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The circular economy ecosystem in Morocco Empirical study

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Abstract : The circular economy is a serious way to overcome the shortcomings of the linear economy. The credo of the circular economy is to transform waste into resources and extend the life of products and materials. Its objective is to overcome the problem of the depletion of resources, by creating innovative products, services, and business models, taking into account all flows throughout the life of a product or service. This research aims to make an overall assessment of the ecosystem of the circular economy in Morocco, which has taken off since the 2000s. The ecosystem encompasses all the international conventions that Morocco has ratified and which constitute a solid foundation for the development of the circular economy in this country. The ecosystem also integrates the institutional and regulatory frameworks that frame the sustainability and circulation of the economy in Morocco. We also conducted qualitative research with 22 industrial moroccans companies to understand their experience of transitioning from a linear to a circular economy.

Keywords: Circular economy; Morocco; Ecosystem; Regulatory framework; Strategies; Empirical survey.

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Introduction

The circular economy aims to replace the linear economy based on the "extract-consume-dispose" process, which generates negative externalities in terms of economic, social, and environmental sustainability. Interest in this process continues to grow at a time when the whole world is facing challenges related to the scarcity of food and energy resources, pollution, and climate change. In the era of the Anthropocene, humanity today consumes 1.8 times of resources that the planet can renew in one year. This ecological debt will be multiplied by two under the effect of demographic and economic growth according to the Global Footprint Network. The circular economy should therefore give impetus to an economic system with an alternative and regenerative flow model (Geissdoerfer et al, 2017). The intended purpose is to save resources by minimizing the use of materials and energy throughout the life cycle of products, through repair, reuse, and recycling. The circular economy tends to green the economy and relies on innovations that consider sustainability (Horbach & Rammer, 2019).

According to The Global Circularity Gap Report 2023, the circularity rate of the global economy did not exceed (7.2%) in 2023, falling by two points compared to 2018 (9.1%). Germany, the Netherlands, Japan, and China are the precursor countries for implementing the circular economy. Morocco, for its part, is taking a close interest in the circular economy through the outline of several regulations and initiatives. The cost of resource degradation related to poor performance of the waste management system reached 3.52% GDP of in 2014 according to a study by the World Bank and the State Secretariat to the Minister for Energy. This finding demonstrates the significant shortfall that can be recovered through the transition to a circular economy. To this end, the management of industrial and household waste, the problem of wastewater, the reduction of the energy slate, and the development of clean energies are on the program of its political and economic agenda.

A country familiar with ancestral circularity practices through traditional processes, Morocco has since the 1990s demonstrated a serious commitment to sustainable development. This commitment is legible through its ratification of international conventions, the establishment of an institutional and legal framework, and the concretization of these policies through the outline of strategies and plans at the national level.

The (Global Environment Facility, 2016) has classified Morocco's sustainable development strategies and policies into three generations: the first generation (1995-20the 04), the second generation (2005-2009), and the third generation (2010-2014). We can add a fourth generation from (2015-2022). Indeed, Morocco has taken a big step by developing the National Strategy for Sustainable Development 2030 launched in 2019, of which the circular economy is a key element, and which aims in the long term for a contribution of 4% of GDP. The National Waste Recovery Program (PNVD) also launched in the same year defines the strategic axes of waste reduction and recovery. The implementation of this plan should help reduce the cost of damage related to waste management estimated at 3.7 billion DH equivalent to 0.4% of Moroccan GDP (World Bank and the Ministry Delegate to the Minister of Energy, Mines, Water and the Environment, in charge of the Environment, 2017). The same ministry predicts that by 2030 Morocco will reach a total deposit of 39 million tons of waste. Regarding the energy transition, the High Commission for Planning forecasts that Morocco will produce 52% of its electricity from renewable sources, including 12% from hydroelectricity, 20% from solar and 20 % from wind power by 203. The ultimate goal is set for 2050, where all energy consumed in Morocco will be 100% green. In the same vein, Morocco has announced its commitment to achieve zero emissions. Morocco is in 4th place worldwide in the ranking established by Germanwatch and the International Climate Action Network as well as the German New Climate Institute. To support the challenges of decarbonizing economies, green mobility, and energy independence, Morocco is developing new sources of renewable energy notably green hydrogen. The World Energy Council has identified identifies Morocco as one of the six countries with a strong potential for the production and export of hydrogen and green derivatives. Nevertheless, the development of a circular economy remains a social project that is still far from being realized.

