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# Analysing the Role of the State in the Transformation of Industrial Parks to Eco-industrial Parks

## Endüstriyel Parkların Eko-Endüstriyel Parklara Dönüşümünde Devletin Rolünün Analizi

Yılmaz Kaplan[1]

***Öz***

*Bu çalışma, endüstri parklarının eko-endüstriyel parklara dönüşümünü yeni kurumsalcı teorik bir bakış açısıyla incelemektedir. Kötüleşen iklim krizi, mevcut Lineer Ekonomik (LE) sistemi işlevsiz hale getirdiğinden dünya genelinde sistemik bir değişim ihtiyacı ortaya çıkmıştır. Bu ihtiyacın bir sonucu olarak Döngüsel Ekonomi (DE) fikri popülerlik kazanmıştır. DE, özellikle LE'nin "al-yap-kullan-at" mantığından kaynaklanan ekonomik eylemlerdeki doğrusallığı, "geri dönüştür-yeniden kullan-azalt" mantığı üzerine inşa edilen döngüsel ekonomik eylemler ile değiştirmeyi amaçlamaktadır. Bu noktada endüstri parklarının DE ilkeleri doğrultusunda eko-endüstriyel parklara dönüştürülmesi DE fikrinin nasıl kurumsallaştırılabileceğini görmek için yararlı bir örnek oluşturmaktadır. Çalışma, piyasa aktörlerinin kısa vadeli çıkar hesapları ve mevcut LE sistemine olan yapısal patika bağımlılıkları nedeniyle bu dönüşümü etkin bir şekilde başlatamadıklarını iddia etmektedir. Öte yandan, etkin kurumsal gücü ile devlet, bu dönüşüm sürecini hızlandıran bir katalizör rolü oynayabilir. Özellikle devlet, LE sistemine bağımlılıklarının üstesinden gelmeleri için piyasa aktörlerine yasal, finansal, teknolojik ve toplumsal ağ desteği sağlayabilir. Ancak devlet bu süreçte girişimci olmalı ama müdahaleci olmamalıdır. Yatay bir yönetişim yaklaşımına sahip olmalı ve bu yaklaşımın merkezine altyapısal yardım, iletişim, sosyal ağlar ve öğrenmeyi koymalıdır. Bu, devletin söz konusu dönüşüm sürecinde hükmeden değil patika açıcı olması gerektiği anlamına gelmektedir. Bu nedenle, devlet mi yoksa piyasa mı sorusuna takılmış saplantılı ideolojik tartışmalardan ziyade, kötüleşen iklim krizi ile etkili bir mücadele için gerekli sürdürülebilir döngüsel bir sistemin geliştirilmesinde odak noktası devlet ve piyasaya uygun işlevselliğin kazandırılması olmalıdır.*

***Anahtar Kelimeler: İklim Krizi, Döngüsel Ekonomi, Eko-endüstriyel Parklar, Girişimci Devlet, Piyasa, Yeni Kurumsalcılık***

**ABSTRACT**

*This study analyses the transformation of industrial parks to eco-industrial parks from a new institutionalist theoretical perspective. The worsening climate crisis has made the existing Linear Economic (LE) system dysfunctional; thus, a need for systemic change has emerged across the globe. As a result of this need, the idea of Circular Economy (CE) has gained popularity. The CE particularly aims to replace the linearity in economic actions originating from the LE's "take-make-use-dispose" logic with the circularity of economic actions constructed through a "recycle-reuse-reduce" logic. At this point, the transformation of industrial parks to eco-industrial parks in line with the CE principles constitutes a useful case to see how the idea of the CE can be institutionalized. The study argues that the market actors cannot effectively initiate this transformation due to their short-run interest calculations and path-dependence on the existing LE system. On the other hand, the state with its strong institutional power could play a catalyst role accelerating this transformation process. In particular, the state could provide regulative, financial, technological, and societal network support to the market actors to deal with their dependence on the LE system. However, the state should become entrepreneurial, but not interventionist in this process. It should have a horizontal governance approach and put infrastructural help, communication, networks and learning at the centre. This means that the state should become a path-opener but not the dominator of the mentioned transformation process. Therefore, rather than obsessive ideological debates over the state versus the market, the focal point should be the proper functionality of the state and market in the establishment of a sustainable circular system to cope with the worsening climate crisis.*

