Complementary Economics

Greater Sustainability by Learning From Nature's Ecosystems

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Abstract

To reach the UN Sustainable Development Goals, fundamental changes in dominating political and economic thinking are needed. This paper demonstrates how complementary economics, a concept that emphasizes the importance of economic systems functioning like ecosystems, can be a necessary extension of the current economic understanding to achieve the SDGs and a sustainable future. The benefits of a complementary economic understanding are illustrated through the example of *Omatt Gjenbruksverksted* in Bodø, Norway, a workshop that repairs and resells waste electric and electronic equipment. The business model of *Omatt* was developed through the interaction between several local actors. Two of the authors of this paper have actively contributed to developing and testing the business model in practice, and from this experience with the project, we are developing some more theoretical perspectives on complementary economics. *Omatt Gjenbruksverksted* arose organically to answer specific, observed local needs that set the direction for how the business model developed, which is a key element of complementary economics. Much like in ecosystems, the project partners all have different needs that must be fulfilled. At the same time, they have resources that can be useful for other actors. By working together, potential or "sleeping" assets are realized and activated, and thus greater value is created, both in economic, environmental, and social terms. A complementary economic approach is well-suited for mapping these needs and resources of the cooperating actors, and the model of analysis has great transfer value to other cases. Economic systems that function like ecosystems, interconnected across levels and sectors, are needed to gain a sustainable future and reach the UN Sustainable Development Goals, and a complementary economic approach is useful to achieve this.

Keywords: sustainability, complementary economics, triple bottom line

1. Introduction

This paper focuses on a workshop for repairing and re-selling electronics in Bodø, Norway, named *Omatt Gjenbruksverksted* . Omatt provides an example of how a business model can concretize the term *sustainability*. The business model was developed through the interaction of local businesses and local government, with a volunteer organization – the local Red Cross – acting as coordinator. The main

goals of the business model are co-creation, reciprocity, considerate use of human and material resources and long-term strong sustainability.

We have chosen to use the term *complementary economics* because we think it successfully encompasses the principles inherent in Omatt's business model.

As a concept, complementary economics is an example of retrovation – a re-finding – of ways to adapt during times when increased capacity for action has not been factored into budgets. Combinations of money-based and non-money-based contributions along with a long tradition for voluntary work have been, and still are, important elements in Norwegian economic context. A complementary economic approach builds on simple principles:

1) *activating* resources, both existing and potential
2) in *cooperation*
3) to achieve *mutual* benefit.

The procedure is to identify needs and available assets in the current situation. In addition, ways in which the individual actor in need can make a positive contribution are identified, and resources are activated. Such a form of economic thinking aims to assemble the individual parts to a greater good, like when one is solving a puzzle. The better the puzzle is planned; the greater the synergies that can be achieved.

Our ontological starting point is as in Jakobsen (2019: 55), that fundamental changes in the dominating economic and political approaches are needed in order to fulfil the UN Sustainable Development Goals (SDGs). The SDGs build on a common core of values that involves both social, ecological and economic considerations, and cooperation to achieve the goals (UN, 2015). This core of values can be called the "triple bottom line", where cultural/societal values, natural values and economic values are considered as equally important (Elkington, 1999; Ingebrigtsen and Jakobsen, 2007). The circular economic approach that is also fully compatible with this kind of understanding includes values that can be of natural, manufactured, human, cultural or economical character. To reach the UN SDGs, a holistic and long-term perspective is also needed, where solidarity with future generations is integrated. Then it is useful to have a broadened economic understanding, based on how ecosystems function. That is where our complementary economic approach can contribute.

Other writers have highlighted similar principles as us, pointing out that (neo)classical competitive economics is not able to create equality and sustainability, and have therefore sought out different, more value-based ways of economic thinking. The triple-bottom-line principle is an example of this. Other examples are a pluralistic economic understanding (Söderbaum, 2014), stating that "Neoclassical economics is more or less blind to equality issues and not enough to deal constructively

with present unsustainable trends" or an inclusive economy based on African traditions and a "worldview that understands reality as inclusive, complementary and relational" (Kanu, 2017).

