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On the Implementation of a Circular Economy: Role of Institutional Capacity Building

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Abstract

This paper aims to explore the role of institutional capacity building in the development of a circular economy. The study was conducted using open-end interviews with firms and other actors about the industrial symbiosis in the United Kingdom in the light of the particular conditions of the National Industrial Symbiosis Programme (NISP) experience. A content analysis methodology was applied to the interviews results. Our survey indicates that limited institutional capacity building imposed real constraints of a circular economy. The phase-out of industrial symbiosis in the UK has raised several concerns that should be taken into account. Our results demonstrate that knowledge and relational resources and mobilization capacities were weakly developed. Increasing knowledge and relational resources enable companies to increase mobilization capacity. The design of circular economy should include critical importance of these institutional capacities which positively influenced its adoption as a long-term waste and resource availability solution among companies.

Keywords: *Industrial Symbiosis, Circular Economy, Industrial Ecology, Solid Waste Management, Institutional Capacity*

1. Introduction

According to Ellen MacArthur Foundation (2013), extracting raw material is predictable to grow to 82 billion tons around 2020. The report suggests the population should grow to 9 billion by 2050 increasing demand for oil, coal, iron and others by at least a third. This trend according to McKinsey Global Institute (2013) influenced the prices of raw materials since 2000. Two key areas concern: there should be a downward trend in the generation of waste; and that the era of cheap resources has ended, and therefore better use must be made of them (Hill, 2014). Cooper (2002) argued that there was a general consensus among industrialized countries to reduce the throughput of resources, thus the progress required should be a shift from a linear economy to a circular one.

Given this concern, the European Commission adopted a “Circular Economy Package”, which includes revised legislative proposals on waste as such: a common EU target for recycling 65% of municipal waste by 2030; a common EU target for recycling 75% of packaging waste by 2030; a binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030; a ban on landfilling of separately collected waste and promote economic instruments to discourage landfilling. It is also

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necessary to simplify and improve definitions and harmonies calculation methods for recycling rates throughout the EU; concrete measures to promote re-use and stimulate industrial symbiosis. It means turning one industry's by-product into another industry's raw material and economic incentives for producers to put greener products on the market and support recovery and recycling schemes (eg for packaging, batteries, electric and electronic types of equipment, vehicles). The Package, elsewhere, includes an action plan for circular economy specifically for sustainable consumption and production up 2030 (COM (2015) 614 final, n.d.).

Circular Economy (CE) represents an overarching umbrella whereas the planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being (Murray, Skene, & Haynes, 2015). These CE's processes are set up at macro, meso and micro level according to institutional framework adopted in each country (Ghisellini, Cialani, & Ulgiati, 2016). At the macro level, for example, the China adopted a law to introduce the Circular Economy, at meso level, eco-industrial parks and regional area through the industrial symbiosis should create a condition to reduce, reuse and recycling resources and at the micro level, the CE should be run as cleaner production within an established firm.

In the UK, the national waste strategy developed under the Environment act in the 1990's required companies to take responsibility for reuse, recovery and recycling waste (Costa et al., 2010). In 1996, the UK government established a landfill tax which progressively increased over a period of several years to discourage the discharge of waste. The landfill tax imposing was an incentive to reduce waste disposal and to support projects towards industrial symbiosis (IS) (Lombardi & Laybourn, 2012). Industrial symbiosis (IS) means flows and the cycling of materials, nutrients, and energy as a potential model for relationships between facilities and firms (Ayres & Ayres, 2002). The firms engage among them for an economic reason to reduce the cost of disposal, therefore they try to find a cheaply viable solution. This engagement is loaded of capacity learned across the processes of exchange over time. In other words, these IS processes create institutional capacity understandable as knowledge, relationship, and mobilization (F. Boons, Spekkink, & Mouzakitis, 2011). According to Murray et al (2015), industrial symbiosis is a narrow concept than CE because it contributes to reduce, reuse and recycle the resources within an industrial system.

