



## Distributed economies — A new engine for innovation

Allan Johansson\*, Peter Kisch, Murat Mirata

*The International Institute for Industrial Environmental Economics, Lund University, PO Box 196, 221 00 Lund, Sweden*

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### Abstract

This article introduces the concept of *distributed economies (DE)* as a fresh strategy to guide industrial development towards becoming more sustainable. The concept calls for a transformation in the industrial system towards DE departing from the socio-economically and environmentally unsustainable dynamics associated with large-scale, centralised production units that are favoured by neoclassical economic drivers. With DE, a selective share of production is distributed to regions where a diverse range of activities are organised in the form of small-scale, flexible units that are synergistically connected with each other and prioritise quality in their production. However, rather than the total abolishment of large-scale production, our argument concentrates on finding a renewed balance between large- and small-scale and between resource flows that take place within and across regional boundaries. Other desirable characteristics of production units compatible with DE are elaborated. The paper concludes by calling for the deployment of the vast amount of globally and regionally available knowledge for the formation of regionally adapted strategies to create dynamically “self-organizing” business environments.

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### 1. Introduction

The notion of “the two cultures” is attributed to the British physicist C.P. Snow [16]. In his Rede Lecture for the House of Parliament 1953, Snow pointed to the existence of what he called “the two cultures” in the administration; on the one hand a scientific culture driven by pragmatic techno-economic arguments and on the other hand a culture of the humanistic tradition. He felt that the former was ill represented in the administration and as a consequence many important decisions were taken with insufficient understanding of the basic facts. In fact, this dichotomy between reason and emotion runs throughout the whole of our western

culture. It is between the two extremes that the contemporary discoveries in art and science have developed, giving each époque its label. This is where the cultural elements of the time, the “memes” as Dawkins [3] calls them in his book “The Selfish Gene”, are formed. The memes catch on, jump and spread, until they are surpassed and taken over by stronger new “strains”.

In a later analysis inspired by the intellectual storm of his first speech, in an effort to bridge the gap between the two extremes, Snow pointed to the emergence of what he called “the third culture”. He also drew attention to the fact that his real concern, which passed somewhat unnoticed, was the rapidly increasing gap between the industrial nations and the developing world — those who have and those who have not. Snow’s seminal speech has also caused a larger echo; concern for the developing world is a strong dimension of today’s sustainable development efforts.

\* Corresponding author. Tel.: +46 46 222 02 00; fax: +46 46 222 02 10.  
E-mail address: [allan.johansson@iiee.lu.se](mailto:allan.johansson@iiee.lu.se) (A. Johansson).

53 Together with growing affluence, the broader un-  
 54 derstanding of human responsibility characterising  
 55 Snow's third culture has also brought about a feeling  
 56 of joint responsibility for the environment and our finite  
 57 earth, similar to that voiced in the concept of sustainable  
 58 development. As a consequence, initiatives of various  
 59 sorts to protect our environment have been developed  
 60 and implemented. Some efforts, such as voluntary  
 61 preventative approaches i.e. cleaner production, have  
 62 proven to be remarkably effective, although insufficient,  
 63 in decreasing the environmental impact of industrial  
 64 production. However, protecting the environment is not  
 65 a singular issue. Instead, it can be seen as a proxy for  
 66 many unfulfilled desires in human development, all  
 67 complex in their own right: emotions and appreciation  
 68 of beauty, the desire for ethics and equity as well as  
 69 concern over personal material prosperity. These are  
 70 essentially, the same things that inspired Snow to  
 71 perform his analysis of the "two cultures".

72 As a sub-group to this larger issue, industrial  
 73 environmental protection has, over the last decades,  
 74 been subject to similar tensions. The focus has shifted  
 75 from acute problems and protection of the local  
 76 neighbourhood, towards precautionary action, which  
 77 is no longer limited to the primary production processes  
 78 but covers the environmental effects of the products  
 79 during their whole life cycles. Over more than two  
 80 decades, the concept of 'Clean technology' [12] has  
 81 assured that the environmental concerns have been  
 82 included in a rational manner in modern technical  
 83 development work. Certainly, there are still many areas  
 84 with great opportunities for improvement through  
 85 standard 'Clean technology' measures, but new addi-  
 86 tional strategies for innovation and industrial develop-  
 87 ment are needed. In particular, with today's climate  
 88 of reduced public spending for virtually all sectors of  
 89 R&D, there is an urgent need to question the current  
 90 support and coordination structures for fostering in-  
 91 novation, which are focussed solely on the amount and  
 92 rate of innovation rather than on the orientation of  
 93 innovation towards identified needs.

