

## **COMPLEX PHYSICAL AND REHABILITATION ACTIVITY PROGRAMS**

**Radoslav Mirinchev, PhD Student**  
**Burgas Free University**

**Abstract:** *Physiotherapy involves specific interventions aimed at individuals and populations where movement and function are or may be threatened by disease, old age, injury, pain, disability, illness and disruption by environmental factors.*

**Keywords:** *rehabilitation physiotherapy, programs*

**Introduction:** Physiotherapy involves specific interventions aimed at individuals and populations where movement and function are or may be threatened by disease, old age, injury, pain, disability, illness and disruption of environmental factors. Physiotherapy uses physical exercise and natural factors in the complex process of restoring the health, physical condition and working capacity of patients and people with disabilities. Rehabilitation is a complex of treatment methods (baths, massages, heating, etc.) that restore the normal state of the body after an illness. In Specialized Hospitals The National Rehabilitation Complex EAD ( SBR-NK EAD ) conducts the following programs for the rehabilitation of patients:

- Extensive rehabilitation program.
- The Victoria Program.
- The comprehensive program for cardiovascular diseases.
- The complex rehabilitation program for patients with ankylosing spondylitis (AS), also known as ankylosing spondylitis.
- Complex rehabilitation for patients with coxarthrosis.
- Complex rehabilitation of patients with osteoporosis.
- Complex rehabilitation of patients with cardiovascular diseases.
- Complex rehabilitation for the treatment of gynecological diseases and infertility.
- The complex rehabilitation of patients after chemical and heat injuries, as well as problems with scarring.
- Complex rehabilitation for the treatment of cerebral palsy.

Complex rehabilitation of patients with poisoning with lead salts, other heavy metals and radiation damage, is a multifaceted approach that includes various strategies to cleanse the body of accumulated toxins and support general healing. It is important to note that rehabilitation should always be carried out under the guidance and supervision of medical professionals. Here are some components that can be included in a comprehensive rehabilitation program:

- **Medical Evaluation :** The first step is a detailed medical evaluation to determine the extent of poisoning or radiation damage. This assessment helps determine the appropriate treatment method and monitor progress throughout the rehabilitation process.



- **Chelation:** Chelation therapy is the usual method of removing heavy metals from the body. Chelation agents such as dimercaprol, DMSA or EDTA are administered orally or intravenously. These agents bind to heavy metals and facilitate their elimination through urine or faeces.

- **Nutritional support :** A well-balanced and nutrient-dense diet is essential to support the body's natural detoxification processes. Including antioxidant-rich foods such as fruits, vegetables, and whole grains can help neutralize free radicals and aid in overall healing.

- **Hydration:** Adequate water intake is essential to flush toxins from the body. It stimulates urine production, which helps eliminate heavy metals and other toxins.

- **Supportive medications :** Depending on the specific circumstances, medications may be prescribed to relieve symptoms, support organ function, or manage complications related to poisoning or radiation damage.

- **Physical rehabilitation :** In the presence of physical disabilities or impairments, physical rehabilitation can play an important role. Physical therapy, occupational therapy, and other rehabilitation techniques can be used to improve muscle strength, coordination, and mobility.

- **Psychological support :** Poisoning or radiation damage can have psychological effects on patients. It is important to address any mental health issues, such as anxiety or depression, through counseling or therapy to support the patient's overall well-being.

- **Environmental Assessment :** Identification and removal of the source of heavy metal or radiation exposure is essential to prevent further poisoning or damage. This may include assessing and reducing workplace hazards, improving housing conditions or introducing protective measures in risky environments.

It is important to emphasize that the specific recovery approach may vary depending on the individual's condition and the severity of the poisoning or radiation damage. Close collaboration between medical professionals and patients is essential to ensure the most effective and personalized rehabilitation plan.

The Victoria Program is a complex rehabilitation program specially designed for women who have undergone breast cancer treatment. She focuses on providing medical, social and psychological support to help women recover and improve their quality of life after breast cancer surgery. Although the exact details of the Victoria program may vary depending on the health institution or organization offering it, here are some common components:

- **Medical Rehabilitation:** Medical rehabilitation within the Victoria program includes specialized care to meet the physical needs of women after breast cancer surgery. This may include wound care, pain control and monitoring for any post-operative complications. It may also include post-operative reviews with the surgical team and other medical professionals involved in the treatment.

- **Physical therapy:** Physical therapy plays an important role in the recovery process. It focuses on restoring range of motion, strength and flexibility in the affected areas. Physical therapists develop individualized exercise programs and provide exercise guidance that can help restore mobility, reduce the risk of lymphedema, and improve overall physical well-being.

- **Emotional and psychological support:** Coping with breast cancer and its treatment can be emotionally challenging. The Victoria program recognizes the importance of addressing women's psychological well-being during recovery. She

can offer individual or group counseling, support groups, and psychological interventions to help women cope with the emotional impact of their diagnosis and treatment.

- **Social support:** Breast cancer can have a significant impact on a woman's social and personal life. The Victoria Program can provide support and resources to help women deal with challenges they may experience in relationships, work and other aspects of their lives. This may include guidance on managing changes in body image, sexuality and fertility, as well as providing information about support networks and community resources.

- **Education and lifestyle modification:** The program can offer educational sessions to increase women's knowledge about breast cancer, its treatment, and self-care practices. This may include guidance on healthy lifestyle choices, such as diet, physical activity, and stress management techniques, to promote overall well-being and reduce the risk of disease recurrence.