The main objective of this research is to make an inventory of public policies concerning sustainability in Morocco and how they constitute the basis for the implementation of a circular economy. We also conducted

qualitative research with 22 industrial companies located in different industrial sites to understand their approach to the circular economy, motivation, production process, benefits, and evaluation of their experience in their transition from a linear economy to a circular economy. From this perspective, our research question is: what ecosystem for the implementation of the circular economy in Morocco?

Methodology

Our work is based on an extensive literature review in which, for the most part, we have focused on peer-reviewed articles, selected books, and book chapters. The objective is to sketch a conceptual framework of the circular economy as well as its key underlying concepts and an explanation of its principles. To paint an inventory of the circular economy in Morocco, we have relied on official documentation and legal texts as well as reports and studies drawn up by non-governmental organizations. The first axis will attempt to conceptualize the circular economy and explain its principles. The second axis draws up a map of sustainability policies in Morocco. In the third axis, we will proceed to operationalize our research in the field through a questionnaire sent to 22 Moroccan industrial companies decommissioned at the territorial level and which made a transition from the linear economy to the circular economy.

1.1 Conceptualizing "circular economy"

We owe the economist (Boulding, 1966) the idea of circular economy, (Pearce and Turner, 1989) then popularized it with their work on the economics of natural resources and the environment. They helped introduce the idea of a "bioeconomy", where the natural resource is part of a system that not only provides useful resources for humanity but also resources for all types of life and organisms. Since the 2000s, the "circular economy" concept has made its grand entrance on the international scene. Nevertheless, a solid scientific grounding is difficult to identify because the circular economy is based on various scientific fields and refers to many schools of thought. It is a broad and transversal concept that encompasses several notions such as industrial ecology, bioeconomy, zero waste, natural capitalism, cradle-to-cradle design, and more recently the "green economy". It also covers activities such as product life extension, reuse, repair and recycling, material and energy efficiency, and new modes of socio-technical organization (De Jesus, Mendonça, 2018).

The definitions of the circular economy abound and diversify. For example, according to (Liubarskaia and all, 2021), the concept of circular economy emphasizes the need to use raw materials in a cycle that includes the sphere of consumption. Other organisms use the waste of some organisms, that is, a self-regulating biogeochemical cycle. (Korhonen and all., 2018) have defined the circular economy as "a sustainable development initiative whose objective is to reduce the linearity of societal systems of production-consumption flows of material and energy through the application of material cycles, cascading and renewable energy flows to the linear system." (De Jesus and Mendonça, 2018) define the circular economy "as a multidimensional, dynamic and integrative approach, promoting a reformed socio-technical model to carry out economic development, in an ecologically sustainable way, by balancing and rewiring industrial processes and habits of consumption in a new closed-loop use-production system.

Referring to the ranking of definitions established by (Korhonen & all, 2018) demonstrated in Table 1, the circular economy has been defined in almost as many ways as there are researchers and practitioners. The points of convergence of these definitions concern the elimination of waste, the reduction of the consumption of precious resources, and the creation of economic value from waste (EMF, 2012). For (Kirchherr et al. 2017), the only common denominator to all definitions is the desire for better use of resources.