Mutual benefit is a foundational principle for how ecosystems work, where adaptation happens all the time for the ecosystem's inhabitants to be able to meet their needs. Species adapt to each other in symbiotic interactions. Interaction between levels in a social or economic context is well illustrated in models that were originally developed to describe interactions in nature. Capra and Jakobsen (2017) call it "the systemic principles of life", underpinning that instead of conquering nature, human-made (economic) systems should aim "to develop knowledge that teaches us how we can adapt economy to the principles found in nature" (2017: 833). The *feedback loop* (Holling, 2001: 394) and the *Panarchy model* (Walker & Salt, 2006: 11, 75, 80-81) illustrate how experience and learning are key features in systems operating by the principles of life, and how dynamic processes at different levels affect each other. In general, developmental processes are larger and slower at the overall (global, national) level, and faster at lower (local, regional) levels. This means that early effects, of changed framework conditions or of system errors, will first and best be visible from below. Thus, local solutions to global problems are noteworthy since feedback from below is thus absolutely necessary in order to be at the forefront of developments. Consequences propagate upwards over time and can have much greater ripple effects at later stages. Experiences accumulated from the bottom-up create arenas for sharing and mutual learning from the mistakes that others have made, and the solutions they have found. This paper aims to contribute to creating this kind of accumulated experience-based knowledge base by sharing experience from our pilot project.

Conscious economic planning can be achieved by following the principle of mutual benefit, and hence this becomes a foundational principle in the complementary economic approach. This understanding includes both the triple-bottom-line perspective, and historical experience with many different combinations of sector-transgressing private-public cooperation in Norway (see for example Koren, 2012; Myhre, 2015; Stugu, 2017). Traditions in Norway point towards complementary economic thinking. From the 1800s a rich variety of NGOs, flourishing in the civil and volunteer sector, shaped both common political participation, and laid a foundation for the welfare state, which was established in the 1900s. Echoing a similar theme, the early founding of non-profit organizations created an institutional legacy of civic commitment in Norwegian communities (Marquis and Tilcsik, 2013: 209, referring to Greve and Rao, 2012). Furthermore, Norway has the age-old *dugnad* tradition: networked voluntary work with reciprocity as a key value. In this context, our concept of complementary economics can hence be understood as a retrovation, where old knowledge is reused in new packaging. Practical historical experience from a Norwegian context also shows that if a welfare service of the type that is in focus in this case shall be sustainable over time, it requires involvement and support from both the public, private and voluntary sector, and from households/inhabitants. Figure 1 below illustrates

how interaction between sectors leads to the resources from each sector contributing more greatly to covering each other's needs than in a scenario where there is little or no cross-sector cooperation and where the actors would rather compete for resources than cooperate to utilize them wisely.

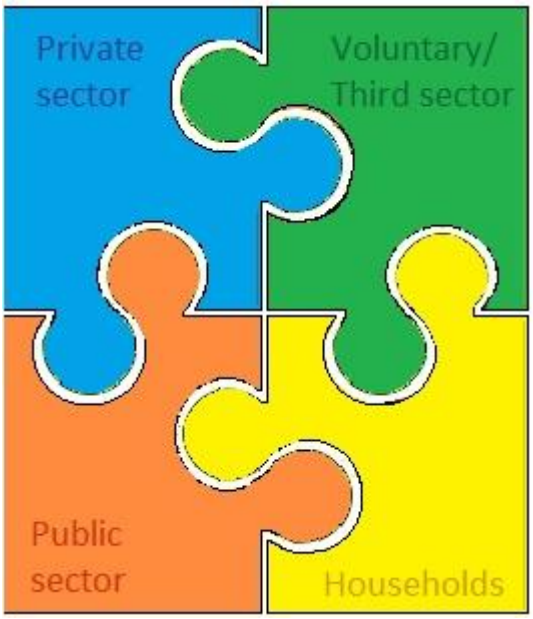

***Figure 1**. Key principle: Mutual benefit through Cross-sector cooperation.*

When thinking of economics in this way, the discussion about growth becomes quite irrelevant. Instead, the discussion centres on the allocation of existing resources in the combinations where they generate the largest benefit. Hence identifying real needs and allocating the resources to meet these becomes a priority, rather than starting out with a supply and then working towards meeting a created demand. As it is expected that the budgets available to Norwegian public bodies will become tighter in the coming years ((St. meld. nr. 29 (2016–2017); St. meld. nr. 5 (2020-2021)), it seems clear that civil society, business and volunteers are forced to solve societal needs in cohesion and with wiser use of resources.