- **Long-term recovery planning:** The Victoria program can help women develop a long-term recovery care plan that outlines long-term follow-up and monitoring after breast cancer treatment. This plan may include regular checkups, mammograms, and other tests to monitor for possible recurrence or late effects of treatment.

- **Complementary Therapies:** Some rehab programs include complementary therapies such as acupuncture, massage, yoga or meditation to help manage treatment side effects, reduce stress and improve general well-being. These therapies can be included as part of the Victoria program, depending on the preferences and needs of the individual.

The Victoria program aims to address the multifaceted needs of women following breast cancer surgery, recognizing the importance of a holistic approach to recovery. By providing comprehensive medical, social and psychological support, she helps women regain their physical and emotional well-being, helping them feel empowered and improve their quality of life after treatment.

The comprehensive program for cardiovascular diseases focuses on complex rehabilitation of patients with various cardiovascular conditions. Such a program aims to improve cardiovascular health, manage symptoms, prevent complications and increase overall quality of life. The specific components of the program may vary depending on the individual's condition and health care facility, but here are some common elements:

- **Medical Evaluation:** The program begins with a detailed medical evaluation to evaluate the patient's cardiovascular health, including diagnostic tests, imaging, and evaluations of cardiac function. This assessment helps determine the appropriate treatment method and guides the rehabilitation plan.

- **Medication Management:** Patients with cardiovascular disease often require medications to manage their conditions. The program includes close monitoring of medication regimens, adjustments as needed, and education about medication adherence and possible side effects.

- **Lifestyle changes:** Promoting healthy lifestyle habits is an essential element of cardiovascular rehabilitation. The program provides guidelines for changes in dietary habits, weight control, smoking cessation and regular physical activity, customized to the patient's condition and capabilities.



Lifestyle changes aim to reduce risk factors and improve cardiovascular health.

- **Training:** Physical activity is an integral part of cardiovascular rehabilitation. The program may include supervised physical training sessions led by professionals trained in cardiac rehabilitation. These sessions include cardiovascular, muscle-strengthening and flexibility exercises, customized to the patient's specific needs and capabilities.

- **Cardiac rehabilitation:** Cardiac rehabilitation focuses on supporting patients who have undergone cardiac procedures such as coronary bypass surgery, angioplasty or stenting. It includes supervised physical exercise, healthy lifestyle education, stress management techniques, and emotional support to aid in recovery and reduce the risk of future cardiac events.

- **Nutritional advice and nutritional counseling:** Nutrition plays an important role in cardiovascular health. The program can provide individualized diet plans, nutrition counseling, and education about healthy eating habits, including reducing sodium, saturated fat, and cholesterol.

- **Education and risk factor management:** The program offers educational sessions to increase patients' understanding of their cardiovascular conditions, risk factors, and precautions. This includes education in blood pressure management, cholesterol control, diabetes management (where applicable), stress reduction and strategies for maintaining a healthy lifestyle.

- **Psychological support:** Cardiovascular disease can impact mental and emotional well-being. The program can provide psychological support through individual counseling or group therapy to deal with stress, depression and adjusting to lifestyle changes associated with the condition.

- **Support network:** Patients are encouraged to join support groups or use community resources to connect with others who are having similar experiences. Support networks provide emotional support, shared knowledge and a sense of community.

- **Postoperative treatment:** The program includes a comprehensive plan for postoperative treatment, which includes monitoring the patient's progress, evaluating the effectiveness of the treatment and adjusting the rehabilitation plan if necessary. Regular checkups, diagnostic tests, and communication with health care personnel are key components of continuing care.

The goal of the cardiovascular program is to improve the patient's heart health, optimize treatment outcomes, reduce the risk of complications, and improve overall quality of life. Rehabilitation programs are usually conducted under the supervision of a multidisciplinary team, including cardiologists, nurses, nutritionists, exercise physiologists, and mental health professionals who work together to provide comprehensive patient care.

The comprehensive rehabilitation program for patients with ankylosing spondylitis (AS), also known as Bechter's disease, aims to control symptoms, improve functional ability and increase overall quality of life. AS is a chronic inflammatory disease that primarily affects the spine and sacroiliac joints, causing pain, stiffness, and reduced mobility. Here are some common components of an AS rehabilitation program:

- **Physical therapy:** Physical therapy plays an important role in controlling the symptoms of AS. It focuses on improving joint mobility, reducing pain and maintaining or improving proper posture. Physical therapists can provide manual

therapy, stretching exercises, and specific exercises to strengthen muscles and improve flexibility.

- **Exercise and fitness:** Regular exercise is essential for people with AS to maintain joint mobility and overall fitness. The program may include customized exercises, such as low-impact aerobic exercise, aqua therapy, and flexibility exercises, to improve range of motion, cardiovascular health, and muscle strength.

- **Posture and body mechanics:** Educating patients on proper posture and body mechanics is essential to control AS. The program can provide guidance on maintaining proper posture, ergonomic principles for daily activities, and techniques to reduce stress on the spine and joints.

- **Pain control:** AS can cause chronic pain and discomfort. The program may use a variety of pain management strategies, such as heat or cold, transcutaneous electrical nerve stimulation (TENS), and relaxation techniques, to relieve pain and improve overall well-being.