***Keywords: Climate Crisis, Circular Economy, Eco-industrial Parks, Entrepreneurial State, Market, New Institutionalism***

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**INTRODUCTION**:

The Linear Economic (LE) system institutionalized after the industrial revolution has gradually brought about the climate crisis, and this crisis convincingly shows the dysfunctionality of the LE system. In particular, the LE system has a "take-make-use-dispose" logic, which causes the exploitation of natural resources in an unsustainable way. Here, the main problem is the disconnect between production and consumption in the LE system. The resources are extracted from the Earth, used in production, consumed, and disposed of. More importantly, this linear process continuously needs further exploitation of the natural resources and produces more waste and emission. However, the Earth with its limited resources has started not to tolerate the increasing mass production and consumption actions after the 1970s (Meadows et al., 1972). As a response to the dysfunctionality of the LE system due to the worsening climate crisis, the idea of the Circular Economy (CE) has increasingly gained the attention of people (Nobre & Tavares, 2017). The CE simply suggests connecting production and consumption actions as much as possible. According to this understanding, if the circularity of resources between production and consumption is increased, the leakage of natural resources from the economic system will be prevented. This means less pollution and less exploitation of the natural resources, and the establishment of a more sustainable system. In other words, the CE aims to develop a circularity between "take-make-use" oriented actions, and in this way, the disposal of natural resources from the economic system will significantly be decreased if not eliminated (Andrews, 2015). Therefore, the CE aims to develop a "recycle-reuse-reduce" logic behind economic actions to prevent the resource leakage from the system as much as possible (see: Ellen MacArthur Foundation, 2013; Geissdoerfer et al., 2017; Ghosh, 2020; Kaplan, 2022a; Kirchherr et al., 2017). Even though the CE makes an effective critique of the LE and a more sustainable suggestion, there is not any clear blueprint showing how to achieve an institutional change from the LE system to a circular one.

This study has been devoted to providing an analytical answer to this question. To this end, the study has developed a theoretical framework by benefiting from the New Institutionalism (NI) (see: Peters, 1999). From this theoretical point of view, an analysis on the role of actors in an institutional change process could provide new insights; therefore, the study has focused on the state as a key actor who could play an entrepreneurial role in the mentioned institutional change process. To empirically analyse the entrepreneurial role of the state in this process, the study has been designed as a case study and has focused on the role of the state in the transformation of industrial parks to eco-industrial parks (see: Eckstein, 2000; George & Bennett, 2005; Yin, 2003). The industrial park is a meso-level institutional structure in which numerous enterprises are clustered to gain a comparative advantage through this agglomeration; thus, it has a transformative power over the existing socio-economic structure. As a result, a case study on the aforementioned transformation process will also provide a new insight to the discussions on sustainability. The study also benefited from the secondary data derived from several empirical research conducted in different countries to establish a holistic framework for its analyses.

As a result, the study has firstly concentrated on developing a theoretical framework to analyse the potential role of state in an institutional change from an NI perspective. This analysis mainly argues that the state could play an institutional entrepreneurial role to change the course of the linear history even though the main NI approaches prevail continuity over change as the possible future for an institutional setting. In the following section, the study argues that the path-dependence might limit the market dynamics to trigger the transformation of industrial parks to eco-industrial parks in line with the CE principles, but alternatively, the entrepreneurial state could become a catalyst accelerating this transformation.

## 1. The Theoretical Framework: Institutional Change and the State

The New Institutionalism (NI) prioritises structure over agent while explaining the social world. They mainly lean on the idea that a structure is far beyond the accumulation of agents, and it shapes agents' way of thinking and behavioural patterns. Therefore, actors perform actions appropriate to the institutional setting where they live, and in this way, the continuity of this institutional setting is guaranteed. On the other hand, change as a potential future of an institutional setting emerges as a rarely witnessed phenomenon which could only be possible through exogenous shocks (DiMaggio, 1998). To illustrate, Rational Choice Institutionalism (RCI) reckons on the concept: "punctuated equilibrium" while explaining why stability is a more expected feature of an institutional structure than change (Krasner, 1988). This perspective argues that once an institutional setting is formed, actors tend to follow its rules as this behavioural pattern is more rational. For example, North (1994) argues that if an institution is considered as a game, actors represents the players of it, and their rationality urges them to play the game according to its rules. In the same vein, Historical Institutionalism (HI) also benefits from the same concept while explaining why institutional change is a rarely experienced phenomenon, and how path-dependence tendency in actors' actions makes continuity much more possible than change in terms of the future of an institutional setting (Pierson, 2004; Streeck & Thelen, 2005). Sociological Institutionalism (SI) also assumes that an institution actually provides a cultural and cognitive setting in which actors develop a collective logic appropriate to this setting and behave accordingly (i.e. the logic of appropriateness). Therefore, the logic of appropriateness developed by the members of an institution maintains the continuity of this institution. However, despite the mainstream approaches in the NI which explain institutional change through exogenous shocks, endogenous factors should also play an important role in an institutional change process as it is a complex social phenomenon which cannot be explained through only one parameter (see also: Pollack, 1996).