It is necessary to separate between weak and strong sustainability (Zadek, 2001; Ott, 2011). Weak sustainability allows for an "exchange" between natural resources and other types of capital, and is often the basis of neo-classical economics, for example when purchasing carbon emission allowances. With such a mindset, it is irrelevant whether resources are unused natural resources, or if resources are processed. On the other hand, the principle of strong sustainability maintains that one cannot damage or reduce the stock of natural resources. That means that resources in use must be renewable or conditionally renewable. When using resources of the latter kind, the outtake cannot exceed the regrowth (Ingulfsvann, 2013). With a wide understanding of processed resources, both resources that have been intentionally adapted to human needs, and resources that have been contaminated from such use, are included. Then it is clear that the stock of natural resources is diminishing quickly. Seen from this perspective, comprehensive changes are needed to reach the UN SDGs. When the goal is to achieve

long-term strong sustainability, resources that are damaged or blocked from current or future use, must be depreciated as losses.

In recent decades, attention seems to have been focused on economic and environmental sustainability, while societal sustainability has not been a priority (Holand, 2017; 2020). This downgrading also had negative consequences for the voluntary sector/third sector. Still, the voluntary sector is considered essential for the welfare state in Norway (St.meld. nr. 10 (2018-2019)). Also Bodø municipality, where our empirical example is situated, considers contributions from the volunteer sector as key to achieve goals linked to inclusion, public health, and welfare (Bodø kommune, 2017a; 2017b). Statistics also show that the volunteer sector's economic impact in Norway is increasing, especially regarding responsibility for safeguarding social and environmental sustainability (Statistics Norway/SSB, 2019).

2. Methods

This article shows how a complementary economic understanding works in practice, with the help of an empirical example in the form of the project *Omatt Gjenbruksverksted*. Omatt was started as a pilot project by Bodø Red Cross in the fall of 2019 in cooperation with the waste management company Iris Salten IKS and the extended producer responsibility company Norsirk. It aims to repair electrical and electronical equipment for reuse, and at the same time create activity and inclusion for persons with no other opportunities in the working life. The workshop creates values within all three dimensions of sustainability: social, economic, and environmental. The concept's value proposition is that Omatt shall demonstrate sustainability in practice through considerate use of human and material resources (table 1).

Two of the authors have actively contributed to developing and testing the business model in practice, departing from an ontology rooted in industrial ecology and ecological economy thinking. The project came about as a result of an exploratory approach towards solving a number of unmet needs (see table 4). In this perspective, the project becomes active learning, in the form of a research method named *action research,* where the purpose is to solve specific problems, challenges within an organization or society, often with a defined set of values (Johannessen et. Al 2008). In this way, one can develop new perspectives that can help to see reality with new eyes. In this paper, we are developing some more theoretical perspectives based on empirical learning from our experience with the pilot project.

The starting challenges were these: At the immigrant receptions in Bodø there were many people, especially men, who needed work, which would help them find a more meaningful everyday life. Some of them already had valuable skills as workers. At the same time, the local Red Cross second-hand store needed more competence to better take care of the quality of its goods for sale, especially electric/electronic items, a rare competence in our times. Also at the same time, local schools needed

worksites for young trainees learning electric/electronic repair work. The need for jobs with social inclusion and language training is great, the need for skilled workers from perishing professions is great, so is the need for trainee arenas. Combined with the redistribution of financial resources, the Bodø Red Cross saw this as an opportunity to create value in all three dimensions of sustainable development. This was the starting point for *Omatt* both as a business model experiment and as a case for action research.

3. Results and Discussion

Example of complementary economics: Omatt Gjenbruksverksted – Bodø Red CrossA main goal for the Omatt project is to reduce the environmental impact from waste electric and electronic equipment (WEEE) through reuse. WEEE is a growing source of waste**,** and an important focus area in the EU's action plan for circular economy (EU, 2020). Omatt receives WEEE from waste management companies and stores selling new electric and electronical equipment. The products are tested, cleaned, repaired and sold locally in Bodø Red Cross' second-hand store. The store receives income that can be used for socially beneficial purposes.

When the products can be reused rather than recycled, they are lifted in the waste hierarchy (figure 2), which demonstrates what types of waste treatment is preferable from an environmental and resource preservation point of view (Avfall Norge, no date)**.** At the same time this contributes to better local utilization of resources, while avoiding long-distance transportation of waste and energy-intensive recycling processes.