- **Assistive Devices:** Depending on the individual's needs, the program may evaluate the use of assistive devices such as braces, orthotics, or mobility aids to support mobility, reduce pain, and improve function.

- **Education and self-management:** Education about AS, including the nature of the disease, its progression, and self-management strategies is an important component. The program can provide information on medication management, lifestyle modifications, joint protection techniques, and coping strategies.

- **Diet and nutrition:** Although there is no specific diet for AS, maintaining a healthy and balanced diet can support overall well-being. The program can provide nutritional counseling, emphasizing the importance of a well-balanced diet including foods with anti-inflammatory properties, adequate calcium and vitamin D intake, and weight management strategies, if needed.

- **Psychological support:** Living with a chronic illness like AS can have psychological and emotional effects. The program may offer psychological support through counseling or support groups to deal with anxiety, depression and the emotional toll of the illness.

- **Social support and patient advocacy:** Connecting patients to support networks and advocacy groups can provide them with a sense of community, shared experiences, and resources for managing AS. This support can help people cope with the challenges of living with the disease and provide opportunities for knowledge sharing and emotional support.

- **Follow-up care:** Regular checkups with medical professionals are important to monitor the progress of the rehabilitation program, adjust treatment plans, and address any emerging problems. The program may also include ongoing communication with the patient's medical team to ensure continuity of care.

A rehabilitation program for AS should be customized to the individual's specific needs, taking into account disease severity, functional limitations, and personal goals. Close collaboration among medical professionals, including rheumatologists, physical therapists, occupational therapists, and mental health professionals, is essential for developing and implementing an effective rehabilitation plan for patients with AS.

Complex rehabilitation for patients with coxarthrosis, which is a degenerative joint disease affecting the hip joint, aims to control symptoms, improve joint function and increase overall quality of life. Here are some common components of a rehabilitation program for coxarthrosis:



- **Pain control:** Coxarthrosis can cause pain and discomfort in the hip joint. A rehabilitation program may include a variety of pain management techniques, such as heat or cold therapy, transcranial electrical nerve stimulation (TENS), and medications as prescribed by a healthcare professional. The goal is to relieve pain and improve daily functioning.

- **Physical therapy:** Physical therapy is a key part of coxarthrosis rehabilitation. Physical therapists create customized exercise programs to improve joint mobility, strengthen the muscles around the hip joint, and increase overall physical function. This may include exercises to improve range of motion, stretching, strengthening exercises, and gait training.

- **Assistive devices:** The use of assistive devices can aid mobility and reduce stress on the affected hip joint. The program may include assessment and provision of assistive devices such as canes, canes, or walkers to assist with walking and reduce pain during daily activities.

- **Weight management:** Excess weight can worsen the symptoms and progression of coxarthrosis. A rehabilitation program may include guidance on weight management through a combination of exercise, dietary changes, and lifestyle changes. Achieving and maintaining a healthy weight can help reduce stress on the hip joint and improve overall joint health.

- **Joint Protection Techniques:** Educating patients on joint protection techniques is important in the management of coxarthrosis. This includes teaching proper body mechanics during daily activities, such as carrying and bending, to reduce stress on the hip joint. Occupational therapists can provide guidance on adaptive techniques and assistive devices for daily activities.

- **Water therapy:** Water therapy, or hydrotherapy, can be helpful for people with coxarthrosis. The buoyancy of water reduces joint stress by providing resistance for strengthening exercises. Exercising in water can improve joint mobility, muscle strength, and overall function.

- **Education and self-management:** The rehabilitation program should provide education about coxarthrosis, its development, and self-management strategies. This may include educating patients about the importance of maintaining a healthy lifestyle, managing symptoms, recognizing inflammation, and implementing appropriate changes in daily activities.

- **Psychological support:** Chronic diseases such as coxarthrosis can have psychological and emotional impacts. The program may include psychological support through counseling or support groups to address the anxiety, depression and emotional well-being associated with the condition.

- **Surgical options:** In some cases, surgery may be necessary for coxarthrosis. The rehabilitation program should cover preoperative and postoperative care, including preparation for surgery, postoperative rehabilitation, and guidelines for optimizing outcomes after joint replacement or other surgical procedures.

- **Post-Program Care:** Regular follow-up visits with healthcare staff are essential to monitor progress, adjust the rehabilitation plan and address emerging issues. The program should include ongoing communication with the patient's healthcare team to ensure continuity of care and long-term management of coxarthrosis.

A rehabilitation program for coxarthrosis must be individualized, taking into account the severity of the condition, functional limitations, and the patient's specific goals. Collaboration between health professionals, including orthopedists,

physiotherapists, occupational therapists and psychologists, is essential to develop and implement an effective rehabilitation plan for patients with coxarthrosis.

