGs), Systemic Problem

Why Applying Systems Thinking to Sustainability Development?

A system's component pieces will behave differently when isolated from the system's environment or other system components, according to the systems thinking approach to integration. Systems thinking aims to perceive systems holistically, in contrast to positivist and reductionist thinking. It is in line with systems philosophy, focusing on understanding a system by looking at the connections and interactions between the parts that make up the system.

Systems thinking recognise how various system components interact with one another and assure that the whole is greater than the sum of its parts. However, considerable amounts of coordinated thinking that dig deeper to address underlying problems are required if the SDGs are actually to shift our entire system onto a sustainable path. Delivering the SDGs successfully necessitates a truly strong systems approach.

The majority of issues facing humanity, according to Peter Senge in *The Fifth Discipline*, "concern our failure to comprehend and control the increasingly complex systems of our world" (Senge, 1990). In order to solve the challenges of the natural world, Capra and Pauli also underline the importance of systems thinking: "The more we examine the major problems of our time, the more we come to recognise that they cannot be understood in isolation." Instead, they are systemic issues that are interrelated and dependent on one another (Capra et al, 1995:2).

Finding the cause of the issues is a crucial step in creating a systemic strategy since it enhances the likelihood of identifying the leverage points. Senge (2006) defines leverage

as a tiny, focused action that, if executed properly, can result in significant change with little effort. Another way to gain leverage is to make the fundamental solution—which addresses the main causes of the issue—stronger while decreasing the symptomatic response to the issue (Senge, 1990).

The UN Sustainable Development Goals (SDGs)

In 2015, the United Nations (UN) General Assembly established 17 Sustainable Development Goals (SDGs). These goals aim to develop attainable targets that can be met as part of a 2030 agenda for sustainable development; for example, "the goals and targets will stimulate action in areas of critical importance" to humanity and the planet over the next 15 years. The SDGs are further subdivided into 169 targets, with approximately 230 indicators proposed to assist in meeting these targets.

The SDGs provide a road map for addressing poverty, inequality, climate, environmental degradation, prosperity, peace, and justice. It gives confidence in people to take advantage of opportunities for problem-solving.

The UN (2015) acknowledges the value of cross-sector cooperation in resolving the issues mentioned in the SDGs. Cross-sector partnerships are associations between two or more sectors that cooperate to address the societal problems (Bryson et al. 2006).

The United Nations emphasises the value of multi-stakeholder collaboration to accomplish the Sustainable Development Goals (SDGs) by 2030. Governments, the public and commercial sectors, and non-profit organisations are a few stakeholders who will develop deep bonds and cooperate to address a shared interest or concern.

Investigating the systems approach and its relationship to the UN SDGs is critical. Each of the 17 SDGs can be viewed as a goal primarily related to the environmental, economic, or social systems. Attempting to achieve these goals simultaneously, as the systems approach suggests, may involve significant trade-offs.

The holistic approach provides an art form for "seeing the whole" (Senge 2006). It includes analysing, synthesising, and comprehending multi-level interconnections, interactions, and interdependencies. Systems-based approaches are helpful for problem structuring, dealing with interdependence, understanding multiple perspectives, and making boundary judgments, but only in the context of use (Reynolds et al, 2010). Some explicit aid agents in evaluating and taking purposeful action.

The Systemic Problem of Sustainability

The sustainability paradigm is a complex issue that necessitates the collaboration of multiple stakeholders from various sectors. Furthermore, success requires the formation of agreements among the parties involved, as well as the absence of reliable data and many uncertainties. These types of problems cannot be solved using a reductionist approach. Instead, a more holistic approach is required, emphasising the importance of systems thinking in achieving a more sustainable future.

What is a Systems Approach?

Senge (2006) defines systems thinking as a way of seeing the big picture and imagining the interdependence of various components as a single entity. Davidz and Nightingale (2008) expanded the theory by proposing the concept of interdependence and interrelationships. Systems thinking analyses synthesises, and comprehends multiple-level interconnections, interactions, and interdependencies (Davidz and Nightingale 2008).

A systems-based approach, rather than attempting to check off each of the 17 goals individually, focuses on how SDGs can be achieved as a cohesive unit. A systems-based approach recognises that progress toward one goal may impede or enhance progress toward other goals in the exact location.

To address complex, ill-defined problems, systems-based approaches have been used. This includes problem structuring, dealing with interdependence, comprehending multiple perspectives, and making boundary judgments while keeping the context of use in mind. (Reynolds and Holwell).

