

Chapter 12

Circular Economy and Project Management: The Road Ahead



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Abstract Sustainability and circularity open many areas for practitioners, academia, and policy decision makers on how to run business and economy. Sustainable management and circular economy are nowadays present in different ways and levels in a society; therefore, it seems necessary to explore how projects and project management can contribute to sustainable business and circular economy and what projects can bring to society if managed based on circular economy principles. The purpose of this chapter is an overview of opportunity for integration of project management and circular economy and the benefits that could arise from this integration. Based on profound literature review, circular economy business models are in expansion and project management as a discipline has a potential to bring value for circular economy. The aim of this chapter is to contribute with an overview of existing forms of circular economy and project management potential to create the road ahead. Key findings are mapped project management areas as project strategy, processes, tools, and competencies, for integration of circularity.

Keywords Circular · Project · Project management · Economy

12.1 Introduction

A distinguished global institution provided data according to which we can conclude that a global circularity is less than 10% at the global level. The measuring started in 2018, when the measure of circularity was 2.5% (Reuters, 2019; PACE, 2021; OECD, 2020). In addition to this data, it is estimated that the use of resources will be tripled until 2050, compared to 1970 (PACE, 2021). The whole society became aware and concerned about the resource consumption for the same or different motives, hence the concern is overall present. Government and civil societies

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are engaged and contributing to environment, society, and economy. On the other side, companies are part of a society ecosystem and are very much aware of how important are resources and benefits that circular economy (CE) can provide their business, especially on the profit side. From the aspect of economy, CE opens a completely new field for business. Many multinational companies have already incorporated circular economy business model: IKEA, Renault, P&G, IKEA, H&M, Apple, PH, Bridgestone, Xerox, Rolls Royce, Forlin & Scholz, and many others. In addition, start-ups are considered important pillars of business and could positively contribute to develop the technological innovation for the CE (Prujssen, 2019).

The key megatrends of a society are demographic growth, climate change, urbanism, shift in economic power, and technological breakthroughs (PwC, 2019; OECD, 2020; Florence, 2019; Roland Berger Institute, 2020; Ezzat, 2016). International institutions provided research, initiatives, and action plans for CE. The concept of circular economy (CE) has been largely promoted by European Commission which has adopted New Circular Economy Action Plan, in 2020 (European Green Deal, 2019). One more European initiative is the European Circular Economy Stakeholder Platform, a joint initiative by the European Commission and the European Economic and Social Committee. Several governments at various levels have been establishing CE strategies/roadmaps/action plans/framework/white papers (Colombia, Denmark, Finland, the Netherlands, Spain, Sweden, France Belgium, Chile, France, Slovenia, Spain, Portugal, Italy, Norway) (OECD, 2020). CE in Europe could generate savings of even €600 billion per year and achieve €1.8 trillion in economic benefits by 2030 (Ellen McArthur Foundation and McKinsey, 2015).

For business and a society, it is very important to:

- Measure the performances and the effect of CE business model (Laubscher & Marinelli, 2014; Beulque & Aggeri, 2016; Scarpellini, 2021; Vegter et al., 2020; Rossi et al., 2020; Sassanelli et al., 2019; Saidani et al., 2019)
- Understand what the impact of the changes on the society is (Bocken et al., 2019; OECD, 2020; Pitkänen et al., 2020; Banaitè, 2016; Kyriakopoulos et al., 2019)
- Learn, develop, and become more circular with sharing knowledge, best practices and know-how (Bolger & Doyon, 2019; Hedlund et al., 2020; Marra et al., 2018; Atiku, 2020; Mullins et al., 2020; Jiménez-Rivero & García-Navarro, 2017; Kirchherr & Piscicelli, 2019; Petit-Boix & Leipold, 2018).

The key challenge is to discover if project management logic could support business and society needs and how we can be more circular in project management. The purpose of this chapter is an overview of an opportunity for integration of project management and circular economy and the benefits that could arise of this integration.

12.2 Circular Economy Development and Perspective

CE is perceived as a systematic change, not just the nature of a business but the change of the entire value chain. It is oriented on replacement of source materials with alternative resources (more durable, bio-degradable, recycled), design out waste and pollution, keeping products and materials in use, and regeneration of natural systems. It is a model that regenerates itself, production, and consumption of goods through closed-loop material flows (Lewandowski, 2016; Linder & Williander, 2017). The circular economy concept significantly contributes to sustainable development (Schroeder et al., 2019; Suárez-Eiroa et al., 2019) that explains the reason for becoming a hot topic in all aspects of a society.