Complex rehabilitation of patients with osteoporosis focuses on managing the condition, preventing cruciate ligaments and improving overall bone health. Osteoporosis is a bone disease characterized by low bone density and an increased risk of cruciate ligaments. Here are some common components of an osteoporosis rehabilitation program:

- **Physical activity and exercise:** Exercise that stresses the bones and strengthens the muscles is essential for improving bone density and strength. The program may include customized exercise regimens that include activities that stress the bones, such as walking, running, dancing, or stair climbing. Exercise using weights or resistance bands can help strengthen muscles and improve bone health. Balance and posture exercises can also be included in the program to reduce the risk of falls and crossed bones.
- **Strategies to prevent falls:** Preventing falls is essential for people with osteoporosis, who have an increased risk of broken bones. The program may include balance training, gait and mobility exercises, and home safety education to reduce the risk of falls. Occupational therapists can assess the home environment and recommend modifications to improve safety.
- **Nutrition and diet:** A balanced diet rich in calcium, vitamin D and other nutrients is important for bone health. The program may include nutritional counseling to ensure adequate intake of these nutrients and promote bone density. Dietary changes may be recommended, such as increasing consumption of dairy products, leafy greens, and fortified foods.
- **Medication Management:** Where osteoporosis medications are prescribed, the program ensures proper medication management. This includes education about the importance of adherence to treatment, possible side effects, and regular check-ups with medical professionals.
- **Body Position and Mechanics:** Correct body position and mechanics are essential for people with osteoporosis to reduce the risk of cruciate ligaments. The program can provide training in maintaining proper posture, alternative methods of movement, and safe movement and lifting techniques to reduce stress on the bones.
- **Assistive devices and adaptive techniques:** Assistive devices, such as canes, may be recommended to provide stability and support during movement. Occupational therapists can also provide guidance on adaptive techniques and assistive devices to help with daily activities and reduce the risk of falls.
- **Education and self-management:** The rehabilitation program includes education about osteoporosis, its development, and self-management strategies. This may include educating patients about the importance of lifestyle changes, fall prevention strategies, the role of physical activity, and adherence to treatment.
- **Pain management:** Pain associated with osteoporosis can be managed with a variety of pain management techniques. The program may include methods such as heat or cold therapy, TENS, and medications as prescribed by medical professionals to relieve pain and improve daily functionality.
- **Psychological support:** Living with a chronic disease like osteoporosis can have psychological and emotional effects. The program can offer psychological support through counseling or support groups to address the anxiety, depression and emotional well-being associated with the condition.



- **Ongoing Care:** Regular visits to medical professionals are important to monitor progress, adjust the rehabilitation program, and address any emerging issues. The program should include ongoing communication with the patient's medical team to ensure continuity of care and long-term management of osteoporosis.

Osteoporosis rehabilitation programs must be individualized, taking into account the severity of the condition, the specific needs and goals of the patient. Collaboration between medical professionals such as physiatrists, physiotherapists, occupational therapists and nutritionists is essential to the development and implementation of an effective rehabilitation program for patients with osteoporosis.

Complex rehabilitation of patients with cardiovascular diseases aims to improve cardiovascular health, manage symptoms, prevent complications and increase overall quality of life. Cardiovascular diseases encompass various conditions such as coronary heart disease, heart failure, hypertension and arrhythmias. Here are some of the main components of a cardiovascular rehabilitation program:

- **Medical Evaluation:** The program begins with a comprehensive medical evaluation to evaluate the patient's cardiac health, including diagnostic tests, imaging studies, and evaluation of cardiac function. This assessment helps determine the appropriate course of treatment and guides the rehabilitation plan.

- **Medication management:** Patients with cardiovascular disease often require medication to manage their condition. The program includes monitoring of medication regimens, adjustments as needed, and education about medication adherence and possible side effects.

- **Lifestyle changes:** Promoting healthy lifestyle habits is an essential element of cardiovascular rehabilitation. The program provides guidelines for dietary changes, weight control, smoking cessation, and regular physical activity tailored to the patient's condition and capabilities. Lifestyle changes are intended to reduce risk factors and improve heart health.

- **Exercise training:** Physical activity is an integral part of cardiovascular rehabilitation. The program may include supervised exercise training led by professionals trained in cardiac rehabilitation. These workouts include cardiovascular exercise, strength and flexibility training, customized to the specific needs and capabilities of the patient.

- **Cardiac rehab:** Cardiac rehab focuses on supporting patients who have undergone cardiac procedures such as coronary artery bypass surgery, angioplasty, or stenting. It includes supervised exercise training, life coaching, cardiac support, stress management techniques and emotional support to aid recovery and reduce the risk of future cardiac events.

- **Diet and nutrition counseling:** Nutrition plays an important role in heart health. The program can provide individualized diet plans, nutrition counseling, and education about healthy eating, including reducing sodium, saturated fat, and cholesterol.

- **Education and risk factor management:** The program offers educational sessions to increase patients' understanding of their cardiovascular conditions, risk factors, and precautions. This includes education about blood pressure control, cholesterol control, diabetes management (if applicable), stress reduction, and strategies for maintaining a healthy lifestyle.

- **Psychological support:** Cardiovascular disease can impact mental and emotional well-being. The program can provide psychological support through



individual counseling or group therapy to address anxiety, depression and adaptation to lifestyle changes associated with the condition.

- **Support network:** Patients are encouraged to join support groups or use community resources to connect with others who are having similar experiences. Support networks provide emotional support, shared knowledge and a sense of community.

- **Post-Program Care:** The program includes a comprehensive plan to monitor the patient's progress, evaluate the effectiveness of the treatment and adjust the rehabilitation plan as necessary. Regular checkups, diagnostic tests, and communication with medical professionals are key components of continued care. The goal of the Cardiovascular Program is to improve the patient's cardiovascular health, optimize treatment outcomes, reduce the risk of complications and improve overall quality of life. Rehabilitation programs are usually conducted under the supervision of a multidisciplinary team, including cardiologists, nurses, dieticians, physiologists, and mental health professionals who work collaboratively to provide comprehensive patient care.