1.2 Mapping sustainability policies in Morocco

Morocco has been among the pioneering countries in the world in the implementation of public policies aimed at better environmental protection. Its commitment is recognized internationally through its active engagement in environmental diplomacy and multilateral cooperation. The circular economy ecosystem in Morocco is based on a solid legal, strategic, and institutional framework, as we will develop in the following sections. The key

sectors on which efforts are focused regarding the circular economy are agriculture and food production; Water and wastewater; household waste and construction (European Commission, 2020).

a) Ratification of international conventions

Morocco is committed to the 2030 United Nations agenda, and the Sustainable Development Goals (SDGs). In particular, SDG No. 12, which challenges users on their relationship to the objects consumed, the waste generated, and their impact on the environment. Morocco is a pioneer in this momentum, illustrated by its mobilization through the ratification of a number of international conventions.

Table 1: Main international commitments transferred by Morocco in the context of sustainability
Source: collected by us

Location - Agreement Name	**Date of ratification**
Algiers - African Convention on the Conservation of Nature and Natural Resources	1968
Ramsar - Convention on Wetlands of International Importance especially as Waterfowl Habitat	1971
Paris - Convention concerning the protection of the world cultural and natural heritage	1972
London - Convention for the prevention of marine pollution	1972
Washington - Convention on International Trade in Endangered Species of Wild Fauna and Flora	1973
Barcelona - Convention for the protection of the Mediterranean against pollution	1976
London - International Convention for the Prevention of Pollution from Ships	1993
Bonn - Convention on the Conservation of Migratory Species of Wild Animals	1979
Montego Bay - Convention on the Law of the Sea	1982
Vienna - Convention on the Protection of the Ozone Layer	1985
Montreal - Protocol on Substances that Deplete the Ozone Layer	1987
The United Nations Convention on Biological Diversity (CBD)	1992
The Basel Convention on Transboundary Movements of Hazardous Wastes	1992
Rio - Convention on Biological Diversity	1992
New York - Climate Change Convention	1992
Paris - United Nations Convention to Combat Desertification	1994
The United Nations Framework Convention on Climate Change (UNFCCC)	1995
Cartagena - Biosafety Protocol	2000
Stockholm - Convention on Persistent Organic Pollutants	2001
Paris - Convention on the Protection of the Underwater Cultural Heritage	2001
Johannesburg- Convention for sustainable development	2002
Kyoto - Kyoto Protocol	2002
Paris - Convention for the Safeguarding of the Intangible Cultural Heritage	2003
Rotterdam - Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2011
The EU-Morocco Green Partnership	2022

b) The institutional framework

Environmental governance in Morocco is characterized by the multiplicity of sustainable institutional actors. The inclusion of these constitutional principles in the text of the new Constitution of July 29, 2011, reveals the awareness of the importance of environmental and development issues for the state and society in Morocco.

Table 2: The institutional framework for sustainability in Morocco
Source: collected by us

Date	Institution
1972	Environment Division within the Ministry of Housing, Spatial Planning, and Tourism
1980	The National Council for the Environment
1985	Environment Division within the Ministry of the Interior
1992	Environment Department created within the Ministry of Energy, Mines, Water, and the Environment
1994	The National Environmental Council for Sustainable Development
1996	Superior Council for Water and Climate
1997	Secretary of State for the Environment at the Ministry of Agriculture, Infrastructure and the Environment
1998	State Secretariat for the Environment at the Ministry of Planning, Environment, Urban Development and Housing
1999	Moroccan Center for Cleaner Production
2001	Mohammed VI Foundation for Environmental Protection
2002	Secretary of State for the Environment at the Ministry of Land, Water and the Environment
2004	Department of the Environment at the Ministry of Land, Water and Environment
2007	State Secretariat in charge of Water and the Environment at the Ministry of Energy, Mines, Water, and the Environment
2009	The Agricultural Development Agency (ADA)
2010	Morocco's Agency for Sustainable Energy
2012	Department of Environment at the Ministry of Energy, Mines, Water and Environment
2011	Research Institute for Solar Energy and New Energies
2011	The Economic, Social, and Environmental Council
2011	Energy Investment Company
2016	The National Electricity Regulatory Authority
2016	The climate change competence center (4C Maroc)
2010	The National Agency for the Development of Oasis Zones and Argan
2021	National Agency for Water and Forests
2021	Minister of Energy Transition and Sustainable Development

