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Hidden risks

Coming of age of the service economy

Orio Giarini

The modern service economy relies not just on the manufacture of products but on their correct functioning. This measuring of how systems work means that qualitative and non-monetarized considerations are becoming more important.

The notion of risk and the management of vulnerability and uncertainty become key issues in the service economy. Consideration has now to be given to both risks which those involved can influence and also those over which there is no control.

It is essential to adapt to the new service economy and see the opportunities for real economic and social growth.

TRADITIONAL ECONOMIC THEORY still distinguishes between three sectors: the primary or agricultural one, the seondary or industrial one, and the tertiary one including all services (sometimes subdivided further in a quaternary one).[1] This sectorialization is a 'vertical' one and has produced theories of economic development according to which there would be a historical transition from agricultural societies to industrial societies, and there could now be a transition towards a society with a predominant service sector.

Such a theory is essentially centered around the industrialization process, where the predominantly agricultural societies are those which are not yet industrial and where the tertiary sector very often is simply a 'trashcan' used to classify all those economic activities which simply cannot be called industrial.

In reality, for all three types of society, the agricultural, the industrial and the service one, the relevant point is the reference to the priority to be given to better stimulate the production of wealth and welfare. In an industrial society, agriculture does not disappear, quite the contrary: agricultural production becomes more and more efficient thanks to its industrialization. Industrialization does not develop as a completely separate productive activity from agriculture, it also penetrates the traditional way through which agricultural products are produced and distributed.

In the same way, the service economy is not the outgrowth of something completely detached from the industrial productive structure, but penetrates the very industrial production which becomes predominantly dependent on the performance of service functions within (as well as outside) the production process.

The real phenomenon therefore is not the decline and growth of three vertically separated processes or sectors, but their progressive horizontal interpenetration and integration. In other words, the new service economy does not correspond to the economy of the tertiary sector in the traditional sense, but is built on the fact that service functions are today predominant in all types of economic activity.

A Finnish economist, Pentti Malaska,[2] has expressed this idea in the graph shown in Figure 1.

With every fundamental switch from one priority way to produce wealth and welfare to another, there is a modification in the perception of needs or demand. The definition of what is a basic need also changes.

In an agricultural society, it was obvious that the agricultural (pre-industrial) system of production was perceived of as facing the problems of satisfying basic needs.

After the start of industrialization, and in line with the history of economic theory which coincided until now essentially with the development of industrialization, primary needs have been defined in terms of what basic needs the manufacturing system (integrating key agricultural productions) can satisfy. Engel's law states that services are secondary in most cases, because they only fulfil non-essential needs.

The industrial revolution, in the same optic, is supposed to be an efficient method of providing food, shelter and health to people. Only once such basic needs are fulfilled, will many 'services' be consumed.

However, the real changes towards the service economy stem precisely from the fact that services are becoming

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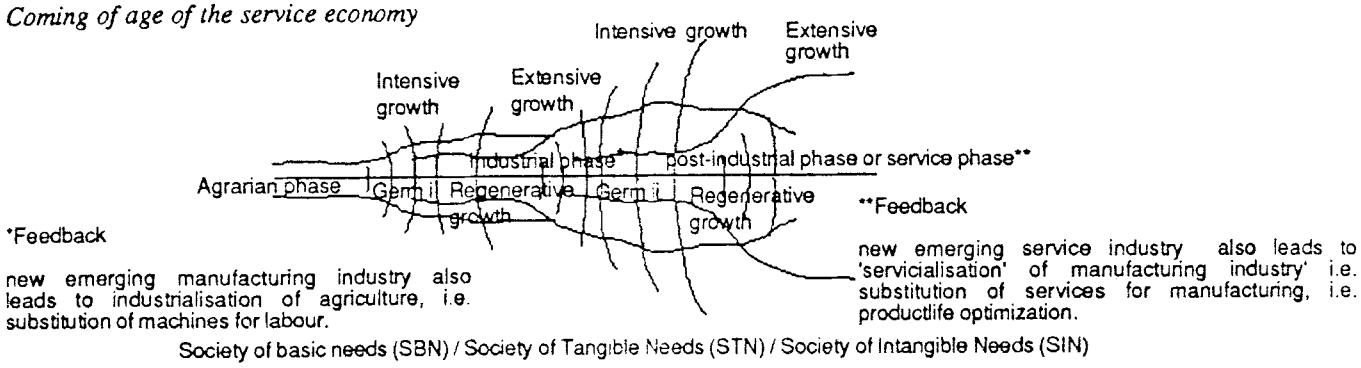