Complex rehabilitation for the treatment of gynecological diseases and infertility aims to address root causes, manage symptoms, restore reproductive health and improve chances of successful conception. Here are some common components of a gynecological and infertility rehabilitation program:

- **Medical Evaluation:** The program begins with a thorough medical evaluation, including a detailed medical history, physical examination, and diagnostic tests to determine the specific gynecologic condition or cause of infertility. This assessment helps guide the treatment plan and approach to rehabilitation.

- **Medication management:** Depending on the gynecological condition, medications may be prescribed to manage symptoms, regulate hormone levels, stimulate ovulation, or treat underlying infections. The program includes monitoring of medication regimens, adjustments as needed, and education on proper medication administration.

- **Surgical interventions:** In some cases, surgical interventions may be necessary to treat gynecological conditions such as endometriosis, fibroids or structural abnormalities. The rehabilitation program includes pre- and post-operative care, including recovery guidance, pain management and rehabilitation exercises.

- **Reproductive counseling:** Patients undergoing rehabilitation for gynecological disorders and infertility often benefit from reproductive counseling. It may include discussions about family planning, assisted reproductive technologies (such as artificial insemination), and fertility preservation options.

- **Hormone therapy:** Hormone therapy can be used to regulate menstrual cycles, stimulate ovulation, or address hormonal imbalances. The program includes close monitoring of hormone levels, adjustment of hormone therapy as needed, and education about possible side effects and benefits.

- **Physical therapy:** Physical therapy techniques may be used to address pelvic pruritus, pelvic floor dysfunction, or other musculoskeletal problems that may affect gynecological health and fertility. These techniques may include pelvic floor exercises, manual therapy, and relaxation techniques.

- **Lifestyle modifications:** Certain lifestyle factors can affect gynecological health and fertility. The program may include guidance on lifestyle modifications



such as weight control, exercise, stress reduction techniques, and dietary changes to optimize reproductive health.

- **Counseling and support:** Gynecological diseases and infertility can have emotional and psychological consequences. The program may include counseling or support groups to address the deepening, depression, and emotional challenges associated with these conditions. Emotional support and coping strategies can play an important role in the overall rehabilitation process.

- **Sexual health education:** Sexual health education can be provided to address issues related to sexual function, intimacy, and communication. The program can offer guidance on coping with sexual difficulties, improving sexual well-being and promoting healthy sexual relationships.

- **Postoperative care:** Regular follow-up visits with healthcare professionals are important to monitor progress, assess the effectiveness of treatment, and adjust the rehabilitation plan as needed. The program should include ongoing communication with the patient's health advisor team to ensure continuity of care and provide support throughout the treatment process.

Rehabilitation programs for gynecological diseases and infertility should be customized to the specific needs of the individual, taking into account the underlying condition, reproductive goals and personal circumstances. A multidisciplinary approach involving gynecologists, reproductive endocrinologists, physical therapists, psychologists, and other health professionals is essential to provide comprehensive care and improve patient outcomes.

**Conclusion:** Programs for complex physical and rehabilitation activities help to:

1. Reduces or eliminates pain.
2. You avoid surgery.
3. You improve your mobility.
4. Recovers from a stroke.
5. Recovery from or prevention of sports injury.
6. Improves balance and prevents falls.
7. Helps with diabetes and vascular diseases.
8. Manage age-related issues.
9. Management of heart and lung disease.
10. For women's health and other conditions.

### **Bibliography:**

1. "Comprehensive physical therapy programs: a systematic review and meta-analysis" by Moreira-Silva et al. (2020).
2. "Evidence-Based Rehabilitation: A Practice Guide" by Mary S. Lowe and Joy McDermid (2014).
3. "Exercise and physical activity in older people with knee osteoarthritis: a systematic review and meta-analysis" by Fransen et al. (2015).
4. "Multidisciplinary rehabilitation programs for older cancer survivors: a systematic review and meta-analysis" by Stout et al. (2019).
5. "Effects of aquatic training on body composition, physical function and quality of life in healthy and overweight individuals: a systematic review and meta-analysis" by Torres-Unda et al. (2020).

## **APPLICATION OF CIRCULAR ECONOMY MODELS ALONG THE BLACK SEA COAST**

**Georgi Hadzhiev, PhD Student**  
**Burgas Free University**

**Abstract:** *The circular economy model seeks to address precisely the two main defects of the linear model. The idea of the circular economy draws its inspiration from the way nature works and, more specifically, individual biosystems.*

**Keywords:** *linear economy, circular economy*

### **Introduction**

An interesting regular phenomenon has been observed over the past hundred years. On the one hand, the consumption of resources on a global scale is increasing, on the other - the way in which these resources are consumed is clearly proving its inefficiency. The inefficiency can be seen in two ways, leading to two main defects of the linear model. First, uneven consumption of resources - the main part of them is consumed in highly developed countries at the expense of developing ones, and secondly, the accumulation of huge amounts of waste that is not used after being thrown away. The economic model currently followed is linear, i.e. implies the following sequence - extracting natural resources, processing them into final products and consuming the products, which ends with their disposal. In addition, according to a number of studies, the current model of a linear economy cannot ensure the achievement of high economic development by all countries in the world, because the available natural resources are not sufficient for this.<sup>1</sup>

The circular economy model seeks to address precisely the two main defects of the linear model. The idea of the circular economy draws its inspiration from the way nature works and, more specifically, individual biosystems. Just as each of them has its own cycle - (re)birth, development, decline, death and rebirth, so individual systems within the economy have such cycles. Therefore, the life of a product should not end with its disposal in the form of waste that can no longer be used, but on the contrary, each product should be seen as an eternally existing collection of materials, each of which after the conditional end of the given product's life should be included in the creation of a new product. Thus, at some point in the future, society should reach a state where virtually no waste is thrown away, and all products are recycled or used in some way.