12.2.1 Circular Business Models

As mentioned above, companies have become aware of the pressure associated with the resource availability and consumption. Upon that, companies are oriented to new business models to make a profit and contribute to social well-being as a socially responsible entity. One of the main competitive advantages of a company today is knowledge, resilience, and ability to create value using opportunities for development. The literature provides insights into CE business model drivers that could be summed up in internationalization and strict environmental regulations, institutional factors such as governmental support, laws, tax policy, global standards and goals, technological development, and information transparency (Tura et al., 2019).

There are many definitions of a circular business model. One of them presents it as “a model in which the conceptual logic for value creation is based on utilizing the economic value retained in products after use in the production of new offerings” (Linder & Williander, 2017). Geissdoerfer et al. (2020) has collected many definitions in order to describe the types of circular business models. Based on his analysis circular business models are classified into four categories:

- Cycling – providing product through reuse, remanufacturing, refurbishing of material, and energy
- Extending – extended product usage due to design, marketing, maintenance, and repair
- Intensifying – providing product through sharing economy solution
- Dematerializing – providing product through service and software solution.

Very similar logic could be found in Lewandowski (2016) where circular business models are classified based on the next criteria: regenerate (energy recovery, circular supplies, sustainable product location, etc.); share (product lease, maintaining ad repair, upgrading, etc.); optimize (assets management, waste management; produce on demand, etc.); loop (recycling, resource recovering, etc.); virtualize

(dematerialized services); exchange (new technologies). Laubscher and Marinelli (2014) have defined the next areas for integration of the CE principles in business in sales, supply, IT management, partnership, and human resources (HR): (a) Sales in terms of shifting from selling products toward selling services; (b) Product designed and material and components in the production phase; (c) IT/data management to enable resource optimization using technologies; (d) Supply loops as the maximization of the recovery of own assets where profitable and to maximization of the use of recycled materials/used components; (e) Partnerships with suppliers and customers; (f) HR incentives toward culture adaptation and building capacities of human resources.

Most of the authors accepted the approach of 10R framework for companies to support circular economy: reuse, rethink, reduce, refuse, repair, refurbish, remanufacture, repurpose, recycle, and recover (Blomsma et al., 2019; Campbell-Johnston et al., 2020), which are directed at application of materials, manufacturing, and product lifespan.

There are many examples of companies who have successfully applied CE business model strategies, some of them are Renault with implemented solutions of using car sharing platform, integrating plastics from recycling into its vehicles and open first European factory dedicated to the circular economy of mobility; HP and Xerox are (among other initiatives) moving into the product as a service business model: HP is focused on leasing, renting and other service contracts for ink, print and PC services Xerox, use “pay-per-copy” instead selling actual machine): Ikea organizes workshop to educate customer about the product, recycling, and repairing options; has opened the second hand store, where customers can find repaired or refurbished products, previously acquired through “take back” program; H&M from textile industry is reusing and repairing them as much as possible, before finally recycling items.

There are also companies that are providing platforms from intermediation platforms either business-to-business (B2B) or business-to customers (B2C) sharing marketplaces. These companies enable other companies to communicate with each other, for example, Kalundborg Symbiosis allows public and private companies to sell and buy waste of industrial production (Urbinati et al., 2017).

Very important role in CE ecosystem play start-ups (D’Amatao et al., 2020). Start-ups are important pillar of business and could positively contribute to develop the technological innovation for the CE (Pruijssen, 2019). Large companies due to the system complexity are more and more oriented on the open innovation concept and cooperation with start-up companies to provide innovative solutions faster (Chesbrough, 2006; Todorović, 2020). The other market opportunity for CE start-ups is of course new market demands. London, it is estimated that 40,000 new jobs will be created by 2036 in the areas of reuse, remanufacturing, and materials (OECD, 2020).

There are six types of CE start-ups (Henry et al., 2020):

- Design-based – pre-market phase through source material minimization
- Waste-based – seeking additional value from waste

- Platform-based – pursuing sharing/trading business models
- Service-based – to increase usage efficiency
- Nature-based – based on nature-based systemic solutions

However, the implementation of CE business models has many barriers. The key ones related to business environment and industry are the lack of knowledge on how to transform companies' operations into circular business, the lack of knowledge of new technologies and materials, lack of databases for sharing waste information, industrial focus on linear model, and the lack of suitable partners to establish supply chains meeting CE principles (Tura et al., 2019).