In this regard, institutional entrepreneurship could be given as an important endogenous factor which might profoundly shape an institutional change process even if this process was triggered by an exogenous shock. At this point, an institutional entrepreneur should have enough allocative and authoritative resources to achieve its institutional change ambition (Walgenbach & Meyer, 2008). Therefore, the state emerges as a promising actor who could effectively perform this entrepreneurship role because it has both authoritative resources (it can coordinate human actions) and allocative resources (it can control material products) (see: Giddens, 1984). Particularly, its historical bureaucratization gives the state an institutional capacity through which it could make rational decisions about the developments happening around it and put these decisions into practices. Furthermore, this bureaucratic power makes any institutional change legitimate in the eyes of other actors (Giddens, 1985). In other words, with its rational bureaucracy, the state has a transformative power over its society (Evans, 1995), and it could foster long-term transformations through deliberative investments and decreasing related risks (Evans, 1989). This is the reason why Polanyi puts a great emphasis on the state while explaining the transformation as a social phenomenon (Block, 2003). Moreover, an innovative institutional change is a systemic phenomenon which cannot be carried out by firms in the market because it requires complex institutional measures such as new legal frameworks, new research and development infrastructure, and new norms. Therefore, the formation and governance of an effective network between actors in a societal system is a prerequisite for an institutional change, and this network formation and governance processes need leadership (Freeman, 1987). Here, as a result of the above-mentioned reasons, the state arises as the only actor who can play this leadership role over different segments of a society in an institutional change process. For example, the state's leadership was the key in the developmental success of the East Asian countries (e.g. see: Aoki et al., 1997; Ebner, 2007; Wade, 1990).

However, how the state will carry out this leadership is under discussion. In general, the cooperation with the market, but not the domination of the market, could be given as a necessary condition for a successful institutional change (see: Chang & Kozul-Wright, 1994). Therefore, instead of being

regulatory or developmental, the state should become entrepreneurial in a successful institutional change process. The neoliberal understanding conceptualizes the state as a regulatory agent within the market mechanism, and according to this understanding, it should guarantee the implementation of free market rules by every actor in the market (Walter, 2006). From this point of view, a regulatory state could maintain the functionality of the existing liberal system, but cannot initiate a structural change since firms are considered as the main entrepreneurs for innovation/change. Contrarily, a developmental state plays the main role in planning key developmental strategies to benefit from the comparative advantage of its national economy in the globalized world economy. Therefore, the developmental state has a hierarchical governance rationale, and so it is highly interventionist (Jayasuriya, 2005). Alternatively, from a Schumpeterian perspective, the entrepreneurial state serves "the entrepreneurial function of introducing novelty in an economic system". While doing this, the state could use interventionary policies, and more importantly "its conditioning through institutional and physical infrastructures" (Ebner, 2009). In a more concrete manner, the entrepreneurial state has a horizontal governance understanding (less hierarchical), which puts communication, networks and learning at the centre of its policy making process. This entrepreneurial governance mode initially prioritizes experimentation in an institutional change process; thus, the initial experiences help to deal with the uncertainty problem as a side-effect of an institutional change process. Furthermore, the need for the good governance of the uncertainty problem might encourage other market actors to implement expected institutional changes. In a simple manner, the state might develop intermediary institutions in line with new ideas as a hub through which communication/networks between actors could increase, and actors could gain experience on the question how to achieve a proper institutional change (Ebner, 2015; Rodrik, 2004).