The circular economy is a model aimed at extending the life cycle of products. In practice, this means sharing, borrowing, reusing, repairing and recycling existing materials and products as long as possible. When a product reaches the end of its life,

---

<sup>1</sup> Haas, W. et al. How Circular is the Global Economy? An Assessment of Material Flows, Waste Production, and Recycling in the European Union and the World in 2005. Journal of Industrial Ecology. Volume 19, N 5, [www.wileyonlinelibrary.com/journal/jie](http://www.wileyonlinelibrary.com/journal/jie), p. 765



the materials from which it is composed continue to be used in another way. Thus, the generation of waste is reduced to a minimum<sup>2</sup>.

Demand for raw materials and energy resources is growing, but many are limited in quantity. Often, they do not reach within the EU and European countries become dependent on imports from other countries. The effect on the environment should not be underestimated - the extraction and consumption of raw materials increases energy consumption and greenhouse gas emissions. A more reasonable use of raw materials is also a measure against climate change.

The circular economy is an economic approach that seeks to prevent waste by maximizing the use of raw materials or energy. The circular economy is designed as an alternative to the linear model of "take, use/consume, throw away" and sees it as a wasteful model based on the use of large quantities of materials, ignoring their (future) availability and the effects of their consumption and disposal. The assumption underlying the circular economy is that due to the finiteness of the planet's resources, the linear model is not sustainable<sup>3</sup>.

The current linear model of economic development generates a significant amount of waste on the "take, make, waste" principle. In the conditions of limited resources, a change to a new economic model is required, following the model of nature without waste with a closed cycle, reducing environmental pollution, with significant amounts of waste and gases affecting the average temperature of the planet, as well as the congestion of water spaces with plastics and their particles endangering biological diversity. Climate changes are deepening and require a rethinking of the prerogatives in the development of modern economic models around the world. Sustainable consumption and production ensuring minimal waste and closing the cycle of the principle of extraction, production, recycling "take, make, reuse" is known as circular economy. Production with minimal amounts of waste is a guideline for the development of current economies<sup>4</sup>.

### **I. Model of the circular economy**

We are facing great uncertainty in the world economy and increasingly scarce resources, so the call for a new economic model is growing. In search of a significant improvement in resource efficiency throughout the economy, businesses have begun to look for ways to reuse products or their components and recover more and more of their valuable material, energy value and natural resources.

The growing consumption of resources and the environmental consequences it causes require a change in the economic model. The concept of circular economy is part of this change. It is an economic system of production and exchange, where at every stage of the product's life cycle we strive to increase efficiency in the use of resources and reduce the harmful impact on the environment.

One of the big challenges at the moment is how to break away from the growth-dominated model in order to meet the social needs of society and how to replace the current predatory exploitation of natural resources with a new, more efficient, resource-saving and ecologically responsible model.

The circular economy provides basic guidelines for what needs to be done to significantly and permanently reduce the resource dependence of the economy and

---

<sup>2</sup> Стратегия и план за действие за преход към кръгова икономика на Република България за периода 2021-2027 г.

<sup>3</sup> <https://bg.wikipedia.org/wiki>

<sup>4</sup> Балинов, Б., Технически университет-София, Управление и устойчиво развитие 04/2018

move towards overcoming the scarcity of non-renewable natural resources. It offers important solutions, especially for manufacturing skills and design, new business models, building cycle skills, as well as cross-industry collaboration.

The circular economy is a closed loop covering each of the three areas: supply and responsible choice of producers, demand and consumer behavior and waste management (Europesworld, 2014).

The term circular economy envisages a system of production and consumption that generates as little loss as possible. Ideally, almost everything is reused, recycled or recovered to produce other output goods and services. Product recycling and manufacturing processes can help minimize waste and turn the unused part into a resource. The effect is a triple dividend – economic, ecological and social.

Contrary to the linear economy model (extraction, production, consumption, waste), the circular economy functions as a kind of closed system. Its purpose is to produce goods and services, limiting the use of raw materials and energy on the one hand and reducing the generation of waste on the other. The end result is increasing the efficiency of the use of resources, reducing the harmful impact on the environment and at the same time - increasing the well-being of users.

The aim is to increase the efficiency of the use of resources, reduce the harmful impact on the environment and at the same time increase the well-being of the users. The greening of the activities of companies, with the aim of greater competitiveness and sustainability of production, becomes an inevitable necessity (Bansal, P. and Roth, K., 2000). The main emphasis here is resource efficiency, which leads to a reduction in production costs and an increase in productivity. In this direction, the actions related to the utilization of waste, reuse and its actual limitation, carry significant potential (Fricker, A., 2003).