As mentioned at the beginning of the paper organizations might become sustainable by implementing circular business models; however, it requires many intra-organizational and interorganizational initiatives. Organizational barriers are related to management support, organizational agility, risk awareness (Liu & Bai, 2014), capabilities and to incorporate CE principles in existing operations, communication, organization culture, strategic thinking, lack of knowledge on CE benefits for business, technology solutions, materials, product design, etc. (Kirchherr et al., 2018).

12.2.2 National and Local CE Initiatives

To introduce the paradigm of CE, to create good business environment and to raise awareness of people related to transition to CE, it is necessary to implement initiatives at the government level. The success of economic activity is very dependent on national governmental actions, goals and its incorporation in the education system (Kirchherr & Piscicelli, 2019). European Commission, OECD, PACE; UNEP are providing research, measuring of CE effect, guides, events, forums, and platform to enable countries and cities to implement CE concept. Nowadays, countries and cities have strategic document up to 2030 and 2050 where the promotion of sustainable development is a common aim including various national circular economy initiatives. Based on OECD (2020) study, countries that have implemented CE are mainly focused on these objectives: protect environment, decrease consumption, and rethink production and business models, favours innovations, boost behavioural change. Actions are focused on climate change, waste reduction and more efficient and optimal use of resources, reduction in the use of primary raw materials, neutrality, stimulating employment through new jobs related to recycling, remanufacturing, etc.

A good example is Germany, who has benefited from the implementation of CE. The number of people who have been employed is 270,000 employees, 11,000 companies started the business, and the turnover in 2018 was €70 billion. In addition, greenhouse gas emissions seriously harmful for human health were significantly reduced (Mohajan, 2021a, b).

CE present a system change which is the reason of involving all stakeholder in the process that cannot be done only by companies. Strategic orientation of many countries confirms this, as well as the leading education institutions on the world, introducing CE as a course and even study programmes.

12.2.3 Technological Breakthrough

Digital technologies are one of the megatrends in the society. It is recognized in literature and in practice that information technologies can significantly contribute to CE, especially in regard to life cycle stages. Digital technologies can help close the material loop and further to, monitoring, control, and optimize stocks.

Digital technologies can be divided into (1) data collection (Radio Frequency Identification (RFID) and Internet on Things (IoT)), (2) data integration (Relational Database Management Systems (RDBMS) and Product Lifecycle Management (PLM) systems), and (3) data analysis (Product Lifecycle Management (PLM) systems, Artificial intelligence, and Machine learning (Pagoropoulos et al., 2017)).

Digital technologies can support smart manufacturing, smart remanufacturing, and smart recycling (Alcayaga et al., 2019). Introducing technologies changes not only business models but also the way of value creation, enabling capturing of data, storage, and analysis of product information (Pagoropoulos et al., 2017).

From the perspective of CE, it is important to track the current state of the product to predict future condition and to plan actions. This further enables on-time remanufacturing planning, reduction of time waste, waste of work, inventory, disposal, etc..

Smart technologies and all the opportunities of Industry 4.0 significantly improve circular business models, especially Big data analytics and Artificial intelligence (Alcayaga et al., 2019; Todorović, 2020). Concepts of CE, Internet on Things, and product-service system can be synthesized on a framework of smart-circular systems. The smart-circular system consists of smart use, smart maintenance, smart reuse, smart remanufacturing, and smart recycling (Alcayaga et al., 2019).

Hence, the implementation of technologies directly affects business processes, procedures, working practices, employees, organizational values, system, and strategies. Therefore, the success of the smart CE implementation depends largely on organizational factors.

12.3 Project Management Development and Perspective

The evolution of project management has shown that numerous methodologies, approaches, concepts, and standards have been defined. The first globally accepted approach, known as the “waterfall” approach, is a linear and incremental approach with defined phases. This approach has been proposed by the leading institutions of

the Institute for Project Management (PMI), the International Project Management Association (IPMA), and the European Commission. The advantage of this approach is that it emphasizes the development and requirements of the project, and the disadvantage that it is difficult to predict all the circumstances at the beginning of the project, i.e. the client is not able to always state all the requirements. The International Organization for Standardization presented the international standard ISO 21500:2012 to provide general guidelines and principles for Project Management, that confirm the presence of projects in every aspect of a society.

With various changes in the business world and society, it has been concluded that many projects have never been completed and/or did not deliver all expected results (Zwikael & Globerson, 2006). Various studies conducted in the early 2000s have shown that between 25% and 40% of the time on a project needed rework; that 40% of errors were detected by users, and that 2/3 of IT projects fail (Hass, 2007). In response to this Agile Project Management was presented as a non-linear approach in which processes are carried out iteratively. Agile approach focuses on integrated communication, user involvement, document minimization, incremental, and iterative development for fast delivery of results in a constantly changing environment. It is often emphasized that the agile approach gives good results on small and medium projects in which communication with an experienced team is easily facilitated (Dyba & Dingsoyr, 2008). Still, the application of agile methodologies depends on organizational factors.