94 There is a need for new paradigms. Beyond a certain  
 95 level, pollution prevention is not profitable – at least not  
 96 with the present cost allocations. A shift in economic  
 97 thinking is necessary, together with a larger vision for  
 98 entire production chains. Merely technical innovations,  
 99 although certainly important, will not be sufficient to  
 100 resolve the present contradiction. Innovative ways of  
 101 organising production–consumption systems supported  
 102 by an alternative set of value determinants are pressing  
 103 necessities.

104 Sustainable development is the commonly accepted  
 105 new paradigm. It speaks about development, economic  
 106 as well as technical, not sacrifice, and as such can be  
 107 accepted by all, poor and wealthy alike. It also  
 108 introduces the concept of global responsibility that

Snow called for. The difficulty is that global responsi- 109  
 bility must be guided by common ethical standards if 110  
 coherent action is to be expected. However, it is not at 111  
 all clear where such ethical guidelines should be set, as 112  
 we currently lack an effective forum for discussing them. 113

## 2. Pollution prevention is no longer profitable – new 114 strategies are needed 115

Pollution prevention/cleaner production has been an 116  
 effective strategy and its virtues still carry weight as 117  
 useful guiding principles. However, additional 'prevent- 118  
 ing pollution,' after a certain level is reached is either not 119  
 possible or is prohibitively expensive, as seen from 120  
 a classical production economic perspective. Moreover, 121  
 there are occasions where the benefits of cleaner 122  
 production are offset by other dynamics, most distinct- 123  
 tively, ever-increasing consumption and the associated 124  
 re-bounce effects. Thus, there is a need to introduce new 125  
 strategies, which enlarge the scope beyond the tradi- 126  
 tional production economy and incorporate other 127  
 drivers for change than mere production efficiency. 128  
 The structure and sometimes even the purpose of our 129  
 production systems need to be questioned and ultimately 130  
 transformed. 131

A dilemma emerges when we acknowledge, that the 132  
 rapid increase in industrial production has caused 133  
 environmental effects of global dimensions and that, 134  
 conversely, we need to increase production to account 135  
 for the legitimate needs of a growing majority of the 136  
 world's less affluent population. As pointed out by 137  
 Ayres and Kneese [2], there are no fundamental limits 138  
 to sustainability given an adequate supply of energy. 139  
 Nevertheless, achieving this alone requires the whole 140  
 system to change. Production must continue becoming 141  
 more efficient, but the consumption patterns must also 142  
 change. Yet again, the right mechanisms must be found 143  
 to inspire and guide the fundamental drivers of technical 144  
 economic progress and environmental work. Selfish 145  
 interests must be identified and channelled towards 146  
 common goals. Sharing poverty is not an attractive 147  
 slogan. 148

The theoretical constraints to sustainability and the 149  
 opportunities for achieving this are thoroughly dis- 150  
 cussed by Ayres and Kneese [2]. Among other possibil- 151  
 ities, they point out the central importance of the 152  
 discount rate when deciding what is actually sustainable. 153  
 Taking the "conservationist" approach and allowing 154  
 no permanent degradation of the environment implies 155  
 a discount rate close to zero, rather than the "market 156  
 rate of interest" which seems to be favoured by most 157  
 economists. The techno-economic decisions have to be 158  
 made between these two extremes. 159

Ayres and Kneese [2] also point out the large and 160  
 often unrecognised potentials of efficiency improvements 161

162 in the material metabolism of society in general and more  
 163 specifically in energy use. The latter is particularly  
 164 important as sufficient supply of energy is in theory the  
 165 only real limiting factor for perfect sustainability. They  
 166 also point to the need for a fundamental restructuring of  
 167 the industrial metabolic system of how we use and reuse  
 168 materials. An important objective of this restructuring is  
 169 to decrease the material throughput by decreasing the  
 170 material intensity of products, prolonging their service  
 171 lives and finding proper mechanisms to channel them,  
 172 fully or at least partially, back into a useful function.