The SDGs are a plan for solving issues like prosperity, peace, justice, poverty, inequality, climate change, and environmental degradation. It encourages individuals to take advantage of the many opportunities for problem-solving that are accessible, as the United Nations (2015) has noted the significance of cross-sector collaboration in resolving the SDG issues that have been highlighted.

According to Capra (1996), understanding today's significant issues requires looking at the interconnected parts of the same system. Given this, the SDGs should be viewed as a systemic issue that can only be solved through collaboration rather than by any single sector acting alone.

The holistic approach provides a means of "seeing the whole" (Senge 2006) according to Davidz et al (2008). This includes analysing, synthesising, and comprehending multi-level interconnections, interactions, and interdependencies as expressed in the literature. Systems-based approaches can help with problem structuring, dealing with interdependence, understanding multiple perspectives, and making boundary decisions, but only in the context of use - "how the world works" (Reynolds et al, 2010). Some explicitly assist agents in evaluating and taking action.

The Sustainable Development Goals (SDGs) is an extremely complex programme with numerous interconnected goals. It portrays sustainable development as the convergence of three interconnected systems' goals: environmental, economic, and social. It demonstrates how each of the 17 SDGs can be characterised as a primary goal attribute of the environmental, economic, or social system and how attempting to achieve all these goals simultaneously may involve significant trade-offs.

Economic interpretations of sustainability typically begin with the World Commission on Environment and Development's (WCED) 1987 consensus, which defined sustainable development as: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Despite widespread acceptance of the WCED definition of sustainability, it is hard to define to achieve this goal remain without looking at them as a system. The systems approach, which defines *sustainability* as the maximisation of goals across environmental, economic, and social systems, was one of the first economic attempts (Barbier et al,1987).

This method is credited to Barbier et al. (1987), who initially recognised three systems as essential to any growth process: the ecological or environmental system, the economic system, and the social system. Their second assertion states that "sustainable economic growth attempts to maximise the goals of all these systems through an adaptive process of trade-offs" (Barbier et al, 1987).

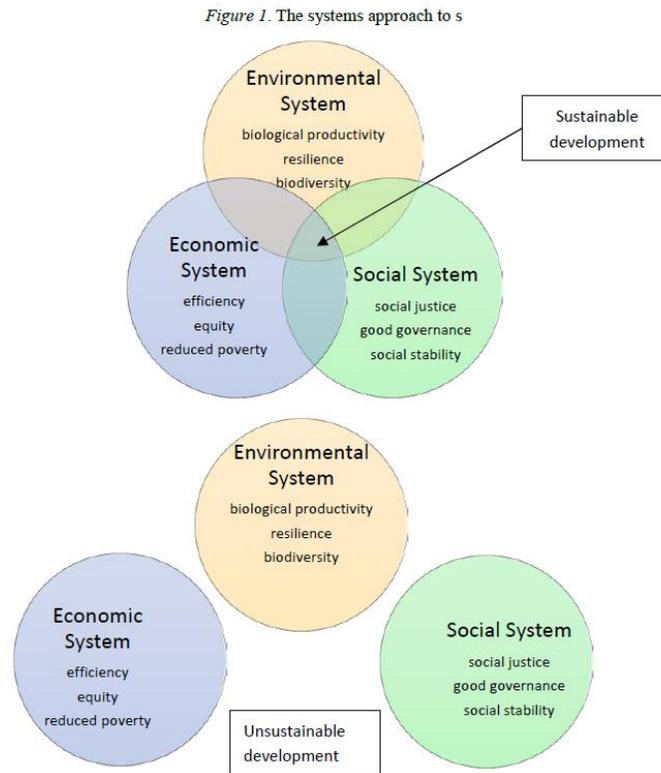
The Systems Approach to Sustainable Development

In order to achieve efficiency, equity, and poverty reduction, the economic system should take into account the effects on biological production, biodiversity, and ecological resilience, as well as the effects on social justice, good governance, and social stability, according to Barbier (et al 1987). (Kazimieras Stanis (2018) The confluence of the environmental, economic, and social systems serves as an example of the fundamental objective of sustainable economic development, which is to maximise goals across all of these systems through an adaptive process of trade-offs. Barbier et al (1987)

One crucial realisation is that maximising the objective of a single system does not result in long-term sustainability because the effect on other systems needs to be addressed (Holmberg et al, 1992). For example, improving economic competence, equity, and poverty reduction may impact the environmental and social consequences

on the ecological and social systems. Therefore maximising the aims of only one system does not lead to sustainability.