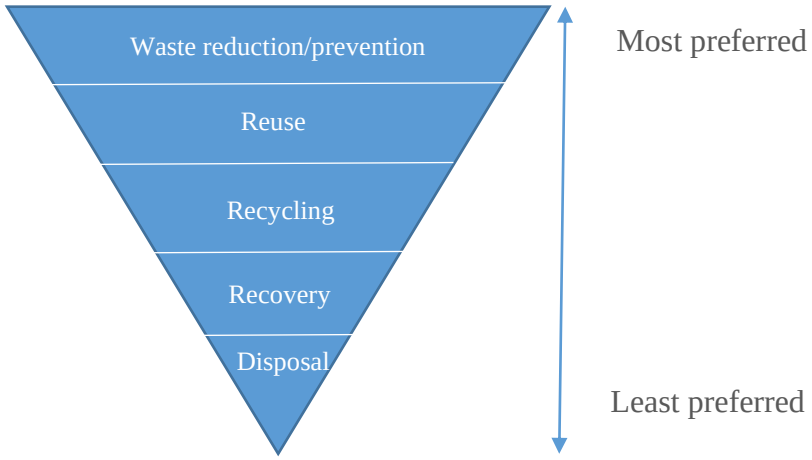

Figure 2*. The waste hierarchy.*

Omatt is officially approved for carrying out the electrical repair work and training apprentices and is hence important for the local society in maintaining the level of expertise in repair work that is important

in a circular economy with more sustainable consumption. Omatt also creates a possibility for the public to have their products repaired.

Components from products that cannot be repaired are taken out with a view to carrying out in-house repairs on other equipment or are sold to private individuals. This is to avoid sending all waste for recycling. As a result, these components are also lifted to a higher level in the waste hierarchy, and greater economic and environmental value is ensured. This part of the job does not require the same level of skill associated with electrical repair work, and therefore an opportunity is provided for the employment of people who do not have professional training in the field of electronics, as well as others who may not have any other possibilities in the job market.

Revenue streams, resources, and core activities

Omatt's revenues today are based on sales of single products. All products made available for sale in the second-hand store have been quickly sold with no form for marketing, and the capacity of the workshop has been the limiting factor for sales. The customer base consists of a wide range of private individuals in the Bodø area, especially immigrants, low-income households, and a considerable share of high-income persons with a strong attachment to environmental issues.

Omatt's most important resource is waste electric and electronical equipment. Crucially, what is considered as waste by others, can become a valuable resource for Omatt. Discarded white goods have been especially important, as well as smaller products like coffee makers and microwave ovens. As the competence and capacity of the workshop increases, also electronic products like mobile phones and computers are also becoming more important resources. The resources consist of products that are well used by households before they are discarded, as well as of products from stores that are damaged in some way and that are often easier to repair and have a longer expected lifetime in the reuse-phase.

While Omatt's customer base is concentrated in the Bodø area in Norway, the concept can easily be replicated elsewhere with local adaptations. The idea is not to extend Omatt's reach beyond Bodø, but rather to establish similar locally based organisations that are willing to cooperate and to share competencies. The concept does not centre on large-scale operations, but rather on decentralized and local solutions. The markets for used goods are limited also in other districts close to Bodø, and similar concepts like Omatt can contribute to covering local demand, creating local employment and encouraging the reuse of WEEE elsewhere.

Omatt's business model in a sustainability perspective

Omatt's business model is a resource driven one based on WEEE as a raw material for the production. Key aims include encouraging the reuse of products, creating meaningful work for those who would

normally have trouble finding a place in the employment market, and generating revenue that can be used for socially beneficial purposes. This is triple-bottom-line thinking in practice. The ambition is that the business model will be an inspiration for other local communities.

The complementary economic element of Omatt is that it is based on cross-sector cooperation. For the project to work, the different actors need to establish effective forms of cooperation. All involved actors need to be equal and co-dependent. At the same time, for the concept to survive in the long term, households must see the value of the service and need to make use of it. This simple formula is the basis for complementary economics, where the main point is seeing the whole picture rather than thinking sectorally. Added value as a consequence of sharing competence is key in a complementary economic approach. Omatt has partners across the value chain, contributing to securing access to waste for reuse, labour, and competence for repairs. Sales of the products are conducted through the second-hand store so that employees in Omatt can focus on developing and maintaining skills in repair work. Altogether, the partners have a good level of competence in terms of people, waste and recycling, and electrical work.

Table 1 sums up the values created for environment, society, and the customer.