173 Devising and implementing strategies that can ef-  
 174 fectively address such prominent concerns and bring  
 175 about necessary transformations is a challenging task  
 176 and a responsibility with far reaching implications. This  
 177 responsibility is partly connected to the fact that what is  
 178 happening in the affluent industrial countries function as  
 179 a blue print for policies in the developing world. Thus,  
 180 the strategic choices made now determine whether the  
 181 short-term decisions, following from the Kyoto protocol  
 182 for example, are likely to influence the future for the  
 183 better or for worse. For the better if the effort is genuine  
 184 and is implemented based upon consensus and solidar-  
 185 ity. For the worse if the short-term measures remain  
 186 empty, inefficient and costly gestures of cosmetics and  
 187 bad conscience, which further burden an already over-  
 188 strained world economy.

189 A few brave individuals like Snow and Rachel Carson  
 190 [4] first voiced the need for change. Their thoughts  
 191 are today gaining more widespread support, touching  
 192 virtually all areas of the society. Thus, we are possibly  
 193 already witnessing a paradigm shift brought about by  
 194 seemingly unrelated reasons that simultaneously call for  
 195 changes in lifestyle and technology. However, a common  
 196 misconception seems to be the assumption that these  
 197 changes must be associated or brought about by  
 198 fundamental scientific and technical breakthroughs. In  
 199 fact, important changes in society can and have  
 200 happened in the past without dramatic changes in basic  
 201 technology. This fact is also captured by Spangenberg  
 202 et al. [17], who states:

203 “We are currently so hooked up on technology that  
 204 we associate every major change with a need for  
 205 a scientific or technological breakthrough. However,  
 206 as mentioned earlier, big technological breakthroughs  
 207 are not always needed for important changes in  
 208 society, a slow improvement of technological skills  
 209 may, when they pass a certain threshold, provide the  
 210 means for dramatic changes.

211 Similarly, the present proliferation of personal com-  
 212 puters bringing nearly limitless processing capacity  
 213 into the hands of the great public, rather than of  
 214 those of a few experts as previously was the case, is  
 215 a result of the gradual improvement of semiconductor

technology and printed circuits. In fact one could  
 216 imagine that we already possess skills that could,  
 217 correctly applied, dramatically improve our quality of  
 218 life, the potential for innovations is not shrinking, on  
 219 the contrary it is rapidly expanding with increasing  
 220 scientific understanding.”  
 221

222 One of the fundamental deficiencies in today’s society  
 223 is not, as often claimed, the fact that we are guided  
 224 by insufficient economic laws. Rather, one could argue  
 225 that the real problem is that the economic laws have  
 226 functioned well despite their simplicity. These laws have  
 227 functioned so well that one forgets that they are merely  
 228 simplified models, which do not include all the  
 229 dimensions we intuitively, and correctly, include in the  
 230 expression “quality of life”. Money is not all, but money  
 231 is all that economies deal with.

232 Modern economy strives towards an optimal alloca-  
 233 tion of limited resources in view of optimised pro-  
 234 ductivity. Application of the theories of production  
 235 economy has contributed to an impressive increase in  
 236 material wealth in the industrialised countries. On this  
 237 level, theory and practice have met well. A natural  
 238 consequence of the optimisation of the production  
 239 function is that the production units tend to increase  
 240 in size. The best result is obtained when one does what  
 241 one is best suited for and the larger the units, the less  
 242 they are, when seen proportionally, burdened by  
 243 necessary expenses for start-up and administration.

244 However, under the presently dominant dynamics,  
 245 fundamental values are at stake and there is a mounting  
 246 concern [1,11,15] that the economic laws that have so  
 247 successfully governed, at least the western economy, do  
 248 not provide the right signals for development becoming  
 249 more sustainable. At least not if it is interpreted as used  
 250 in their original definition as facilitating a more just,  
 251 sustainable form of society that provides a decent living  
 252 for all.