The institutional capacity building was appointed for a body of literature to promote IS linkages among companies, although some contradictions appear in Dutch context appointed by Boons and Spekkink (2012). However, the literature is in a vacuum because it does not approach the transition from the narrow concept as IS towards a broader CE one based on institutional capacity building. Blomquist and Ostrom (1985) showed that institutional capacity building could be a solution to a common-dilemma among actors. In the case of IS, the dilemma is how to substitute raw materials with valuable waste as input come from other companies instead of the natural environment, but how established institutional capacity building for IS should foment CE practices in the UK?

Thus, this paper aims to highlight how institutional capacity created for IS should promote CE practices in the UK. At the academic level, this new knowledge should contribute to CE field still few explored (Murray et al., 2015). For industrial ecology thinkers should be a challenge to link the IS to CE as based on a literature review, we found only a study on it by Wen and Meng (2015). At the business level, the institutional capacity building for CE should promote effectiveness strategy to reduce the cost for raw material and waste disposal. At the governmental level, the transition towards CE should favor more understanding among institutional actors to develop new policies.

The paper is orchestrated to gain more attention on linking from IS towards CE based on institutional capacity building. In the second section, the literature review investigates this linking in a detailed way. The third part affords on the method used to achieve our objective through interviews with some key actors in the UK engaged in IS. In the fourth part, we highlight the results achieved and discussion part shows as these results should be based on the current literature or add new understanding. The conclusion section will close the investigation showing how the institutional capacity should better develop to achieve high performance in the CE context.

2. Building Institutional Capacity For a Circular Economy

In the UK, the CE was influenced in the last four decades by European and national legislation and the Conservative Party 2020 productivity which published a report by Efficiency Commission, published in February 2014 considered one of the strongest efforts towards CE (Hill, 2014). These efforts by the UK are due to clear targets for reduction of waste and establish an ambitious and credible long-term path for waste management and recycling to promote Circular Economy through some actions, among them: "concrete measure to promote re-use and stimulate industrial symbiosis - turning one industry's by-product into another industry's raw material" European Union (European Commission, 2015).

Indeed, the CE goes beyond the industrial symbiosis because it approaches wider actions as municipal and packing recycling among others. Some schools of Circular Economy thinkers as by Ellen MacArthur Foundation (2015), Stahel (2010) with Performance Economy, Lyle (1996) with Regenerative Design and Graedel and Allenby (2011) with Industrial Ecology developed a set of concepts interconnected between them as (1) Design out waste/Design for reuse (2) Build resilience through diversity (3) Rely on energy from renewable sources (4) Think in systems (5) Waste is food/Think in cascades/Share values (symbiosis) (Lewandowski, 2016).

Therefore, against these principles, the CE should develop the knowledge, relational and mobilization capacities to better translate towards a new economic model. The knowledge capacity should design new products/production systems to reduce the energy wasteful from the extraction of raw materials to sell products or services. Moreover, developing new knowledge to develop new business models to sell services instead of products is favorable to resource efficiency depicted by CE. The knowledge capacity is institutionalized over time if actors engaged recognize as a common practice develops new ideas to management resource efficiency (Blomquist & Ostrom, 1985).

The relational capacity in the CE paradigm should be understood as an articulation between actors along the value chain to find a new solution for resource efficiency. Moreover, the actors involved should foment trust to make viable long-term partnerships (Lozano & Witjes, 2016). The mobilization capacity should incentive the actors in the CE to engage in new practices through the relational and knowledge one. Throughout the production and consumption phase, these capacities should be developed to share information about the commons and use-patterns; create a space for communication among companies along the value chain; to accept the cost-sharing formulae; to enforceable contracts and to effect monitoring of use-patterns (Blomquist & Ostrom, 1985).