According to Barbier (1987), even if each system has a distinct set of human-imposed goals, achieving sustainable development requires making trade-offs between the various goals of the three systems since "it is not possible to satisfy all of these objectives all of the time." The costs imposed on the other systems should be considered. Therefore maximising the aims of more than one system does not lead to sustainability.



Source: Adapted from Barbier (1987), Figure 1 and Holmberg and Sandbrook (1992), Figure 1.1.

According to Barbier (1987), the economic system should strive for efficiency, equity, and poverty reduction while also considering the implications for biological productivity, biodiversity, and ecological resilience, as well as the implications for social justice, good governance, and social stability. (Kazimieras Staniškis (2018) The general goal of sustainable economic development, then," as illustrated by the intersection of the environmental, economic, and social systems, "is to maximise the goals across all of these systems through an adaptive process of trade-offs." Barbier (1987).

The Benefits of Progress Towards SDG

The UN's Sustainable Development Goals (SDGs) are individually represented in Table 1, and a predetermined endpoint that can be reached by enhancing some actions over a given time period is shown in Figure 1. Although progress toward each of these objectives is still achievable by 2030, it is more likely that one SDG will suffer as a result. For instance, it might have improved recently in terms of lowering poverty. Nonetheless, how this development was produced might have made some environmental or social objectives less successful.

Table 1: The 17 Sustainable Development Goals
 Source: Adapted from Barbier (1987), Figure 1 and Holmberg and Sandbrook (1992), Figure 1.1.

Area	Colour	Number of SDGs
Economic		7
Social		5
Environment		5

- | |
|---|
| <p>1. No Poverty:
 End poverty in all its forms, everywhere (<i>Economic</i>)</p> |
| <p>2. Zero Hunger:
 End hunger, achieve food security and improved nutrition and promote sustainable agriculture (<i>Economic</i>)</p> |
| <p>3. Good Health and Well-Being: Ensure healthy lives and promote well-being for all at all ages (<i>Economic</i>)</p> |
| <p>4. Quality Education:
 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (<i>Social</i>)</p> |

<p>5. Gender Equality: Achieve gender equality and empower all women and girls (<i>Social</i>)</p>
<p>6. Clean Water and Sanitation: Ensure available and sustainable management of water and sanitation for all (<i>Economic</i>)</p>
<p>7. Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable and modern energy for all(<i>Economic</i>)</p>
<p>8. Good Jobs and Economic Growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (<i>Economic</i>)</p>
<p>9. Industry, Innovation and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation (<i>Economic</i>)</p>
<p>10. Reduced Inequalities: Reduce inequality within and among countries (<i>Social</i>)</p>
<p>11. Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable (<i>Environment</i>)</p>
<p>12. Responsible Consumption and Production: Ensure sustainable consumption and production patterns(<i>Environment</i>)</p>
<p>13. Climate Action: Take urgent action to combat climate change and its impacts (<i>Environment</i>)</p>
<p>14. Life Below Water: Conserve and sustainably use the oceans, seas and marine resources for sustainable development (<i>Environment</i>)</p>
<p>15. Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (<i>Environment</i>)</p>
<p>16. Peace, Justice and Strong Institutions: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (<i>Social</i>)</p>
<p>17. Partnerships for the Goals: A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local levels (<i>Social</i>)</p>
<p>Source: United Nations. Sustainable Development Goals: 17 Goals to Transform our World. Available at http://www.un.org/sustainabledevelopment/sustainable-development-goals/</p>

Conclusion

The Sustainable Development Goals (SDGs) must be addressed with a strategy that can handle a complicated program with many interconnected goals. The UN SDGs are an intricate fusion of the objectives of three interdependent systems: the environmental (or ecological), economic, and social.

Each of the 17 SDGs can be characterised as a key objective attribute of the three goals, as shown by the three convergences. The three convergences show how each of the 17 SDGs can be characterised as a primary goal attribute of the three goals.

Attaining the United Nations' 17 Sustainable Development Goals as a coherent unit necessitates a system-based approach by decision-makers, who must recognise that progress on one goal can undermine or enhance progress on others.

This paper has discussed how SDG is adaptable to be applied to the systems approach. To achieve sustainable development, the 2030 Agenda emphasises the interconnectedness of the SDGs and the importance of ensuring integration across all 17 goals. Aside from that, each SDG is primarily concerned with the economic, environmental, or social systems.

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