### 253 3. Sustainable development and regional development 254 revisited

255 The purpose of companies is to create wealth for their  
 256 owners. This simple maxim has proven to be a very  
 257 efficient way to structure and plan economic activities.  
 258 Growth at the expense of competitors has been the  
 259 prime strategy, economy of scale being the lone star of  
 260 guidance. Large units are efficient in many ways, but  
 261 they are not flexible. Once they have been established  
 262 they can only defend themselves by force, through  
 263 growth.

264 Growth has traditionally been achieved through the  
 265 application of one of the two principal strategies –  
 266 somewhat dependent upon which management theory  
 267 happens to be in favour at a given moment. Growth may

268 happen through specialisation into a narrow market or  
269 through diversification, acquisition and the control of as  
270 many of the necessary basic services as possible.

271 Since the early days of industrialisation, the above  
272 strategies have been dominant and have contributed to  
273 economic wealth creation in many countries. Tradition-  
274 ally, the arrival of an industry in a region meant good  
275 things such as better-paid jobs, secured energy supply,  
276 better transport and communication opportunities.  
277 However, we can also see the negative effects of this  
278 development as manifested by:

- increased vulnerability and inflexibility;
- mounting environmental problems resulting from the production system design which pose a true “limit to growth” (mainly related to extensive logistical activities);
- consumers becoming increasingly disconnected and estranged from producers, resulting in difficulties of responding to true consumer needs;
- continuous and painful restructuring of industries and outsourcing to countries with low production costs;
- quality assuming a subordinate role in relation to ever-increasing price cuts;
- value creation becoming centralised and being moved out of regions, resulting in cultural and mental impoverishment.

295 As the situation has developed, focus has been drawn  
296 to the negative aspects of wealth creation and the  
297 consequences have been frequently criticised. One of the  
298 most disturbing cumulative trends is the unequal  
299 distribution of wealth itself. In the light of average  
300 figures, the world is becoming a better place to live, but  
301 closer inspection of the figures reveals that success seems  
302 to breed success, the rich get richer while the poor  
303 remain poor. Or worse still, the number of poor in the  
304 world increases. This trend seems to hold for both  
305 developing countries and industrial countries alike.

306 When facing these new challenges, knowledge of the  
307 background and historical development is important in  
308 order to allow for critical judgement about future  
309 possibilities and the need for change. In hindsight, it is  
310 easy to see that the neglect of the importance of  
311 environmental issues in the past was inevitable, given  
312 the lack of proper attention to guiding mechanisms for  
313 human economic activities (=ethics). As the American  
314 economic historian Heilbroner [10] once quoted:

315 “A second familiar, but no less serious objection [to  
316 economic-driven behaviour] is that a general sub-  
317 ordination of action to market forces demotes  
318 progress itself from a consciously intended social  
319 aim to an unintended consequence of action, thereby  
320 robbing it of moral content”.

All in all, we can conclude that the ever-increasing  
centralisation of wealth and production systems no longer  
delivers “good things” for all. It is, on the contrary,  
reinforcing wealth and the control of production for those  
who already have acquired more than their share.

Poverty and unequal wealth distribution are the  
prominent barriers to sustainable development. Eco-  
nomic growth and innovation offer the best potential to  
overcome this barrier. However, there is growing  
concern that the traditional ways of measuring progress  
in the form of economic growth are not only inadequate,  
they are also misleading. As pointed out by Ayres[1], the  
major part of the statistical growth we see only reflects  
increasingly frantic activity.

“It amounts to running faster and faster to stay in the  
same place-‘wheel spinning’ rather than true wealth  
creation”

Ayres argues that in fact this statistical growth is  
largely a result of growing expenditures in transporta-  
tion, protection of life and property and the depletion of  
natural stocks – hardly equitable to our vision for  
improved quality of life.

#### 4. Distributed economies – a balance between efficiency and quality

In the following sections, we present arguments for  
choosing regional development as a tool for testing new  
strategies of production and consumption. The un-  
derlying justification is the fact that the required changes  
for sustainability are on the systemic level, as discussed  
earlier. In contrast to pure technical efficiency improve-  
ments, such changes cannot be tested in isolation but  
require all the elements of a real functional system. On  
the other hand, disrupting large systems for the sake of  
merely testing new approaches is clearly not feasible.  
The natural strategy must be able to identify regions  
which find themselves in a state of transition and which  
exhibit a desire and opportunity for introducing new  
thinking throughout the whole system. In particular, we  
are looking for alternatives that can survive in a world  
dominated by large-scale global production systems.