2.1. *From Industrial Symbiosis Experience to Circular Economy in the UK*

To decrease waste production in accordance with the national waste strategy, the UK government created a National Industrial Symbiosis Programme (NISP) (Morris et al., 1998). The design of NISP reflected the European effort to reduce waste in member states. In 2003, NISP began a pilot regional scheme in the West Midlands, which was supported by the Onyx Environmental Trust (private company, currently owned by Veolia Environmental Trust) and in Scotland and in Yorkshire and in Humber. Then, International Synergy Ltd (ISL) assumed responsibility for NISP to promote IS development in the UK with resources provided by the government (Mirata, 2004). Starting in 2012, the budget of NISP was phased out over a period of three years.

Despite this funding reduction over time, the NISP has been extremely successful - consider for example the tonnages of wastes diverted from landfill, the additional benefits created for individual business as well as regional economies, and the carbon reductions that have been achieved (Lombardi & Laybourn, 2012). NISP adopted several mechanisms intended to promote IS throughout the UK. NISP was conceived to create relationships based on workshops in which companies were put together to discuss waste exchange opportunities. The demonstration project mechanisms diffuse best practices and increase firms interests in IS development (R. Paquin & Howard-Grenville, 2009).

The external forces together with the internal evolution contributed to institute the capacities and promote more meaning and turn the practices operative (Healey et al., 2003). External forces derive from UK waste strategy and EU framework to reduce the waste discharge within Union border. Internal evolutions are successive events interconnected among them over time when the knowledge and

relationship are mobilized. The Institutional Capacity (IC) was appointed as a promoter of IS in various contexts as Zone of Zeeland in the Netherlands by Spekkink (2013), in Dutch stimulation program the mobilization capacity by Boons and Spekkink (2012) and in Sloe Area and Canal Zone in the Netherlands by Spekkink (Spekkink, 2015). In the UK, IC building is promoted by a set of actors involved in the IS development as Wrap (Waste Resource Action Programme), Companies, ISL, NGOs, Government, and Media. IC in the UK are built within the RIS (Regional Industrial System) as depicted by Mirata (2004), RISs are more or less established collection of firms located in proximity to one another (F. Boons et al., 2011).

3. Method

This research is qualitative, which is particularly suited to understanding the dynamics operating in a single setting. Interviews were conducted in five companies and nine organizations engaged in developing IS in the UK. We interview companies to understand how institutional capacity was built over time. We also interview the International Synergies Ltd to understand how institutional capacity was built during and after NISP workshops. The Birmingham City Council, WRAP (Waste and Resources Action Programme) and the Innovate UK were also interviewed because they provide political, financial and technological to support Industrial Symbiosis in the UK. Finally, interviewees with Universities, NGOs and media were particularly useful to understand their view about limit the success of IS experience in the UK.

To assure high levels of data validity, we used a semi-structured interview guide developed for each firm and actor to understand the institutional capacity building towards CE. Firms and actors were asked to explain how societal and industrial institutional capacities evolved over time. Other questions explored what significant events stimulated IS development, what goals were proposed and main outcomes in terms of social network and IS concept diffusion.

Face-to-face detailed in-depth interviews were conducted during 2014 in the UK. Each interview lasted between 60 and 90 minutes and was fully recorded, transcribed and coded. Preliminary research using websites, news clippings, and other information was conducted for each firm in advance of the interviews. This was used initially to focus the interviews on insightful questions tailored to the individual company and later to corroborate evidence and avoid personal bias and poor recall by interviewees.

The NVivo® 10 software package was used for a systematic analysis of the interviews and secondary data collected. Each document analyzed aimed to understand how institutional capacity building developed over time to create a network of actor around the industrial symbiosis. This analysis lets us link these understanding with CE principles as above described. To check the reliability from our data extracted, we applied a triangulation approach to ensure information that we obtained from interviews (i.e. primary data) correspond to factual information stated in official documents and reports (i.e. secondary data) (F. Boons & Howard-grenville, 2009). The study used the double hermeneutic coined by Giddens (2013); it means that the actors reinterpret their meanings from an established framework of the world make them. Within industrial symbiosis, the actors involved just created a mindset needed to understand the environmental burden, but the industrial symbiosis development required a change of this mindset overtime. Following Catellani (2011), the analysis examined how directions and strategies were described and how different narratives were structured in building institutional capacity for industrial symbiosis.