c) Strategies and plans relating to sustainability

Morocco has developed a multitude of plans and strategies that can form the basis for the institutionalization of a green economy. These efforts culminated in the implementation of the National Sustainable Development Strategy (SNDD) in 2017, which strengthened and harmonized convergence between sectoral strategies.

Table3: Morocco's strategies and plans within the framework of sustainability

National Strategies & Policies	Date
National Strategy for Environmental Protection and Sustainable Development	1995
National forest program	1998
National Action Program for the Environment (PANE)	2002
First national communication (UNFCCC)	2001
National action program to combat desertification	2001
National land use plan	2004
The National Biodiversity Strategy and Action Plan	2004
Strategy for the development and safeguarding of oases	2005
The National Liquid Sanitation and Wastewater Treatment Program (PNA)	2005
Morocco National Plan for the Implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)	2006
National Irrigation Water Saving Program (PNEEI)	2007
National Strategy and Action Plan for the Environmentally Sound Management of Chemicals (PNDM)	2007
National Household and similar waste management program (PNDM)	2008
National Energy Strategy, 2008-2030	2009
National Plan to combat global warming	2009
National Industrial Pollution Prevention and Control Program	2009
The National Water Strategy	2009
The Halieutis Plan	2009
The Solar Plan ((NOOR)	2009
2nd National Communication to the United Nations Framework Convention on Climate Change	2010
The Strategy for Upgrading the Environment (MANE)	2012
The National Charter for the Sustainable Environment of Morocco	2014
The National Action Plan on Sustainable Consumption and Production Patterns (PAN-MCPD)	2015
3rd National Communication to the United Nations Framework Convention on Climate Change	2016
The National Biodiversity Action Plan 2016-2020	2016
The National Strategy for Sustainable Development by 2030 (SNDD)	2017
The National Energy Efficiency Strategy By 2030	2017
The National Environmental Protection Strategy (SNPE)	2017
The Integrated Wind Program	2018
National Shared Sanitation Program (PNAM)	2019
The National Climate Plan 2020-2030 (PCN)	2019
The National Waste Recovery Program	2019
The National Strategy for the Development of the Forest Estate “Forests of Morocco 2020-2030	2020
4th National Communication of Morocco to the United Nations Framework Convention on Climate Change	2020
The Generation Green Plan 2020-2030	2020
Blue Economy Development Program	2022
The Strategic Water Plan (PNE) 2020-2050	2022
the Partnership for Action on Green Economy (PAGE)	2021
The National Adaptation Plan (NAP)	2022

a) The regulatory framework for sustainability in Morocco

The main legal texts relating to sustainability are mentioned in Table 4:

Table 4: The legislative framework for sustainability in Morocco

Laws and decrees	Date of enactment
Law n° 1-73-255 on sea fishing	1973
Law No. 10-95 on water	1995
Law No. 42-95 on the control and organization of trade in pesticides for agricultural use	1997
Loi n°11-03 sur la protection et la mise en valeur de l'environnement.	2003
Law No. 12-03 relating to environmental impact studies (EIA)	2003
Law No. 13-03 relating to the fight against air pollution	2003
Law No. 28-00 on waste management and disposal	2006
Law No. 1-06 relating to the protection of date palms	2007
Decree No. 2-07-253 classifies waste and fixes the list of hazardous waste	2008
Decree No. 2-09-286 setting air quality standards	2009
Decree No. 2-09-139 relating to the management of medical and pharmaceutical waste	2009
Decree No. 2-09-284 of December 8, 2009, setting the administrative procedures and technical requirements relating to controlled landfills	2009
Law No. 22-07 relating to the designation and management of protected areas	2010
Decree No. 2-09-538 of March 22, 2010, relating to the national master plan for the management of hazardous waste	2010
Law No. 13-09 relating to renewable energies	2010
Law n°22-10 relating to the use of degradable or biodegradable plastic bags and bags	2010
Law No. 25-10 on the development of the Laguna Merchica site	2010
Decree No. 2-09-631 of July 6, 2010, setting the emission clearance limit values	2010
Law No. 47-09 on energy efficiency	2011
Law No. 29-05 on the protection of species of wild flora and fauna and the control of their trade	2011
Law No. 39-12 relating to the organic production of agricultural and aquatic products	2013
Decree 2-13-874 relating to the Thermal Regulation of Constructions (RTC)	2014
Law 54-2014 on self-production of electricity	2014
Law n°81-12 relating to the coast	2015
Law No. 77-15 prohibits the manufacture, import, export, marketing, and use of plastic bags	2015
Law No. 58-15 relating to renewable energies	2015
Decree No. 2-14.782 relating to the organization and operating methods of the Environmental Police	2015
Law No. 36-15 relating to water	2016
Decree No. 2-17-746 relating to mandatory energy audit and energy audit bodies	2019
Decree No. 2.18.74 establishing the National Emissions Inventory System	2019
Law No. 49.17 on strategic environmental assessment	2020

1.3 Local Authorities as spearhead of the circular economy

Referring to a Policy Paper 2020 report, entitled “Plea for an efficient and effective circular economy model”, local authorities can be the spearhead of the circular economy. Local authorities (regions and municipalities) are constitutionally at the heart of the circularity of the Moroccan economy. They benefit from the central prerogative of supporting the bifurcation towards the circularity of the economy within the framework of advanced regionalization. The implementation of the circular economy fits perfectly into the fourth axis of Morocco's New Development Model on "Territories and sustainability", which calls for preserving "natural resources and strengthening the resilience of territories in the face of climate change ".

According to (Niang and all, 2020), territories are increasingly affected by the challenges of climate change and economic and financial globalization. Their productive models are disrupted by the scarcity of resources and tension on budgets. They are called upon to innovate to generate local attractiveness, create jobs and, in particular, negative externalities on the environment. To this end, the circular economy could apply to all sectors of the local authority's economy and generate significant economic benefits through the improvement of resource productivity and the reduction of expenses, the creation of "jobs, and the limitation of polluting emissions and contribute to the competitiveness of the territory.

In addition to the advantages of proximity and pooling, the circular economy is part of a global territorial project. It contributes to the consumption of local products, the mobilization of territorial innovations and their appropriation by the various actors of the local economy, particularly around recovery activities (Bahers et al. 2017). Most regions of Morocco are engaged in the planning and formalization of circular economy projects, particularly in the field of waste management (Organic Law 113-14, Law No. 28) and the blue economy.

Table 5: Examples of some projects for the transition to the circular economy at the regional level

Region	Projects
Tangier-Tetouan -Al Hoceima	- The establishment of a recycling and recovery unit for waste generated by the shrimp shelling activity in the cities of Tangier and Fnideq for the manufacture of food packaging films. - The first factory to manufacture recycled fibers Products that will come from waste generated by the production process, such as cutting waste, “dead stock” and non-compliant products.
Fez-Meknes	- Biogas extracted from waste and used for the production of electrical energy which serves 30% of public lighting in the city of Fez.
Souss-Massa	- The agricultural plastic valorization unit in the commune of Drarga which makes it possible to obtain plastic granules which can be used as secondary raw material in the manufacture of new agricultural plastics (tarpaulins, pipes, drip irrigation, pallets , etc.). - The seawater desalination station, intended to supply the province of Chtouka-Aït Baha powered by renewable energy to the extent that it will be connected to the Noor Ouarzazate solar complex. The station offers an initial capacity of 275,000 m^3/day at a flow rate of 125,000 m^3/day for irrigation water needs and 150,000 m^3/day for drinking water for Greater Agadir CESE (2018). - The Taghazout Bay project, a paragon of eco-sustainable tourism with separators to filter rainwater, connection to the wastewater treatment plant, photovoltaic panels and planting of endemic species. -The Center specializing in the Valorization and Technology of Sea Products (CVTPM) in Agadir conducts research for the biotechnological valorization of marine products.
Casa-Settat	- The Casablanca seawater desalination station project with a capacity of 200 Mm^3/year which will be implemented from 2030. Three areas affected by the project: Greater Casablanca, Berrechid-Settat and El Jadida- Azemmour.