Distributed economies (DE) is currently best de-  
scribed as a vision by which different innovative  
development strategies can be pursued in different  
regions. Similar or complementary schemes can be  
brought together into networks to provide the advan-  
tage of scale without the drawbacks of inflexibility.  
Rapid implementation offers a means of exploiting the  
large wealth of knowledge and potential innovation  
developed in universities and research institutes.

“Regions” in the context of distributed economies are  
loosely defined entities, similar to the ones used in the

literature when discussing the success of the Italian industrial “districts”. An essential feature in the DE context is that the regions can be seen as jointly operating entities capable of creating a “team spirit”, which ultimately can be identified and further, commercialised through a unique brand concept.

It is increasingly important to find practical and innovative economic schemes that, unlike oversimplified statistical models, create real qualitative growth that can be experienced by the individual citizens participating in the actions. An important tool to achieve this is to bring the activities down to a scale that is manageable without slow and cumbersome regulative networks. Organising regional activities mainly in the form of small-scale units will also allow for the local community to possess higher ownership and consequently gain more power in directing these systems in ways that add quality to their lives.

This course of action is aligned with the recent renewed interest towards regional initiatives focussing on the development and implementation of sustainability policies, strategies and practical solutions [7,19]. This is, no doubt, inspired by the remarkable success of the Italian industrial districts, which have attracted much interest from international scholars over the last decades. After the Second World War, these industrial districts experienced a long period of uninterrupted growth. However, during the 1980s some of these districts had to undergo important changes and restructuring and it was argued that in fact the socio-economic form of development represented by the industrial districts could not be viable, due to its ultimate instability [9].

In a thorough analysis, Dei Ottati [6] bears evidence to the contrary. Based on a number of case studies from Tuscany, Ottati describes how many of the industrial districts have shown a remarkable resilience and have been able to meet the external challenges. This has happened mainly through strategies focussing on:

- product diversification;
- quality upgrading;
- commercial specialisation.

The sustainability of industrial regions in a larger perspective, also taking into account the dimension of environmental performance of economic activities and the local environmental quality in addition to the economic dimension, has, to our knowledge, been given limited attention. The latter is clearly a fatal omission if regional development is to be used as a way of getting closer to sustainability. In this paper, we argue that the approach of regional economics, or rather “economic regions” or “distributed economies” (DE) as we call them, offer many advantages over large industrial systems when responding to new challenges imposed

by the need to work, intensively to achieve sustainable development. The smaller size of the “industrial system” results in greater flexibility and economic resilience, as evidenced by the Italian examples. Both are fundamental prerequisites for the restructuring of the metabolism of the industrial system as described by Ayres and others.

It is important to note that the vitality of regions can be created and maintained through local efforts and individual initiatives rather than only through large centrally planned mega-projects that frequently, as we have seen, lack the ability and motivation to improve the local quality of life. Distributed economies have the great advantage of bringing many of the fundamental issues of sustainable development (even those of an ethical nature), closer to the individual, both as a consumer and as a producer. This offers totally new opportunities of dealing with the difficult questions of internalising the externalities. Progress, wealth and quality of life issues acquire a more tangible form when they can be brought down to decisions regarding everyday life.

In order to test the validity and efficiency of the DE concept as a tool to inspire and design regional economic development, a development centre, “the DE Lab”, has been created in the city of Landskrona, Sweden under the auspices of Lund University. This initiative is a natural extension of a well-established activity at the IIIIE called Strategic Environmental Development, during which several case studies focussing on regional development were performed in various locations in Europe.

DE Labs will function as a “search engine” for identifying and testing new innovative business concepts on regional levels and introducing innovations, at all levels of the system of production and consumption. Initially, the majority of the activity will have a case study orientation without an explicit goal of attempting to develop any deeper analytical theory, although many of the central themes that constitute the DE vision are common to most efforts of developing a more acceptable theory for sustainable development, in general. In a manner of speaking, DE Labs offer a valuable tool for true design for the environment as it addresses the fundamental elements of a quality driven development strategy in a practical context. Some of the fundamental areas of concern in distributed economies are as follows.