Cross-border project, international and public projects mostly have high level of complexity, significant impact, great number of beneficiaries, many stakeholders, and sources of funding. This led to significant changes in the approach to project management. To cope with the trend of projectification of a society and new demands, European Commission presented a new methodology for project management in the public sector: Open Project Management Methodology – Open PM² (European Commission, 2018).

Following global trend of sustainable management, project management evolved with a new standard for sustainability in project management: GPM P5 Standard for Sustainability in Project Management, provided by Green Project Management Institute (GPM, 2018).

Projects are a tool for the implementation of organizational strategy, enabling the organization to implement planned activities and achieve change through a special organization, project. For this reason, the project management system should be set up to meet the needs of the organization. The needs of organizations today are to have special business models that are competitive and create positive social change. For almost 10 years, the authors have been exploring the need to combine existing models and find solutions that will ensure business dynamics and business sustainability (Haigh and Hoffman, 2011; Doherty et al., 2014). Based on the previous chapter we can conclude that CE contributes to sustainable development. Further, it is crucial for research and practice (Velenturf et al., 2019).

Projects have been recognized as one of the crucial mechanisms to enable organizational learning, provide innovation, and/or change implementation (Scipioni et al., 2021). Many industries, companies, non-governmental organizations, and

public institutions nowadays are project-based (Artto & Wikström, 2005; Lundin et al., 2015; Packendorff & Lindgren, 2014; Jensen et al., 2016). This is especially important for the CE implementation, not only from a company perspective but from the perspective of the economy. CE requires partnership in the supply chain and is not just a question of one entity. The main barriers to CE implementation are industry development, knowledge and business processes of all partners in the value chain, institutional regulation, and global standards. Projects are the mechanism used by international institutions such as European Commission, UNDP, OECD to implement circularity at the local and national level, to create ecosystem for circular business. From business perspective, one of the most popular trends is open innovations where large companies work on projects with small companies to provide innovations increase company's productivity and agility (Leemann, 2002; Bagherzadeh et al., 2019). The next chapter analyses the option to integrate CE principles in project management and the ways project management could contribute to CE business.

12.4 Project Management Meets Circular Economy

From 2010 to 2020, 78 studies were published on the topic of CE (Piscitelli et al., 2020). At the project level, it also recognized how important it is to apply circular economy principles and philosophy on projects. One of the industries where project management research is very present is the construction industry. This industry frequently requires multifunctional teams and collaboration between different partner companies that make this industry complex, yet very suitable to demonstrate the implementation of circularity. In addition, the construction industry is welcome for circular economy principles due to resource usage. Senaratne et al. (2021) have published a study on circular economy principles for sustainable construction, where it is clearly emphasized the importance of stakeholder collaboration to meet project goals for circular buildings. From this study, we can see that attaining circularity along with other project objectives is a necessity. Further, the authors stated the significance of CE mindset of designers, collaboration with suppliers, manufacturers, client, and end users in promoting CE are key factors that enable sustainability and circularity on project.

Modern business development highlights the strategy that aims to provide value for customers. As seen in the previous chapter, most of the companies, non-governmental organizations, and public institutions implement their strategies using projects. But strategies do not fail when they are being analysed or when the objectives are being set. They fail during implementation and, more particularly, due to the lack of proper project management (Van Der Merwe, 2002). To deal with this issue an approach of strategic project management has been developed with the purpose to focus project implementation on achieving business performances (Patanakul & Shenhar, 2012).

One of the options to integrate CE principles at the project level could be using project strategy (top-down approach). Strategic project management includes strategic alignment of the projects including: project selection and portfolio management, leading, monitoring, and controlling projects to achieve strategic goals of the company. Project strategy presents a strategic focus for project teams, that is designed to help achieve business goals (Milosevic & Srivannaboon, 2006), and a project direction that enables project success in its environment (Arto et al., 2008). The main components of project strategy are (1) perspective (business background, business objectives, strategic concept); (2) position (product definition, competitive advantage, success/failure criteria); (3) guidelines (project definition, strategic focus) (Shenhar et al., 2007). It can be concluded that if a company follows CE principles and uses CE strategy and business model, the CE philosophy could be implemented to a project level, therefore project design, resource usage, resource management, and other processes could be managed in a circular way and contribute to the overall circular business performances.