Moreover, an exogenous shock might make an institutional structure dysfunctional and put pressure on actors to change it. Despite this pressure, it is hardly possible for actors to initiate an immediate institutional change process without a new idea due to the uncertainty problem. New ideas particularly help actors to understand the dysfunctionality of an institutional structure and how to change it. To put it succinctly, new ideas allow actors to develop solutions to the dysfunctionality of an existing institutional system, and this might pave the way for an institutional change process (Blyth, 2002). In the same vein, Tang (2011, p. 2) conceptualizes institutional change as "a process of selecting a few ideas out of many and solidifying them into institutions". From this theoretical point of view, as noted above, the climate crisis has made the linear system dysfunctional and forced the global actors to look for alternatives. However, the dependence of the market actors on the existing linear system is a challenging structural barrier on the institutionalization of the idea of CE as an alternative to the LE system, but the state emerges as a strategic actor which could open a new path for the circular institutionalization. To put it another way, the implementation of the idea of the CE requires good entrepreneurial skills, and the state as the leading game changer needs to perform these skills to change the unsustainable LE system with a more sustainable circular one. In this regard, industrial parks emerge as a strategic intermediary institution through which the state might experience the implementation of a new idea (the CE) at the meso-level and trigger new networks/connections between firms in the name of developing new collective circular actions in the market. In a more concrete manner, once a circular path is opened by the entrepreneurial state in an industrial park, the increasing returns might lock firms into the new circular path, and the accumulation of circular actions of firms might gradually solidify the new circular path (Sydow et al., 2009). The diffusion of the positive experiences/feedback developed within an eco-industrial park might also increase the transformative power of it at regional and national levels.

The following section analyses how the entrepreneurial state could play a catalyst role accelerating the transformation of industrial parks to eco-industrial parks by benefiting from the secondary data derived from several empirical studies from different countries.

## 2. From Industrial Parks to Eco-industrial Parks: The Problem of Path Dependence and the State

The idea of the industrial park firstly emerged in the UK in the wake the industrial revolution. The foundation of Trafford Park as the first industrial park accelerated the industrialization of the Manchester metropolitan area in the early years of the 1900s as it provided necessary infrastructure, a skilled labour pool, and new networks for entrepreneurial partnerships, trade, and market services. Thanks to this positive experience, the idea of industrial park as a means of industrialization swiftly spread across the world (Kozak-Holland & Procter, 2020). In a similar way to economies of scales, industrial parks have a capacity to produce the agglomeration effects (e.g. low costs, new opportunities originating from geographical proximity, labour pooling, and knowledge spillover), and this gives the firms in an industrial park considerable competitive advantages (Porter, 1998). Therefore, it could be argued that industrial parks as meso-level institutional structures have a significant transformative power on a national economy towards industrialization. This is the reasons why the foundation of industrial parks became a strategic priority in development policies in the 20th century (e.g. see: Kim, 1992; Lin, 1992; Lin, 2010). Moreover, thanks to its transformative power, industrial parks have become more apparent in the discussions on how to deal with the climate crisis after the 1990s (e.g. see: Côté & Cohen-Rosenthal, 1998; Lowe, 1997; Martin et al., 1998). In this regard, the general assumption is that if the industrial parks are converted into eco-industrial parks according to the CE principles, this might constitute the core of a systemic change from the LE to the CE.