#### 4.1. Wealth creation for a larger number of people

Without entering deeper into the fundamental question of what is the purpose of life itself, one could, perhaps, accept the general statement that the purpose of economic development is to allow as many individuals as possible to lead a meaningful life. To realise this, it is

479	clear that a number of basic needs have to be fulfilled,	solutions that satisfy the dynamically changing demands	528
480	such as having food, clothes, shelter. In addition to	is becoming an increasingly important determinant for	529
481	those, we may imagine a number of other conditions of	survival. Flexible, small-scale, production systems have	530
482	more abstract nature that are necessary for a “good life”	an inherent advantage for meeting these challenges.	531
483	including security, health care, education, etc. (clear		
484	delineation of what determines a “good life” is not an		
485	easy task as individual preferences vary and also change		
486	over time, making rigid, long-time forecasts difficult).		
487	Common to all is that a certain amount of economic		
488	wealth is needed. It is a convenient tool for achieving		
489	a better life as it provides us with the options for		
490	individual choices. However, it is not an end in itself.		
491	<i>4.2. Reinventing quality and prioritising it before</i>	<i>4.5. Diversification of needs and wants – new</i>	532
492	<i>production efficiency</i>	<i>consumers, new behaviours</i>	533
493	In the early industrialisation, quality was the guiding	There are some visible trends, in particular among	534
494	norm and modern manufacturing technology made it	young people, causing challenges to centralised pro-	535
495	possible to reach a precision and stability in the quality	duction systems. For instance, increasing individualism	536
496	of production that could not be achieved even by the	and interest in expressing yourself as a unique person	537
497	most skilled manual craftsmanship. Quality is generally	(e.g. lifestyle and clothes), interest in unique experiences,	538
498	linked to functional physical properties of a product,	and quality of life as a central element of daily life.	539
499	but in its broader definition it can be extended to include	Furthermore, many consumers are changing from being	540
500	both design and ethics. It becomes a genuine, although	passive to being active in the sense that they are also	541
501	subjective, measure of the service a product provides,	becoming “suppliers” of ideas, demands and desires	542
502	functional as well as emotional. Through this wider	through different conditions of interactivity in product	543
503	interpretation, an almost limitless dematerialised di-	systems.	544
504	mension of added value can be introduced, as is well		
505	known from the world of art and jewellery.	<i>4.6. Symbiotic relationships – higher performance</i>	545
506	<i>4.3. Heterarchies and open innovations instead of</i>	<i>needed for future challenges come from</i>	546
507	<i>hierarchies and closed innovation</i>	<i>self-organising non-competitive processes</i>	547
508	As Stark [18] puts it, development and innovation	In Johnson’s [14] words, self-organising, non-com-	548
509	cannot be engineered, controlled or managed hierarchi-	petitive processes are those where “... diversity of	549
510	cally anymore. Fundamentally, we are talking about	individuals or entities solve parts of a difficult problem	550
511	heterarchies, in which knowledge is distributed and the	in a common world. Their interactions (which may be	551
512	organisation of diversity becomes crucial. This means	chaotic and unintentional) combine in such a way that the	552
513	that organisations must be increasingly capable of	system as a whole performs better and is more robust,	553
514	constantly learning from the outside world and posses	than would be predicted by looking at the performance of	554
515	an increased flexibility encompassing the ability to	the individuals in the system.” Hybrids, strategic alliances	555
516	constantly redefine and recombine assets. Such skills	and symbiotic relationships are all examples of this. In	556
517	enable them to be compatible with the emergent trend	fact, true value is to appreciate the value of both	557
518	of open innovations, described by Chesbrough [5] as	competitive and non-competitive processes and find	558
519	a landscape of abundant knowledge enabling the	a balance between the two.	559
520	organisations to use external as well as internal ideas		
521	for establishing new ideas and internal as well as	<i>4.7. Social, economic and ecological diversity are</i>	560
522	external paths to implement them. A centralised and	<i>prerequisites for efficient production systems</i>	561
523	hierarchical production system is poorly suited for	Distributed economies also have high performance,	562
524	coping with this new era of open innovation.	as Johnson [14] concludes, not because of the compet-	563
525	<i>4.4. Flexible, small-scale production systems</i>	itive nature of the individuals or even because of direct	564
526	The ability to receive relevant market signals on	cooperation, but because of the interdependency of the	565
527	a timely manner and to devise and implement innovative	diverse elements in an economy. Conversely, it is easy to	566
		see that an economy or market that lacks diversity (with	567
		only one path for material/energy/monetary flows)	568
		is quite fragile and less efficient (having serial instead	569
		of parallel performance). But even if we study only	570
		competitive aspects, diversity becomes important since	571
		competition requires diversity or no selection can take	572
		place – the greater the diversity the better the conditions	573
		for competition to be productive as a selective in-	574
		strument. However, the competition process consumes	575
		diversity and thus diversity must be replenished.	576