	- The groundwater recharge project which consists of creating 13 hydraulic thresholds across the EL Himer, Mazer and Tamedrost wadis in the Berrechid basin with a view to artificially recharging the Berrechid aquifer (annual deficit: 20 Mm3/year) . - The COSUMAR pilot project which set up natural lagoon basins and wastewater treatment plants for the treatment of water used at all of the group's sugar factories. In addition, part of the treated effluent is reused for irrigation. - The Casafibre company was able to recycle PET plastic waste to manufacture staple polyester fibers and produces non-woven applications. Casablanca is home to sectors dedicated to tires and used oils which are recycled into biofuel.
Rabat-Salé-Kénitra	- The recycling of wastewater in watering green spaces in the city of Raba, which allowed a reduction in overall consumption of drinking water by 10.8%, equivalent to a saving of 4.1 million cubic meters. “Oum AZZA” landfill in Rabat 850,000 tonnes of waste from the 13 local authorities in the Rabat / Témara / Salé area are processed annually.
Marrakech-Safi	- The Benguerir wastewater treatment plant opened in 2015 which receives wastewater from the city with a capacity of 2.6 million m3, corresponding to a treatment capacity of 112,000 and 165,000 population equivalents in 2020. Part of the treated wastewater (80%) is used in mining activities in the region, while the rest is intended for watering the green spaces of the new Mohammed VI Green City. The sludge produced is treated in a special unit to reduce water content and anaerobically digest to produce biogas “CH4” to generate electricity. The digested sludge is solar dried into powder form, which can be used as fertilizer. -The Marrakech Biogas Station is an energy recovery project from the biogas deposit of the former Marrakech Al Azzouzia landfill. It is part of greenhouse gas mitigation actions in the Waste sector. This Project will allow the valorization of Biogas from 3 Million Tons of Household and Similar Waste into Electrical Energy, in order to make savings in the energy bill of the Municipality of Marrakech.
Béni Mellal-Khénifra	- The Merah Lahrach phosphate laundry recycles 87% of the purified wastewater coming from the Khouribga STEP (2010), the Benguerir STEP (2016) and the Youssoufia STEP (2018). - The El Halassa laundry allows maximum deposit recovery through the extraction of the entire phosphate series and enrichment of all layers with low phosphorus contents, as well as recycling of more than 80% of process water . The laundry will consist of two washing lines with a unit capacity of 1,600 tonnes/hour, a flotation workshop, six crushers, dikes over 120 ha for spreading sludge and water recovery, three sludge decanters and three product decanters.
Laâyoune-Sakia El Hamra	-Desalination and demineralization were launched in the southern provinces, notably in Boujdour where the first unit was built in 1976 by ONEE.
Guelmim-Oued-Noun	- Desalination of sea water from Tiznit-Sidi Ifni. - The first green hydrogen production project in Morocco. Four sites, located in the province of Tan-Tan, are pre-qualified to host the components of this project which consists of developing a hybrid power plant combining solar and wind power to power a green hydrogen production plant an electrolysis capacity of 100 MW, connected to a seawater desalination station.
Dakhla-Oued Eddahab	- The Dakhla desalination station will enter production at the beginning of 2025. With a production capacity of 90,000 to 100,000 m³ per day, this station will be supplied with energy by a wind farm with an optimal capacity of 40 megawatts (MW). It will allow the creation of an irrigated area of 5,000 ha.