4. Results

4.1 An overview of the National Industrial Symbiosis Programme in the UK

All interviewees pointed out the importance of the UK Government role in imposing and periodically escalating landfill tax and waste recycling targets. These pushed firms to find alternatives. The UK Government took a leadership role in shaping practices relating specifically to mitigation of waste. According to International Synergies Ltd (ISL) and WRAP interviewees, the UK government targeted diverse sectors and encourage them to take ownership and find its own solutions. All companies interviewed agreed that the UK Government should apply the landfill tax escalator but they also

indicated the need for financial and technical support. According to the Ab Connect interviewee, her company is looking for alternatives to landfill, such as digestion treatment and generation of fertilizer that can be applied to their land. The interviewee indicated that the company was experimenting circular economy within their own facilities driven by the fact that the cost of waste disposal is going up.

The WRAP interviewee argued that UK recycling rates were really low compared to other European countries like Germany, Belgium, and Austria. The Green Alliance interviewee pointed out that if the UK had not been forced to adopt the EU directives limiting landfill, the country would still be landfilling most of its waste because it is the cheapest alternative. The Financial Times interviewee confirmed that business media is absent in "recycling", "waste reduction" and "resource efficiency" discussions but should have a story to tell about benefits of industrial symbiosis among companies. The Innovative UK interviewee reinforced the need to establish policies on promoting recycling.

All companies reinforced the importance of government involvement in developing a waste resource action program in the UK. NISP was a readily available means for Government to do this. However, the UCL professor interviewed argued that industrial symbioses required fundamental investments in innovation and technologies development, which takes time in an area where companies don't have resources and don't want to spend much time. On the other hand, the WRAP interviewee defended NISP as just one alternative to deal with waste disposal. In his point of view, the waste problem should be treated from a top-down perspective considering waste prevention measures and reducing materials used in production.

All interviews indicate that waste disposal was a clear issue to be solved but sharing solution and resource is hardly mentioned. The Birmingham City Council interviewee indicated that the Tyseley Environmental Enterprise District served as an initial project because of existing linkages and physical proximity to ISL, which allowed convenient meetings and planning for IS activities. On the other hand, the LU interviewee pointed out the value of an IS national program that could act as an information clearinghouse on good practices.

The interviewees indicated four reasons why their companies participate in NISP. First, the workshops were cost free. Secondly, they were sold as business opportunities to save money using waste. Third, they were seen as providing network building opportunities to reduce the cost of waste disposal. And finally, government money was available for technical assistant and equipment acquisition. All companies interviewees found that industrial symbiosis workshops run by ISL were a useful arena at which participants could look "outside the box" to identify business opportunities arising from the waste exchange. This includes opportunities to transform waste from something to be disposed of to by-product or sources of energy. NISP established regional teams and held workshops involving different firms and technology experts to help them find viable solutions. The regional teams visited each other's factories and whenever they held meetings they also toured the company's facilities. Companies were mobilized to develop projects having short-term economic benefits and ignored longer-term opportunities requiring group commitment.

The GKN Aerospace interviewee noted that the database produced by NISP might be useful to the company in exploring possible symbiotic exchanges if it could be made available free of cost when the UK Government funding was phased out. The Arla Food interviewee indicated that his company was invited by ILS to participate in a workshop because of its huge network of UK milk suppliers. These suppliers, as well as Arla Food itself, are sources of large amounts of waste. The Lower Reule Energy interviewee pointed out that investment in waste-for-energy was a product of IS workshops and WRAP funding.