- 577 4.8. *Life quality as an integrated component for*  
578 *development and innovation*
- 579 There is really no limit to how modern production  
580 techniques and product design concepts can be used to  
581 add value and versatility to services without adding to  
582 material flows. Integration of activities into networks  
583 of functions can be further used to add true quality of  
584 life – rather than for creating more and cheaper  
585 products. The underlying force to enable such a change  
586 is the dramatic technical progress, as yet largely  
587 unexploited, made in informatics, communication, bio-  
588 technology and micro-technology. Above all, the speed  
589 by which these changes can be (and are) introduced  
590 brings in a new dimension. It can be argued that  
591 improved quality of life is the ultimate goal that can  
592 mobilise selfish interests.
- 593 4.9. *New producer – consumer relationships*
- 594 Historically, being large meant access to a wider  
595 international market. Smaller companies were simply  
596 left with the local markets. Today, relatively small actors  
597 can have both a local and global presence at an  
598 affordable cost. In particular, IT has provided us with  
599 the possibility of having a global presence without the  
600 need of being large or dominant. Rather, small and  
601 flexible actors can certainly pay closer attention to real  
602 needs and wants.
- 603 4.10. *Integrated design and innovation*
- 604 It is a common myth that progress is driven by  
605 rational thought alone. In fact, often the powerful  
606 drivers are linked to emotion and imagination and have  
607 disappointingly little to do with knowledge or rational  
608 thought as we traditionally see it. Thus, creativity and  
609 design are fundamental for creating new values but are  
610 currently often separated from innovation. There seems  
611 to be a large possibility for improvement by integrating  
612 innovation and design practices at a very early stage.  
613 These do not need to be serial processes, but rather  
614 contemporary ones.
- 615 4.11. *Social and ecological capital as an advantage*
- 616 It is striking to see that in many regions there is  
617 a perception that they are losing out to more attractive  
618 locations and cosmopolitan areas. Financial capital is  
619 very mobile and human resources are increasingly  
620 becoming so, resulting in the fact that regions are  
621 drained – left with no real values. In the distributed  
622 economies concept, there is a clear emphasis on using  
623 social and ecological capital as an advantage. This is  
624 a form of natural asset that can deliver unique values in  
625 a unique mix, if wisely designed and utilised. In return,
- this has the possibility of attracting more mobile 626  
financial and human capital. 627
- 4.12. *A renewed balance and symbiosis of small and 628  
large-scale production systems* 629
- The distributed economies concept does not advocate 630  
abandoning large-scale production systems once and for 631  
all. On the contrary, there will certainly be a need for 632  
efficient ways of producing commodities and bulk 633  
goods. In many sectors it is simply not realistic to go 634  
for small-scale solutions per se. However, it seems likely 635  
that a renewed balance of small and large and in 636  
particular new forms of symbiosis and coexistence can 637  
bring about benefits for both systems. A distributed 638  
system can take care of exclusive high value streams for 639  
products for which quality is absolutely essential. The 640  
remaining values, flows or products which have no 641  
exclusivity will be taken care of by large-scale systems 642  
for which lower prices are the driving factors. 643
- 4.13. *Collaboration and collective spirit* 644
- It is important to find the right engines for change – 645  
that is, to provide incentives to individual initiatives. All 646  
big things start small. However, today we find ourselves 647  
in a situation where the small things an individual can 648  
do are too insignificant to inspire and the important 649  
things are not possible to realise on a small scale in the 650  
face of mass-production competition. The essential 651  
element in the “distributed economy” vision is to 652  
remove this anomaly by introducing and making proper 653  
use of a collective team spirit where improvements in the 654  
quality of life will be shared by a collective community 655  
that has similar ambitions and values. Collaboration 656  
driven by such collective spirit can also bring along 657  
a competitive benefit to alternative production systems. 658  
Furthermore, it is argued that there is an inherent 659  
value in small-scale production and that economic 660  
growth can be achieved without the loss of this unique 661  
feature through innovation and growth in added value 662  
and economy of scale through networking. Indications 663  
of a technological preference for smaller scale pro- 664  
duction units can, in fact be seen, for example, in the 665  
steel industry, traditionally dominated by large-scale 666  
production as discussed by Johansson and Holappa [13]. 667
- 4.14. *A new balance between intra-regional and 668  
inter-regional exchanges of resources* 669
- As implicit in all of the above mentioned attributes, 670  
distributed economies call for acquiring a renewed 671  
balance between the exchanges of material, energy, 672  
knowledge, human, cultural and financial resources that 673  
take place among regional parties (intra-regional) and 674  
those that cross regional boundaries. However, it is not 675