2.1 Empirical investigation

A questionnaire was sent to 22 industrial companies. 99% of companies interviewed are SMEs. The fields of activity of these companies are the plastics industry, the paper industry, and operating in the processing and recovery of plastic and metal waste, in particular the dismantling of end-of-life vehicles (VFV),

electrical and electronic equipment (WEEE), the manufacture of recycled staple polyester fiber, the recycling and recovery of tires and the manufacture of staple fiber. Geographically, the responding companies cover the main recovery sites. Casablanca-settat, Zagora, Khouribga, El Hajeb, Tangier and Inezgane.

The salient fact that emerges from the survey relates to the fact that 41% of the companies in the panel adopt the principles of the circular economy out of concern for the environmental issue. 38% of them to meet current market demand and in anticipation of environmental innovations. Nevertheless, the attractiveness of subsidies granted in the field of the circular economy only motivated 3% of companies. Customers also have a say in the motivation of circularity in production since 6% of companies have adopted the principles of the circular economy following customer demand. The survey also shows that the external environment exerts little pressure since only 3% of companies have been forced to comply with the principles of circularity in their production because of this pressure. It emerges from the first question that the main motivation for the transition to a circular economy for the majority of the companies in the panel relates to the environmental issue.

Ecodesign is integrated into the first phases of production, 44%3% of companies adopt it in the exploitation of the raw material while 22% adopt it in the production phase, 6% in the logistics phase, 9% at the consumption phase, and 19% End of product life. Regarding the integration of recycling into the production process, 14 companies, or 82% of the panel, integrate recycling into the production process.

The transition to a circular economy has led to additional investments for 88% of the companies in the panel. The costs generated by the acquisition of additional equipment come first for 33% of the companies questioned, followed by materials with 22%. 8% of companies confirmed that the greening of their production has led to organizational changes, particularly for recruitment or training costs for 22% of the companies interviewed. Other investments concerned the acquisition of land, buildings, recycling equipment and tube production, recruitment, etc.

1. What was your motivation for adopting the principles of the circular economy?		
	Favorable attitude towards the environmental issue	41%
	External environmental pressure	3%
	Current or projected market demand for environmental innovations	38%
	Grants for Environmental Innovations	3%
	At the request of customers	6%
2. Ecodesign is integrated into which stage of your product's life cycle?		
	The exploitation of the raw material	44%
	Production	22%
	Logistics	6%
	Consommation	9%
	End of life	19%
3. Adoption of recycling in the production process		82%
4. Has the transition to a circular economy led to additional investments?		82%
	The materials	22%
	Additional Equipment Costs	33%
	Organizational changes	8%
	Recruitment or training costs	22%

The benefit generated by the migration to a circular economy concerns the creation of jobs with the affirmation of 31% of the companies in the panel. The environmental benefit came second with 27%. Customer satisfaction comes third with 16%. For 12% of the companies questioned, the transition has enabled a reduction in the costs of energy, water, or materials. 12% confirmed that the adoption of the circular economy has improved the reputation of the company.

The participating companies were questioned on the method of managing the waste generated by their activity. The results show that 52% of companies surveyed claim to use recycling, 22% of companies use reuse and 15% adopt treatment, then disposal, 7% opt for repair and 4% choose disposal.

Regarding the process applied to the end-of-life product, the participating companies were asked about the treatment allocated to their final product. The results show that 53% of companies surveyed say their product can be recycled. 25% of companies say it can be subject to reuse and 14% say it can be processed and then disposed of. 4% are equal for Elimination and repair.