Industrial parks are historically institutionalized to increase companies' competition, and increasing competitive power is conceived as the main sign of the sustainability of an economy. However, after the realization of the climate crisis, sustainability started to be considered as the symbiotic institutionalization of economic actions embedded in the ecological system. Therefore, eco-industrial parks represent the re-institutionalization of conventional industrial parks according to this newly emerging sustainability understanding, which puts the environment at the centre, instead of competition. At this point, it is hardly possible for the market actors to make a paradigm shift and put the environment at the centre of their actions due to their short-run interest calculations and the zero-sum logic of LE system (i.e. economy versus the environment) (see: Tsekourads, 2009). In other words, the firms which do not play the game according to its rules (i.e. the lower-cost competition in the LE system) would be eliminated from the game. Therefore, the actions performed by the market actors could maintain the functionality of the linear market system (the continuity of the existing system), but hardly trigger a paradigm shift towards a CE system (Kaplan, 2022b). Moreover, the mentioned paradigm shift also necessitates a structural change in the way of network formation from narrow industrial symbiosis to broader social networks (de Abreu & Ceglia, 2018). This implies that an eco-industrial park needs to extend its previously formed industrial networks to its surrounding socio-economic ecosystem. Put differently, beyond aggregating industrial entrepreneurs in a particular place, an eco-industrial park tends to extend its ecology centred actions further away. Here, in addition to economic actors, it tries to develop new connections with different segments of the society. For instance, to improve labour force in line with new ecological priorities, it could trigger educational reforms in the local schools, or it could play an active role in the urban planning of the city where it is located by expanding the symbiotic relationship beyond its industrial location. However, despite this need, the market dynamics do not have the capacity to make this structural change without having governmental support due to their dependence on the existing structure. As discussed in the previous section, enterprises are the rule follower of the existing linear market mechanism, and their performing rule breaker role is hardly possible (Martin & Sunley, 2006). In particular, the linear paradigm deeply shapes the market actors' way of thinking (cognitive abilities); thus, it might be hard for the conventional enterprises which were institutionalized in the linear paradigm to fully comprehend the CE principles and perform proper circular actions. Additionally, the increasing returns historically developed in an industrial park might produce organisational inertia towards the circular ideas as the performance of the existing habits might be considered more profitable in the short-run (Arthur, 1989; Simboli et al., 2014). To illustrate, there are several studies which point out this path-dependence phenomenon as a significant structural barrier against the transformation of industrial

parks to eco-industrial parks (or foundation of new eco-industrial parks) through the market dynamics (Guo, 2012; Hu et al., 2021; Roberts, 2004; Wang et al., 2022). This is also the reason why there emerged an implementation gap between companies' actual actions and the necessary actions appropriate to the CE principles (Gibbs & Deutz, 2007).

More specifically, the path-dependence-related structural barriers could be grouped into four categories: regulative, financial, technological, and social (e.g. see: Heeres et al., 2004; LeBlanc et al., 2016; Li et al., 2015; Park et al., 2016; Sellitto et al., 2021; Veleva et al., 2015; Zhu et al., 2015). These barriers clearly show that the transformation of industrial parks to eco-industrial parks requires a proper institutional capacity building, and the state could deliberatively govern this capacity building process (Healey, 1998). First of all, the transformation to eco-industrial parks needs necessary regulatory frameworks, and only the state bureaucracy could develop these frameworks. The state is particularly needed to replace linear regulatory framework with a circular one in a holistic way. In particular, the firms which intend to implement circular actions might be marginalized by the existing linear regulatory framework. For example, Yedla and Park (2017) argue that the waste management regulations adopted in the linear paradigm limit the reuse of by-product as feedstocks, and this dilutes further development of symbiosis between companies. In addition to this, the laws on intellectual property rights make knowledge spillover among companies harder, but easy knowledge spillover is an important trait of a circular relationship (Li et al., 2015). Thus, the state should take necessary measures to make knowledge spillover easier in eco-industrial parks. In this regard, a new circular framework should provide clear standards of circular actions and guidelines/indicators showing how to achieve these standards (Piatkowski et al., 2019; Stucki et al., 2019). Moreover, the start-up companies founded in accordance with the CE principles might be considered as the main building blocks of eco-industrial parks as they could perform the CE actions much better than the conventional companies (they do not have a path-dependence problem compared to the existing companies), but they also need encouraging regulative measures to flourish in eco-industrial parks. For example, Henry et al. (2020) found that regulatory barriers (e.g. taxes and the directives preventing the usage of waste as resource in production) play an inhibitor role in the formation of new circular start-ups after analysing 128 different circular business models; thus, according to them, the state is the pivotal actor who could eliminate these barriers.

Secondly, the financial support mechanisms are also necessary for a successful transformation to eco-industrial parks, and the state again appears as the critical actor who could provide necessary financial mechanisms. According to Daddi et al. (2016), the state should complete its regulations on eco-industrial parks with economic instruments. At this point, the state could provide direct or indirect (e.g. subsidies, taxes or procurements) financial supports. For instance, Chen et al. (2017) found that direct financial support is a significant factor which drives enterprises towards eco-industrial parks. As noted above, an initial cost originating from a behavioural change towards the CE might discourage enterprises to participate in an eco-industrial park symbiosis, but Chin et al. (2021) argue that subsidies compensating for this cost could accelerate the development of symbiotic behavioural patterns among enterprises. By comparing the industrial symbiosis developments in China, Denmark, USA, Germany, and Japan, Yu et al. (2015) also came up with the idea that financial incentives such as tax exemptions and subsidies are more favourable than regulatory policies in the formation of the industrial symbiosis. Moreover, the state should also take necessary measures for the establishment of a well-functioning circular financial market. As an example to this argument, Abu-Qdais and Kurbatova (2022) maintain that the formation of a circular financial market will be a better strategy for China beyond direct financial support. In the same vein, Sakr et al. (2011) also found that local financial mechanisms could make eco-industrial parks more sustainable by carrying out a case study in Egypt.