Table 1. *Value creation for the environment, society, and customer.*

Value for environment	**Value for society**	**Value for customer**
Lifting waste higher up in the waste hierarchy, and preserves the resources in the waste	Economical profits for humanitarian purposes	Electrical products of good quality, that are considerably cheaper than equivalent new products
Prolonging the lifetime of WEEE, reducing the product's environmental impact	Creating unique apprentice positions that provide competence in repairs	Making it easy for the customer to choose the socially and environmentally best option
Reducing transportation emissions by treating the waste locally.	Employing persons that otherwise would have had no place in the labour market	
	Creating a concept with transfer-value to other districts	

Evaluation of the business model – SWOT analysis

The pilot project has shown that the concept of Omatt works well. There is great demand for the products, and the business has relatively low costs for repairs and production. Levels of cooperation relating raw material inputs, labour and sales is good, and allows Omatt to focus on core activities and

keeping production costs low. Hence, Omatt can encourage positive environmental and social values, while running an economically sustainable business. Omatt's largest costs are salaries, rent and electricity, expenses for collecting waste products for repairs, and consumables like tools, detergents and similar. The costs are relatively predictable and many of them are fixed. Hence the costs per product are reduced through growth in the production levels.

As the capacity of the workshop increases, an important part of the plans for the Omatt project is to secure access to more electrical products of the type that are more easily repaired, through cooperation with a broader range of partners. This will contribute to the widespread use of more WEEE, while helping enhance the efficiency of repairs. Cooperation agreements with public and private actors for Omatt to repair their used electrical products will also be beneficial for these partners, as they will be able to show that they take responsibility for society and the environment by sending their electrical waste to reuse locally, rather than recycling through national or international channels. The SWOT analysis below further sums up the strengths and weaknesses of the business model and key external factors.

Table 2. *SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)*

Strengths	**Weaknesses**
- Great demand for the products - Unique offer and unique competence in the local area - Low production costs - Good cooperation for raw material input, labour and sales - Sustainability and circular economy in practice through local benefits and reduced environmental impact	- Some complaints still - Lack of capacity in the workshop – does not balance with the demand - Sales of single products – no repetitive revenues - Products only available in one physical store today
Opportunities	**Threats**
- Repair and reuse of several types of products, like IT-products or components - Offering services like repairing computers - Reaching a larger customer segment through changes in attitudes towards buying used products, and by marketing the concept more - Getting more cooperation partners for raw	- Legislation is strict – risk of not complying with all relevant demands - Fires or other electrical accidents at customers' homes - Losing key personnel with critical competence - New competitors - Losing cooperation contracts

materials in to increase the production - Implementing a system for documenting repairs and handling complaints, to document the quality and professionality, and be able to charge higher prices - Start selling the products online and starting a delivery service to reach more customers - Apply for grants to invest and develop the concept further	

Locally, Omatt competes for sales with the private market where people sell and buy used electrical products online. Omatt, however, represents a more stable and predictable market with regards to access and prices, and can document the repairs and tests each product has been through, to ensure the customer about the quality of the product.

Evaluation of the triple-bottom-line and contribution to strong sustainability

It is important for both the business and its partners to act in accordance with the UN SDGs. Omatt should not only generate economic profits, but also contribute positively to the environment and the local society. It is also important for them to give consumers the opportunity to make sustainable choices.

Omatt has chosen to focus particularly on those of the UN SDGs that comply the most readily with the company's activities: 12 - responsible production and consumption, 8 – decent work and economic growth and 17 – partnership for the goals. The project creates benefits for the environment through making waste a valuable commodity. By lifting WEEE to a higher level in the waste hierarchy and prolonging the lifetime of products, the consumption of new products is reduced, and environmental impact is reduced. Omatt makes it easy for citizens in the Bodø area to choose environmentally friendly electrical and electronical products – a possibility that has not been easily available for these consumers hitherto. By reusing products locally, the environmentally damaging long-distance transportation of waste to energy-intensive recycling plants elsewhere in the country or abroad is avoided. The business model hence directly contributes to SDG 12.

Omatt will also take social responsibility and create benefits for their local community beyond generating its own economic profit. This happens through offering apprentice positions and generating local employment opportunities for persons in lack of other opportunities in working life. The workshop will focus on making sure that each employee gets customized tasks and good working conditions, and meaningful work. In cooperation with Bodø's high schools they make suitable locally based apprenticeships available and maintain and transfer knowledge about repairs that proves key to

achieving a circular economy. By these means, Omatt's business model also contributes directly to SDG 8.