1. What The benefit of the transition to a circular economy has allowed?		
	Reduced energy, water, or material costs	12%
	An environmentally added value	27%
	Job creation	31%
	Improving the reputation of the company	12%
	Customer satisfaction	16%
2. How is the waste generated by the activity managed?		
	Elimination	4%
	Treatment, then elimination	15%
	Reuse	22%
	Repair	7%
	Recycling	52%
3. What process is applied to the product at the end of its life?		
	Elimination	4%
	Treatment, then elimination	14%
	Reuse	25%
	Repair	4%
	Recycling	53%
4. What is your assessment of your company's transition to a circular economy?		
	Positive	100%
	Negative	0%
	Product quality	14%
	Turnover	17%
	Environmental impact	38%
	Company image	24%

Regarding the overall assessment of the transition experience from a linear economy to a circular economy, all the companies surveyed indicate that the transition is positive. They claim to perceive the benefits made firstly on the impact on the environment, and then on their brand image, thirdly comes the positive impact on turnover, and lastly the improvement on the quality of their product.

Conclusion

It should be noted that the circular economy is still in its infancy in Morocco. The empirical investigation demonstrates that Moroccan companies are learning to manage waste in a new way and that a fundamentally new system is actively forming, in which most of the waste will be sent for recycling. Therefore, the foundations of a circular economy are developing. Nevertheless, the survey shows that several parameters should be considered to improve the circularity of production at the level of Moroccan companies. Training is an essential skill that has been mentioned because the implementation of a circular economy requires certain expertise. The lack of qualified personnel, financial means, and technical expertise are the causes indicated by the companies in the panel as disabling regarding the implementation and development of the circular economy. The survey also revealed that the companies questioned mentioned the absence of incentive measures (taxes, subsidies, and market creation) that encourage the development of the circular economy at the level of industrial companies.

According to the analysis of the literature, the measures taken by Morocco are interesting but with very limited results. Certainly, the circular economy represents an opportunity for Morocco in many aspects by offering interesting potential and prospects in terms of employment, economic growth, and poverty reduction while preserving resources. The transposition of the circular economy within a territory calls for a certain anticipation at the level of the various development plans which aim for a circular economy, clean production, more rational management of environments by seeking the preservation of ecosystems and the integrity of Biodiversity, a concept which is at the heart of the word “green”. This sector includes: ecological agriculture, habitat conservation, reforestation and gentle methods of forestry, the creation or management of parks and urban forests, protection of soils and environments in general. This objective is only possible through a strengthening of collaboration between all stakeholders (local authorities, private sector, universities, civil society, citizens, etc. a plethora of sectors can be exploited such as urban agriculture, ecological construction.

Nevertheless, the transformation towards a circular economy requires drastic socio-economic changes. It remains dependent on a multitude of factors and stakeholders. In addition to the real effectiveness of the regulatory framework, a multitude of tools must be put in place to implement the seeds of the circular economy. A systemic approach must involve implementing the circular economy at macro, meso, and micro levels using local learnings, skills, innovations, and funding to embed it into the cultural ethos of the Moroccan population and supply and production chains. Hence, the importance of education relating to the environment, territorialized governance, including education, and training focused on sustainability. The formation of human capital in the field of the circular economy also remains important. It constitutes the talent of Achilles of the curricula and must be integrated from a young age.

It is also interesting to resort to the promotion of the sharing economy, which allows considerably greater efficiency of use and reduces the number of assets that must be created. Behavioral economics is a serious track in the process of ecological transition through the involvement of individuals and the community. In our view, the success of the circularity of the Moroccan economy must be a social project understood and adhered to by all Moroccans. Hence the importance of openness to behavioral economics as a complementary tool is likely to generate significant impacts in the activation of decision-making levers in the daily lives of individuals, including for environmental issues. In addition to the strengthening of the public-private partnership, the encouragement of investors with innovative ideas in relation to the circular economy outlines the real materialization of this desire for change towards a circular economy.

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