Thirdly, the transformation of industrial parks to eco-industrial parks requires innovative technological infrastructure, and the state has an ability to provide this necessary infrastructure. In fact, industrial parks are designed as a technology hub providing crucial infrastructural services to industrial clusters. However, an eco-industrial park might need more sophisticated technology to transform previously

discarded by-products or waste into resource (Maqbool et al., 2018). The technological infrastructure of an eco-industrial park should also support energy saving and pollution prevention sufficiently. Therefore, the rationale behind the institutionalization of an eco-industrial park is green technology, but green technology needs smart investment in research and development. Regarding this point, every socio-economic ecosystem where an eco-industrial park is embedded is unique, and as a result of this uniqueness, every eco-industrial park needs its own specific research and development infrastructure. However, the establishment of this technological infrastructure has the dire need of governmental support as it requires sophisticated organizational skills and financial source. In other words, green technology is one of the most important parts of the institutional capacity building of an eco-industrial park, and the state emerges as the main actor who could initiate necessary technological infrastructure. To illustrate, Li et al. (2015) give green technology as a necessary condition for the development of circularity in eco-industrial parks, but the initial investment in green technology has high costs and this discourages enterprises from making this investment (Zeng et al., 2021).

Additionally, eco-industrial parks require new societal relationships, and the state could open a new path for the formation of these relationships. In particular, the existing network relations which are shaped according to the competition-oriented clustering in industrial parks might itself constitute a structural barrier in front of developing new circular networks appropriate to their surrounding socio-economic ecosystem. To put it another way, an industrial park tries to create competitional advantages by developing geographical proximity in the LE paradigm, but the circular logic behind the eco-industrial park aims to create an ecosystem by developing new institutional, social and cognitive proximity in addition to the geographical one (Velenturf & Jensen, 2016). Here, the cognitive proximity means the homogenization of companies' decision-making processes, the institutional proximity means the acquisition of same circular visions by companies, and the social proximity means the embeddedness of companies' economic actions within their surrounding socio-economic ecosystem, and these new contributions are required to achieve the coordination, mutual-learning, knowledge transfer, and innovation between companies (ibid.). However, triggering willingness and trust between companies to initiate the circular transformation of an industrial park is difficult (Maqbool et al., 2018). For instance, Veiga and Magrini (2009) underlined this trust problem while analysing eco-industrial park development in Rio de Janeiro (Brazil). As a solution to this problem, Hartley et al. (2020) suggested that governments could play a catalyst role in forming new circular networks by investigating the situation in the EU. In line with this suggestion, de Abreu and Ceglia (2018) also observed that the governmental agencies highly improved new networks among companies in the UK, and Wang et al. (2017) also made a similar observation in China.

All in all, it could be argued that the state intervention is a dire need for the transformation of industrial parks to eco-industrial parks. However, the nature of the state intervention is crucially important. As noted in the theoretical discussion section, the entrepreneurial state could be strategically helpful in an institutional change process. The entrepreneurial state deploys itself as an initiator/catalyst in the market to open a new path and encourage the market actors to follow this new path, but does not attempt to hierarchically govern the market. For instance, de Abreu and Ceglia (2018) argue that the state might be initially needed for the institutional capacity building of eco-industrial parks, but the healthy functioning of these parks requires the implementation of market rules under the domination of the market actors. In the same way, Korhonen et al. (2004) emphasize the proactive actions of enterprises in addition to governmental policies as another important requirement for the good governance of eco-industrial parks. Zhu et al. (2015) also maintain that a more sustainable eco-industrial park requires more stakeholders in its governance in addition to governmental agents.