676 possible to exactly delineate where such a balance  
677 should be met. A shift towards adding more value to  
678 local resources, retaining more of the added value  
679 benefits in the region and increasing the share of high  
680 added value would lead to high quality products in the  
681 inter-regional exchanges being fostered.

## 682 5. Conclusions

683 Distributed economies is focussed upon starting small  
684 on a regional basis and taking advantage of individual  
685 enthusiasm and entrepreneurial spirit with a vision of  
686 growth, not through size of production units, but  
687 through inter-regional networking – “Economies of  
688 scale through networking”. The concept offers an  
689 important dimension of inter-sectoral cross fertilisation  
690 as opposed to specialisation. In this way, industrial  
691 symbiosis becomes more than mere coexistence.

692 Neoclassical economics has often turned out to be  
693 counterproductive for making business decisions, in  
694 particular when related to issues of sustainability.  
695 In practice, many different decision criteria are used  
696 and in many of these the discount rate can be pernicious,  
697 both with respect to industrial decisions, such as plant  
698 investments as well as nature itself. At present, it seems  
699 that contrary to what is often intended, nature is  
700 discounted everywhere [8].

701 The question of scale is also important. Increase in  
702 scale has worked well in terms of production economy.  
703 It has also made it possible to respond to clearly  
704 identified environmental problems, as a better pro-  
705 duction economy allows more elaborate environmental  
706 protection systems. However, it is unlikely to work when  
707 the problems become more complex, as evidenced by  
708 global issues such as the greenhouse effect. Possibly, we  
709 need to accept that in view of the complexity of things,  
710 we must focus more on the flexibility and resilience of  
711 industrial systems than on sheer production efficiency.  
712 Diversity in industrial production systems may well turn  
713 out to be as important as efficiency. It is also important  
714 to bring fundamental questions down to a level that can  
715 be managed through individual decisions more closely  
716 involving human motivation and responses.

717 Distributed economies offers a new strategy for  
718 designing road maps for regional development and  
719 for the exploitation of the large wealth of gathered  
720 knowledge and innovation potential in universities and  
721 R&D institutions.

722 Whereas in the cold war period, the politically  
723 dominant issue was safety, security and control, focus  
724 has now shifted towards managing change, adaptation  
725 and environmental issues. So far, both operate on large  
726 scale and neither address Snow’s concern – those who  
727 have not are still left without. In contrast, “distributed  
728 economies” offers an approach by which different

strategies can be pursued in different regions and similar  
or complementary development schemes can be brought  
together into networks providing the advantages of scale  
without the drawbacks of inflexibility. We feel that the  
concept introduces the important element of dynamic  
“self organization” vital for survival in a future of  
increasing complexity.

Faced with such complexity, the search for a single  
development trajectory may not only be futile, but  
downright counterproductive. While looking for the  
ideal solution, important time is lost. Eventually,  
implementing a single strategy will introduce unwanted  
rigidity into the system, making it incapable of profiting  
from the constant flow of new knowledge.

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