CE principles could be integrated via project management processes: initiation, planning, execution, monitoring, and closing. Through the project initiation, project goals, scope, and results could be stated in terms to integrate circularity. Good planning could improve collaboration and communication on the project, which is one of the recognized organizational barriers to CE implementation. Execution and monitoring could follow CE principles to ensure circular business performances. This integration via project management process depends on project management approach and methodology.

Circularity could be implemented using different project management tools. This is very much related with the previous options since typical project management tools could be used to incorporate CE principles. For example, project charter, different project plans, and especially monitoring system. Project charter can present the intention toward circularity since it presents the identity of a project. Project plans could include a set of activities on collaboration with suppliers, manufacturers, client end users and other partners in promoting CE (Senaratne et al., 2021). Since projects are oriented on achieving business performances, the monitoring and controlling systems should be an important tool to track project results. Monitoring system could include key performance indicators that are consistent with circular performance at the organizational level. Further, Mayer et al. (2019) emphasized the importance of measuring progress toward circular economy meaning that the project evaluation could also include criteria that illustrate desired impact on circular economy. Lessons learned could be a significant tool to acquire knowledge and create new knowledge at the project and organizational levels (Scipioni et al., 2021).

One of the levels where CE can be incorporated in project management is the level of competencies. Leading project management associations (IPMA and PMI) are developing a framework of project managers competencies. Competencies are in every industry crucial for value creation (Todorović & Obradović, 2018). On the other hand, one of the barriers of CE implementation is lack of knowledge on CE business models, CE benefits, technology solutions, materials, product design, etc. It is stated by Scipioni et al. (2021) that the knowledge and the learning process in

the organization are crucial for CE implementation. Project manager competencies framework includes competencies in three areas: perspective, practice, and behavioural. Based on previous conclusion, the set of standardized set of project management competencies is in line with CE requirement, and still it requires new knowledge on CE practice, context, and attitude to cope up with all CE requirements regarding new solutions, green technologies, product/service design, options of recycling, reusing, etc.

The opposite point of view is to consider projects as a mechanism to implement CE, to contribute to a company that does not have CE business model or does not implement CE principle in any form. In this case, projects can be a vehicle to test and introduce circularity in the organization. Many companies are using open innovation approach that has been shown as a very effective approach, especially for complex systems. Companies which use open innovation are developing external connections and spread network, get new knowledge, and proven solutions, shared. It can be concluded that strong ties to partners lead to superior firm performance (Caputo et al., 2016). If the market accepts CE concept and there are reliable partners for the cooperating, e.g. CE start-ups that are very agile, a company can consider an option of developing a project in cooperation with partner(s) and create an innovation that follows CE principles. Project could present a roadmap for the company on how to use CE in its business (bottom-up approach). In addition, these projects can be a knowledge provider to a company.

12.5 Discussion and Conclusion

Circular economy business models are in expansion and project management as a discipline has a potential to bring a value for circular economy. Project management is present in all aspects of a society and many business companies as well as non-governmental and public institutions are project-based. The main international institutions are developing circular ecosystem at the national and local levels in many countries based on projects. Therefore, the importance of integrating circularity into project management could bring many benefits for the system.

This chapter analyses the impact that CE has on the companies, the development of CE business models, and their presence at the global level. It also presents the evolution of the project management discipline that has already incorporated market and a society needs in terms of agility, sustainability, and digitization. The concept has proven flexibility which was the starting point of initiation of circularity in project management.

Projectification of a society, on the other hand, and barriers for the CE implementation on the other hand provide an opportunity to define the area of improvement of project management to contribute to the CE trend. The chapter defines the option of implementing CE at the project level as top-down approach. CE principles could be manifested on project via project strategy, project management processes, project management tools, and project management competencies. Considering the

fact that project could be used to introduce CE in a company, we presented the concept of the open innovation as a mechanism to introduce CE to the company via collaboration.

Future direction of the research could be towards each of the suggested options for integrating CE in project management. The integration of CE via competencies could be extremely significant for organizations in selecting and developing project managers to manage projects based on circularity. Cascading from organizational strategy to a project strategy could enable the system to implement circularity through all business processes. This could be even more supported if the circularity is implemented via project management tools. Different project management methodologies have different possibilities to incorporate circularity, still a proper way could be found. The main conclusions are that CE integration in project management is a valuable topic for researchers and practitioners equally and that there is a significant need for developing project management framework that includes circularity.

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