Figure 1. Growth of the dominant sectors

indispensable for making available basic products and services fulfilling basic needs. Services are no longer simply a secondary sector, but they are moving into the focus of the action, where they have become indispensable production tools to satisfy the basic needs and to develop the fundamental tools to increase the wealth of nations.

The insurance industry is a typical example: until a decade ago, everybody, including people in the insurance industry, accepted that insurance policies covering such things as life risks, or material damages, were a typical secondary product in the traditional economic sense that they could only expand once the basic needs were satisfied by material production.

However, during the ten years following 1973, when the growth of GNP in the world dropped from an average of 6% to less than 3% per year, the overall sales of policies continued to grow about 6% per year. If insurance consumption were of secondary importance, the slow down in other activities and in particular in manufacturing would have produced more than proportional reduction in the sales of insurance, according to Engel's law.

The explanation for this continuous growth of insurance activities, even in periods of declining growth, lies precisely in the nature of the modern production system which depends on insurance and other services as key tools to guarantee its proper functioning. At a very advanced technological level of production, where risks and vulnerabilities are highly concentrated and represent an essential managerial challenge, insurance has become a fundamental pre-condition for investment.

Similarly, at a more general level, social security, health and life insurance have by now achieved the status of a primary need in most industrialized countries.

Value of products and systems

Another key difference between the industrial economy and the service economy is that the first gives value essentially to products which exist materially and which are exchanged, where value in the service economy is more closely attributed to the performance and real utilization (in a given time period) of products (material or not) integrated in a system.

Whereas during the classical economic revolution, the value of a product could be identified essentially with the costs involved in producing it, the notion of value in the service economy is shifting towards the evaluation of costs incurred with reference to obtained results in utilization.

The first approach considers the value of a washing machine *per se*, the second evaluates the actual performance of the washing machine, taking into consideration not only its cost of production but also all other sorts of costs (learning time of the people using the machine, maintenance and repair costs, and so on).

The applicability of the two approaches is inherent in most of cases in the technological complexity of the products: in the case of simple products and tools, the assessment of the value can be limited to the tool or the product *per se*: nobody buying a hammer would think it necessary to take courses to learn how to use it. In the case of a computer, however, the cost of learning how to use it tends to bypass the purchase cost of the machine, especially if the cost of all the necessary software is added.

Similarly, people buying tools such as dishes or even a bicycle will not consider signing a maintenance contract. With purchases of electronic type-writers, photocopying machines, or even television sets, however, maintenance contracts – even for individual consumers – are more and more common. In the service economy, the functioning of a tool is being purchased (therefore, including costs of maintenance and repair): people are buying functioning systems, not products.

The same type of concept can be found for instance in the health sector. For reasons which are clearly linked to the development of the service economy, institutions called Health Maintenance Organizations (HMO) are growing in importance in the United States.

These organizations combine various elements: incentives to doctors to produce healthy patients rather than big consumers of drugs and hospital services; generalists integrating the collaboration of specialists; the use of new technologies to record all useful data of the patients' medical history; reduced social health expenses. The good functioning of these HMOs in the United States has provided better treatment for patients and cost reduction in the health sectors, because the target is an optimal system operation and the value of the HMOs is not identified with the amount of money spent for drugs or hospitalization.[3]

Money is more efficiently spent because the economic value has been shifted to the problem of the performance and results (increasing health) rather than to a pure 'industrial' vision (equating more drug consumption with health and wealth increase in all cases).

The service economy is thus influencing the traditional industrial sector to really operate as a service (providing the best possible utilization value), rather than as an industrial production machine (interpreting the increase of costs and

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money spent as an increase of wealth).