The transition to a circular economy shifts the emphasis to the reuse, repair, recycling of existing materials and products. This requires, on the one hand, a reduction in the share of waste and, on the other hand, a change in the behavior pattern of producers related to the offering of a new type of product with re-usability possibilities (McDonough and Braungard, 2002). Advances in eco-innovation provide new products, processes, technologies and organizational structures that enable a transition to business models based on the repair, reuse or recycling of products or their components. This is undoubtedly a new opportunity for small and medium enterprises.

Most of the business practices applied so far boil down to achieving more with less. In contrast, the circular economy model relies on reuse. Its essence goes far beyond the limits of only waste management or recycling. At the heart of this concept is the effort to maximize the benefit of an already created product throughout its life cycle. Therefore, a key place is occupied by eco-design and the possibility of individual components of an end-of-life product being reused (Sherwin and Evans).

The development and popularization of the concept of a "circular economy", in which resources are used to the maximum, can become a generator of a new type of economic growth and additional jobs, while at the same time solving serious societal challenges related to the exhaustion of natural resources and their ever-increasing prices on international markets as well as their environmental footprint.

This will help ensure a cleaner and healthier environment for European citizens, as well as more durable products. At the same time, the expenses of the enterprises are expected to decrease by 8% of the annual turnover<sup>5</sup>.

---

<sup>5</sup> <http://ec.europa.eu/environment/newprg/index.htm>



For this reason, recycling is becoming an increasingly relevant topic. However, the concept of a circular economy is far from exhausted there. The idea here is to produce products in a way that allows them to be easily repaired or converted into other products afterwards (so-called product transformation), with companies being responsible for them even after they are sold. To close the circle, each industry works with the others and uses their waste material to achieve the so-called industrial symbiosis.

The development of the so-called blue economy is a new trend that is gaining more and more popularity as a way of sustainable development of the marine ecosystem. The blue economy is also known as blue growth and aims to develop businesses and initiatives that are of societal importance, contributing to the preservation of natural flora and fauna around oceans, seas and coastal areas.

This type of economy is based on creating sustainable business models that protect and restore marine resources while stimulating economic growth and employment. Projects related to the development of the blue economy emphasize knowledge of the marine environment, methods for intelligent marine planning and integrated monitoring. The blue economy has several fields of action related to innovative ideas and projects. Among them are aquaculture, blue biotechnologies, use of sea and ocean energy, coastal tourism and the seabed<sup>6</sup>.

The coast offers employment opportunities and has traditionally well-established blue economy sectors, including the following:

- coastal and marine tourism, including sub-sectors or diverse forms of tourism such as beach, cultural and underwater cultural heritage (UCH)/adventure tourism, historical, wellness and spa tourism, ecological and nature tourism, cruise and yacht tourism, recreational boating;
- extraction and commercialization of marine living resources (fishing, aquaculture and processing and distribution);
- maritime transport, ports, shipbuilding and ship repair, including smart/environmentally clean shipping and maritime industry;
- extraction of minerals, oil and gas (marine non-living resources).

## **II. Examples of successful introduction of circular economy models applicable to and for the specific environment of the Black Sea coast:**

### **1. An example of innovation from "Nasekomo" AD<sup>7</sup>**

With the ever-increasing population of the planet, humanity is facing one of the main global problems - the lack of protein to feed itself.

By 2050, the Earth's population will increase by 2 billion people. This population will need an additional 100 million tons of protein per year. Current methods of procuring them are unsustainable.

The solution is provided by the innovative Bulgarian startup "Nasekomo" AD. Valuable animal proteins are produced here, transforming organic by-products. And what's more, they do it without using up arable land, water or depleting wild fish stocks. For this purpose "Insect" uses Black Soldier Fly or black fly "Soldier". It is extremely efficient for protein production: 1 fly can lay up to 900 eggs, and its larvae increase their weight 10,000 times in just 12 days.

---

<sup>6</sup> <https://move.bg/ustoichivo-razvitiie>

<sup>7</sup> <https://nasekomo.life/>

In practice, the larvae of the fly feed on organic by-waste such as beer mash from breweries for example. After that, the larvae turn the by-products into body mass, from which protein meal and oil are subsequently obtained. They are used as an ingredient in animal feed. In addition, the company also produces high-quality animal manure as a by-product of their production. And all this is done with zero waste, thus Nasekomo applies the principles of the circular economy.

## **2. Innovation of the French company Veolia in Bulgaria <sup>8</sup>**

Business from sludge - when you supply drinking water to 100 million people, produce 53 million megawatt hours of energy and convert 42.9 million tons of waste into new materials and energy, you have a good idea of the cost of resources. The French company Veolia is one of the pioneers in the circular economy concept. It operates in dozens of countries and over the years has introduced various innovations in the sphere of the circular economy.

One of the main solutions it introduces is the standard production of energy from waste and sludge. This is the practice used at the Kubratovo wastewater treatment plant, which is located near Sofia and is operated by the group. In Bulgaria, Veolia is known for being the concessionaire of Sofia Water, that is, the capital's water supply operator. What is not known is that, according to the company's data, the station is the most energy efficient among all 10,000 stations of the group worldwide. The valuable thing about it is that it reuses a number of raw materials. For example, sludge collected from wastewater is treated anaerobically, producing biogas that powers the plant. Separately, sediments are used for soil enrichment, and sand - for use in construction.

The Struvia technology, developed by Veolia Water Technologies, reuses phosphorus from wastewater, a substance that is becoming increasingly scarce in Europe. Phosphorus sludge is removed in water treatment plants and can be packaged and sold later to be reused in agriculture as fertilizer.