To ensure a sustainable running of Omatt Gjenbruksverksted, the organisation's strategy is to work by a triple-bottom-line and measure their success by the extent to which they can generate societal gains and contribute positively to the environment while operating with an economic surplus, as illustrated in table 3.

Table 3. *Triple-bottom-line for Omatt Gjenbruksverksted*

Social responsibility	**Environmental impact**	**Economy**
Create apprentice positions and practice for students	Increase the amounts of WEEE for reuse	Sales must cover production costs and create space for further development
Create individually customized employment	Reducing the transport of WEEE for recycling	Non-profit – potential profits are used for development or ideal purposes
Create added value for second-hand stores with ideal purposes	Become certified within an environmental standard	

Both economic capital in the form of direct and indirect financial contributions, waged and volunteer work, infrastructure, and social capital in the form of trust, goodwill and support are key to achieve a sustainable running of Omatt's business. Also, knowledge and competence are key resources. In practice, this works as a formula incorporating various different factors. The case presented here shows that the establishment of Omatt activated potential or "sleeping" resources pertaining to the involved partners, so that these contributions became real resources. The realization of resources that happens during the interaction between the actors also contributes to a perception of reduced demands for profit, because the gains in the other areas are perceived as valuable. As the case shows, these are clearly real gains, although they can hardly be described in monetary terms. As a supplement to the more traditional SWOT-analysis, we have developed a model for complementary economic analysis. This is a useful form for mapping needs and resources among involved actors, and it is especially useful in the case of a resource-driven business model like this. In the case of Omatt, the analysis is shown in table 4.

Table 4. *Complementary economic analysis of Omatt Gjenbruksverksted*

Schools	need	Practice arena
	recourse	Competence and labour
Red Cross	need	Means for operation
	recourse	Connection function between actors
Businesses	need	Getting rid of discarded or damaged products

	recourse	Discarded/damaged products becomes a resource for the reuse workshop
Individuals (customers)	need	Cheap products, sustainable option
	recourse	Purchasing power, demand for sustainable consumption
Individuals (employees)	need	Meaningful activities/work
	recourse	Competence and labour
Municipality	need	Measures for employment and integration
	recourse	Infrastructure
Landlord	need	Activity in empty premises
	recourse	Infrastructure
Workshop Omatt	need	Discarded products for reuse, competence and labour
	recourse	Resales and reuse of products, integration measures, employment opportunities, contribution to sustainable use of resources, being a practice arena

4. Conclusions

Omatt Gjenbruksverksted developed organically when it was started by the actors themselves, the Red Cross in cooperation with the municipality and local business. The ideas behind the concept arose as solutions to concrete, observable local needs that became guidelines for how the resource-driven business model evolved. An interesting feature with complementary economics is that it is driven more commonly by bottom-up processes than top-down ones, something that is especially visible in the case of learning in the Omatt project.

Omatt and other businesses that run similar concepts offer illustrative examples of today's economic reality, where complementary economics are largely put into practice at the micro level. The complementary economic aspect is mainly based on the added value that occurs when "sleeping" assets are realized, and new value creation can take place. The concept shows that the purpose is not maximizing profits, but to solve societal and environmental challenges. In a triple-bottom-line perspective the concept brings gains within both social, environmental, and economic value creation: social human needs are met, environmental impact is reduced, and some financial revenue is generated. A main point is that more values are accounted for than the strictly financial. A complementary economic analysis is well-suited for mapping the needs and resources of cooperating actors, and the model of analysis has great transfer value to other cases.

This article describes an economic order that already exists, that has historical roots, but that so far has not received the recognition it deserves. This is an economic order that consists of many different and complex contributions, in cooperation across sectors, where the goal is interconnected use of resources. Such an approach seems necessary for society's sustainability – or robustness – in meeting future challenges.

What is needed in the future is that economic systems function like ecological systems, interconnected across levels and sectors – from small to large, from locally to globally, where there is no longer a separation between producers and consumers, but where every actor has a role as a contributor to the system. That is how ecosystems function, and how more winners can be created by learning from nature's ecosystems. And the gain? A sustainable future, shaped by local communities. The ability of each individual company, organisation, and local or large community to adapt to reach the UN SDGs will be decisive. That is why a complementary economic approach, with interaction across sectors and between levels, is the way to go.

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