According to the Arla Food interviewee, the most important IS workshops task was to maintain communication and sharing ideas among participants. Trust building was a consequence of these relationships. The Ab Connect interviewee, who had previously worked as a technology expert, pointed out that NISP was designed to overcome technological, financial and information barriers to industrial symbiosis. After the IS workshops, meeting was convened to discuss how the waste solution could be implemented. Nevertheless, the Arla Food interviewee pointed out that engagement occurred only when there was a clear economic return in the short run.

The Veolia interviewee indicated that the company was initially in support of NISP as an environmental education program on waste management. However, the company itself is a long-term investor extracting value from recycled materials. The Green Alliance interviewee argued that industrial collaboration is hard to create within a broader framework. In her point of view, company production is specific and industrial symbiosis would require a lot of one-to-one interaction between firms to understand how waste stream could be used elsewhere. It implies quite a high level of planning and collaboration between businesses which is not common in the UK. Additionally, trust is a key element for companies to lock into contracts for use of waste as by-product or energy source.

All interviewees stated that financial constraints are a significant barrier to developing industrial symbiosis. In this way, WRAP interviewee added that they help companies to write a business plan to get money from them. From company's perspective, the UK government should have been able to fund initial IS investigations. The ISL interviewee pointed out that the phased out of UK Government funding necessitated a new self-sustaining business model.

4.2 *Building Knowledge Resource*

At the beginning, NISP has difficult to get companies involved because they didn't know the program. However, once companies realize that NISP was working well, they become interested. According to the interviews, companies said that "NISP a quite interesting initiative, it doesn't cost anything, and they can go on saving possibility to do something with the waste and reduce cost". At the end of the program, they had something about 15.000 companies as members of the network. According to the interviewees, NISP builds trust as a program that can provide new solutions for waste problems. The NISP interviewee pointed out that coordination process was more difficult, but once companies have established first contacts and they perceived that the resources were available, they start to participate in the workshop.

ISL used case studies to convince companies to participate at NISP. Once a company had done some activity at NISP, they should write a small report about what type of solid waste they have, how the facility operates and what the outputs, tons of material diverted from landfill or tons of carbon saved from doing industrial symbiosis. Companies had written and NISP had sent that around their members.

ISL interviewee reinforced that brought people to get this talking about a particular program that we're involved in is a hard task. ISL was running a number of events, actually in the Tyseley area, so they brought people together in that locality. ISL interviewee pointed out that there was a lot of different approaches with people that knew people businesses personally, or built a relationship with them through work, or, they know, through other projects that they've been involved.

The ISL interviewee said that the waste exchanges fail because companies do not know among them. This approaches the ISL not taken because they would change the behavior in the market through voluntary action. According to ISL interviewee, they work to convince companies that they can share information and it is valuable. It means to create a level of information that companies don't feel threatened with, on a voluntary base and getting benefit from it.

Companies interviewees reinforced that they get a benefit and figure out that help them get more benefit if they share that information within their supply chain. It's creating information-sharing in a competitive space, and do this through this voluntary action. According to the ISL interviewee: "We're not going to hit you with the stick now, but if you don't think about how you can do something differently, there is the stick and we might hit you later on," almost like a threat. They have done that with the hospitality and food service sector because they have been able to show them that the regulations that the European Commission are imposing on member states are going to have a big impact on them.

4.2 *Building Relational Capacity*

Company responses showed that the "relational capacity" is a starting point for interactions with other companies about industrial symbiosis development. In this way, NISP and IS workshops influences companies to communicate with each other about possible waste exchange opportunities. Companies

acquire knowledge about the value of their waste and opportunities to exchange waste as by-product or energy source. Regarding “knowledge resources”, companies do not want to share key information about their waste because they feel threatened by competitors.