In partnership with French DIY retailer Castorama, Veolia is creating a completely recycled kitchen countertop. It is created from leftover wood and plastic, and the product is recyclable even after it is no longer in use.

## **3. An example of innovation from "Fishland"**

Fish processing plants generate large amounts of waste, which reaches up to 40%. To get rid of this waste, businesses pay fees, which represent serious costs. The company has decided to process this waste by entering it into an installation for the production of fish meal and fish oil. In this way, the costs of dealing with waste can be invested in the production of new products that bring additional profit.

The fish waste processing plant contains serious potential for solving problems in several directions - dealing with the generated waste, opening up new jobs, occupying a serious market niche and meeting the needs of the local fishmeal and oil market.

The installation itself is a production line that consists of several components: a grinder - which reduces the volume of the incoming raw material; vessel for "cooking" - the raw material is "cooked" for a certain time at a temperature of up to 80 degrees; press - under pressure, the dry mass, which represents the fish meal, is pressed out of the liquid, which is a mixture of fish oil and water; the dry mass - the fishmeal is ground to a powdery mixture and filled in suitable containers (sacks made of wheat or other material); the liquid is taken to a separate container that separates the "oil" from the water - the fish oil is mechanically filtered to present a final product, and the

---

<sup>8</sup> Forbesbulgaria.com/2021/02/04/компания-на-бъдещето/



water, which is also mechanically filtered, can be stored and reused for the company's needs.

The introduction of the plant in fish processing and aquaculture enterprises can be cited as a positive example of the transition to a blue economy in terms of dealing with waste products and adding value to the input product. In this way, the production cycle is closed and the problem of production waste generation is eliminated.

#### **4. Activity of the Bulgarian company BLOIL<sup>9</sup>**

BLOIL processes waste oil and turns it into biodiesel, thus keeping nature clean of harmful fats, while at the same time enabling hundreds of cars to reduce exhaust gases and substances using the biodiesel that the company produces.

Biodiesel is a biofuel made from vegetable oils or animal fats. It has characteristics close to those of petroleum diesel and is considered particularly suitable as a fuel for standard diesel engines without the need for further modifications.

Biodiesel improves the performance of the engine, increases its power, contains no sulphur, reduces fuel consumption and last but not least, biodiesel is cheaper than conventional diesel as it is not subject to excise duty.

This is the most promising and environmentally friendly fuel.

Biodiesel can be used in its pure form and as an additive to regular diesel.

Vegetable oil is mainly composed of triglycerides, which contain three fatty acid esters linked to a single glycerol molecule.

In the process of trans esterification, triglycerides are reacted with a mixture of methyl alcohol and sodium hydroxide so that the fatty acid esters are broken off from the glycerol molecule and attached to the methyl group of the methyl alcohol. Potassium hydroxide, which is preferred by many biodiesel producers, can also be used.

#### **Conclusion**

Waste reduction, eco-design, reuse and similar measures can save EU businesses a lot of money and reduce overall annual greenhouse gas emissions. Currently, the production of materials we use in everyday life generates around 45% of emissions in the EU.

The transition to a circular economy will reduce environmental pollution, ease problems with the procurement of raw materials, and strengthen innovation and competitiveness. The change has the potential to add another 0.5% to the EU's gross domestic product and create 700,000 jobs in Europe by 2030. Consumers will also gain access to more sustainable and economical products.

Although in the initial stage of introducing elements of a circular economy in Bulgaria and the EU with the adoption of adequate legislative measures and a number of practical design tools, the eco-design of the product is aimed at reducing the pressure of the generated waste, increasingly oriented towards turning it into a resource for subsequent productions and reduction to a minimum of their disposal, as well as to create prerequisites for the deterioration of the environment.

Regarding the development of the blue economy, it can be concluded that the Bulgarian Black Sea coast has been subject to serious development and urbanization in the last 30 years. Its coastal economy and maritime sectors remain vital segments of the national economy. As part of the blue space of Europe, the coastal and maritime areas of Bulgaria are the object of considerable interest beyond the national borders.

---

<sup>9</sup> <http://bloil.bg/>



The above highlights some lesser-known ways in which established and emerging sectors in Bulgaria's blue economy can optimally use the blue economy platform and tools for strategic, integrated and engaged development and protection of coastal and marine natural capital to support and development of blue industries, services and activities. The benefits generated through blue economy tools can not only make a significant contribution to the national economy, but also help Bulgaria lead the current heterogeneous development practices in the Black Sea region and promote technological development and innovation, which are closely related to marine protection and effective maritime spatial planning.

### **Bibliography:**

1. Балинов, Б., Технически университет-София, Управление и устойчиво развитие 04/2018
2. Стратегия и план за действие за преход към кръгова икономика на Република България за периода 2021-2027 г.
3. [Forbesbulgaria.com/2021/02/04/компания-на-бъдещето/](https://forbesbulgaria.com/2021/02/04/компания-на-бъдещето/)
4. Naas, W. et al. How Circular is the Global Economy? An Assessment of Material Flows, Waste Production, and Recycling in the European Union and the World in 2005. *Journal of Industrial Ecology*. Volume 19, N 5, [www.wileyonlinelibrary.com/journal/jie](http://www.wileyonlinelibrary.com/journal/jie), p. 765