**CONCLUSION**:

This study is devoted to analysing the role of the state in the transformation of industrial parks to eco-industrial parks from an NI perspective. The worsening climate crisis has clearly showed that the linear economic system institutionalized after the industrial revolution is no longer sustainable. As a response to this crisis, the idea of CE gains popularity as it proposes the circularity of resources in-between

economic actions to prevent the resource leakage. The CE particularly aims to replace the LE's "take-make-use-dispose" logic with the "recycle-reuse-reduce" logic in economic actions to prevent the resource leakage from the economic system. By preventing the resource leakage, the CE promises sustainable economic growth and environmental protection. Despite this promise, how the CE can be institutionalized in practice is not clear. Therefore, this study has focused on the transformation of industrial parks to eco-industrial parks as a case to release important parameters in a possible CE oriented institutional change process. Furthermore, industrial parks have a transformative power on the rest of an economic system, and a successful analysis on their transformation to eco-industrial parks in line with the CE principles might pave the way for a broader systemic change towards the CE. At this point, the study argues that the state is a strategic actor which could play a catalyst role in the transformation of industrial parks to eco-industrial parks. It has been found that the path-dependence on the existing linear economic system limits the market dynamics/actors in initiating a transformation process from industrial parks to eco-industrial parks. In particular, the short-run interest calculations of enterprises actually strengthen the functionality of the existing LE system. Moreover, there are important structural barriers which the market actors cannot handle alone. Here, the state emerges as a catalyst which could accelerate the transformation of industrial parks to eco-industrial parks according to the CE principles. The study has found that the state could provide regulative, financial, technological and societal support for the market actors. Firstly, the circular economic actions cannot be taken within the linear regulative system; thus, the circular regulative measures are necessary to accelerate the circular actions among the enterprises in industrial parks. For example, the waste management regulations designed within the linear paradigm restrict the usage of by-products in new production processes, or the regulations on intellectual property rights limit knowledge spillover in industrial parks even though knowledge spillover is a sine qua non for an industrial symbiosis. Secondly, the market actors need efficient financial mechanisms to replace their linear economic behaviours with circular ones, and again, the establishment of these mechanism needs the state support. Thirdly, the green technology is an essential ingredient of an eco-industrial park, and the private investment cannot establish this technological infrastructure without the help of the state. Last but not least, the circularity in eco-industrial parks could be achieved through deepened socio-economic networks within an eco-industrial park and with other stakeholders from its surrounding socio-economic ecosystem. These deepened networks need mutual trust between stakeholders and the state could establish this trust environment much better than the competition-oriented market.

However, while giving this support, the state should be in an entrepreneurial mode rather than being interventionist. To do this, the state needs to follow a horizontal governance strategy. With regard to this point, industrial parks automatically constitute intermediary institutions for states, and they could use these institutions in an experimental way to acquire knowledge on how to institutionalize the idea of the CE. For instance, the state can convert an industrial park into an appropriate environment through strategic infrastructural investments, and this appropriate environment might help the embeddedness of the idea of the CE by the market actors. This appropriate environment is generally labelled as an industrial symbiosis in which enterprises themselves could deepen their networks with each other and learn the implementation of the CE in an effective way. As noted above, this symbiotic relationship could result in the development of institutional, social and cognitive proximity in addition to the geographical one that industrial parks already have. The institutional and cognitive proximity will help companies in an eco-industrial park to develop identical way of thinking and behavioural patterns; thus, an eco-industrial park could perform like an organic body. In this way, for example, knowledge transfer between the organs of an eco-industrial parks will be much easier. Additionally, the social proximity will enable this organic body to fully integrate itself into its socio-economic eco-system, and this means easy diffusion of knowledge and experiences into its surrounding socio-economic structure (see also: Boschma, 2005; Prosman et al., 2017; Velenturf, 2016; Velenturf & Jensen, 2016).

These findings suggest that an ideological debate over the market versus the state is not useful in dealing with the climate crisis. Rather than being obsessed with this debate, the functionality of the

state and the market should be re-conceptualized in order to establish a more sustainable system to cope with this devastating crisis (e.g. see: Adami & Schiavon, 2021; Cameli, 2022; Lane, 2019). In this regard, the idea of the CE is a chance to re-arrange the functionality of these key actors in a complementary way. Otherwise, neither the state nor the market has the sole power to overcome this problem. As this case study clearly shows, the transformation to a more sustainable circular system needs both the state and market participation. Therefore, following studies could focus on the possible ways which enable the complementarity of the state and market while developing efficient policies against the climate change.

**Compliance with Ethical Standards**

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