According to ISL interviewee, NISP had developed a culture of sharing, of trust and of development, and a mutual confidence. ISL sent practitioners to visit companies where the business opportunities need to happen and this developed those relationships between companies, as well. As everything, the longer they are in that relationship, the more touch points they have with people and companies, then the greater trust and mutual respect they have for one another so that it can develop. It didn't happen quickly, it developed over time.

What's happening is that the concept, the network got a symbiosis; it is building relationships; and they don't build relationships unless they had trust. And bigger thing is they've discovered something in this exchange of ideas and this whole area is a good area to think outside the box. Once they have found a partner they can work with, however, they wouldn't work between them if they don't build the relationship based on trust. They may have a great idea but their ability to deliver that idea is weak, or they don't have the money, or they don't have the infrastructure to be able to work with them. And they may be completely out of their depths in terms of dealing with normal exchanges, once they get into things like handing over a product or whatever. When the companies solved going into a relationship they start to understand who the other person is, or the other company is. Once they know that they can both work together, and then it will have something to trust.

Moreover, companies when coming together they sign an NDA, non-disclosure agreement. So, if they are talking about something between and there's a certain element of intellectual propriety then by signing this declaration between two companies, it promises to not talk about the secret thing they've got. An NDA is a very common practice in a lot of ways that gives a certain level of trust between two companies. There was a concept of sharing ideas because the most interesting things are that they change their perception due to the trust. People were more open to the idea of talking to somebody, another company beyond the commercial relationship.

4.3 *Building Mobilization Capacity*

According to ISL interviewee, they have a large solid waste database. The idea was to mobilize companies from a different sector that differently they did not able to meet to discuss their problem about waste and to find out solutions together, therefore the NISP offered a speed date service for people who got problems in companies. The ISL encouraged people, and research people to companies interested in a waste exchange. It was quite informally. The workshops represented arenas whereas the participants were influenced by practitioners to find solutions. Previous successful projects were exposed to the public to influence them about the business viability in the IS context. However, the great effort was developed outside these workshops, directly in the companies to find out the real problems that could be emerged during the production processes. Many synergies, in fact, encountered during the workshops not always were possible due to economic cost or technical barriers.

However, the “mobilization capacity” is weak because once companies got Government funding for waste management through WRAP, such as to install a bio-digester or set up contracts with suppliers, they discontinued involvement in NISP. General public concerns are still about forest and nature conservation instead of waste disposal. They do not have a clear understanding what does industrial symbiosis means.

5. Discussion

CE requires a formal agreement among actors, sharing of information gained from research and material use, co- branding strategies (Braungart, McDonough, & Bollinger, 2007), the IS development in the UK need to advance more toward as set of rules and guidelines to CE. As IS developed an integration of actors around trust building, in the CE, however, they should be in circular value chains through business model innovations that reinforce the transition towards a circular economy and better positions supply chain operations (Batista, Boursakis, & Maull, 2016). The UK just began the transition

toward Zero Waste Programme depicted by EU from a landfill tax scheme, thus the results show a progress by UK government in this pathway.

The workshops promoted new skills and acquire new knowledge sharing information with others (Boons et al., 2011). However, the synergies between firms encountered limitations because of a shortage of business plan and no strategic information was disclosed. The ISL influenced the participants, but sometimes were a small business with few financial resources and the leadership was not fully engaged because did not see waste reduction strategically. Thus, the cognitive proximity called for Velenturf and Jensen (2015), where managers that participated in these workshops could influence the leaderships, did not work because the industrial symbiosis is more than matching demand and supply of waste. The industrial symbiosis involves a systematic approach as defined by Lowe (1997) included the financial expenditure to change the actual technology.

The CE requires a combination of advanced technology, skills, management, finances, policy, and governance develop strategy and to update production facilities and equipment (Heshmati, 2015), thus the actors in the UK should be integrated knowledge from different areas and not learn in the workshop, only. In the CE the knowledge of circular technologies is likely to pursue a circular business model and see this transition as an opportunity rather than as a barrier (Rizos et al., 2015), and thus the knowledge developed within the IS area should be less focused on commercial aspect.

In the UK, the ISL had the capacity to mobilize others due to their free service, but the companies were weak engaged although they reduced the risk of failing. The capacity of mobilization is basic for IS development (Ehrenfeld & Gertler, 1997), however in the UK the firms do not relate this capacity building because the ISL coordinated all the work as Paquin and Howard-Grenville (2012) pointed out as well, thus it limited their development as Sturdy (1997) argued because it neglected active role of managers. The workshops presented the results achieved about some business cases; however, these were confined to these meetings losing the bigger opportunity. The information sharing as the results are key for IS development as argued (Chertow & Ehrenfeld, 2012; Ehrenfeld & Gertler, 1997).

In the CE, the cross-sectorial firms should be involved to capture business opportunity long the supply-chains, thus recovery strategies and re-use options should be set up involving network design and product acquisition and operations management activities in inventory, production planning and control, and scheduling (French & Laforge, 2006). Thus, the ISL should address these strategies in a more comprehensive term, for example, switch from business opportunity to a holistic business opportunity involving the supply chain and thus a cross-sectorial approach. These require focusing on reduce, reuse and recycling strategy and not only waste exchange as IS depicts, it is from an end-of-pipe strategy to begin-of-pipe one to capture benefits on the long run. The CE benefits are captured on the long run because require a lot of time to set a holistic strategy at meso and macro level, instead of the micro level (Ghisellini, Cialani, & Ulgiati, 2014).

These shortages should be fulfilled by strategies for building IC for each CE elements depicted by Lewandowski (2016) as design out waste/Design for reuse, build resilience through diversity, rely on energy from renewable sources, think in systems and waste is food/think in cascades/share values (symbiosis). These shortages should be fulfilled by strategies for building IC for each CE elements depicted by Lewandowski (2016) as design out waste/Design for reuse, build resilience through diversity, rely on energy from renewable sources, think in systems and waste is food/think in cascades/share values (symbiosis). To set up a design out waste, companies engaged in the IS should promote skill for circular technologies creating an institutional area with wider actors as government and NGO. These could provoke institutional resistance because old paradigm and cost-efficiency strategy should be preferred in the short run. The building of resilience through diversity should focus on the promotion of new alternative solutions green-oriented as renewable energy, for example, involving new internal and external capacity.

The CE requires new renewable energy because the cost of energy from fossil fuel should turn uneconomic the recycling of materials, thus the customer relationships should be incentivized to return their product and end of life. The companies should involve their actors in a system thinking approach instead of linear one because the environmental solutions require strategies beyond those that integrate value chain from production to consumption. The CE requires not only business focus, but a

stakeholder focus to aware each part to take own responsibility toward sustainability. Thus, waste as food approach is important to internalize in the companies promoting technical and organic expertise among production, distribution and consumption stake. This should be possible if a network is built at business, regional and governmental level to regenerate a new economic around technical and organic cycles.

6. Conclusion

Circular Economy was depicted as a panacea and a new alternative to rethink about energy, raw materials, products, and customers. Thus, a new approach needs to take towards this alternative economy. Industrial Symbiosis should be considered as one of the brunches of Circular Economy because it works with resource efficiency through waste management in input and output. In the UK due to governmental and European Union effort, the waste management was at the top of environmental agenda. Thus, NISP was set up to reduce waste production at firm level through a coordinating firm UK based to build institutional capacity for Industrial Symbiosis to work on. However, Institutional Capacity building for Industrial symbiosis was not intended for CE, thus the companies need to develop new strategies to adapt these capacities. The CE elements here discussed should be integrated at the top of agenda by business and governmental stake. Furthermore, this agenda needs to be shared at society level though an establishment for new national business system towards CE, thus this paper pointed out further research agenda in this direction.

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