If the accent is put increasingly on measuring the results of how systems work, qualitative and non-monetarized considerations will obviously become more relevant. Self-service restaurants or shops are systems which can reduce prices by asking the customers to do non-monetarized work (customers actually do a 'job' themselves rather than paying somebody a salary to do it).

The self-service type of economic system contains a clever combination of monetarized and non-monetarized activity. HMOs are sometimes criticized for not being of use for the less healthy part of the population (they have a 'selection effect'). But it is here that social programmes might have a positive complementary role.

Evaluating the working of systems and their actual results also allows an easy identification of the part of the non-monetarized performances and contributions.

Systems evaluation – the organization of tools and persons in a given environment to obtain desirable and economically valuable results – has to take into consideration various degrees of complexity as well as the vulnerability in systems functioning.

Growth of complexity

During the initial phase of the industrial revolution, everyone's attention was focused on increasing production within a relatively specialized environment. In the course of its various development phases, the industrial economy has grown more and more complex, both vertically and horizontally.

Vertical complexification is concerned with the multiplicity of stages in the transformation of raw materials into finished products, whilst horizontal complexification deals with the development of all service activities which go with and support the actual productioon process.[4]

Let us first examine vertical complexification. One result of specialization is that each new product or each new generation of machines which replaces an earlier one has a more limited range of application. Thus, the gain of productivity is in most cases compensated by a reduction in the scope of the product.

For example, it was possible on an early weaving-loom to use either wool or cotton and to produce fabrics for either clothing or bed linen. Today, the most advanced looms can only be used for one fibre and are limited as to the range of dimensions of the cloth produced.

Each event in the production-line, from raw material to finished product tends to become a distinct operation (tied to a special tool or machine) just as soon as the boundary conditions enabling certain improvements can be determined.

Thus, specialization signified the multiplication of means and methods, each one of which adapts itself to more and more precise purposes. For each new technology or method introduced, the number of intermediate stages of transformation increases.

At this stage we can already conclude that the degree of specialization has to be conceived in terms of optimization and not in terms of linearly increasing development. Specialization is inevitably linked to the goal sought after, and there may be specializations the purpose of which may become insignificant and even cease to exist.

In parallel with the processes of specialization and vertical complexification of the system of production in the industrial revolution, the supporting service activities such as insurance, storage management, research, training, finance, sales and marketing, security, recycling of waste, grow more and more important.

At the beginning of the industrial revolution, many of these functions already existed, but often in an unidentified and unclassified way, or were considered utterly secondary: when we are dealing with a small artisan-type production, problems of storage, distribution and the elimination of waste exist of course, but they are of secondary importance and never constitute a so-called job.

The transformation of textile production from tens and hundreds of thousands of small units in the 18th century in Europe into the huge concentration of production that we know today has caused the emergence of the need, among others, for the professional management of stock control and distribution. In terms of insurance, this transformation creates problems as to the question of insurability: a risk is in fact more easily insurable when it has a smaller average cost and a higher loss frequency.[5] This is a fundamental factor for the definition of the optimization of the economy of scale, which most economists have unforgivingly forgotten until now.

Additional measures

As scale and specialization increase in size and scope, more measures have to be taken to ensure a smooth inflow and outflow of materials. Whereas a small baker can if necessary buy flour each day to produce his daily output of bread, a synthetic-fibre factory has to prepare far in advance for the proper inflow of raw materials necessary for its operations.

The same is true for the provision of capital finance: at the beginning of the industrial revolution, this was essentially the role of the wealthy individual, who was in a sense his own banker. Later on, in the course of the last century, joint-stock companies grew up because of the necessity for the aggregation of the financial resources of a number of individuals.

It was only towards the end of the last century that banks started to develop their function as collectors of savings and the channelling thereof into industrial investment. Today, the most important investment projects have reached such a gigantic scale that they need international consortia of banks.

The flow and quality of output arising from the new technologies was such that it began to give rise to the need for specialized new professionals, whose task is to check the concentration of waste products and dangerous characteristics of certain processes. This phenomenon has become particularly important during the last 20 years although in fact, 'waste management' always existed beside every production system, albeit in an 'undifferentiated' way and with fairly limited consequences.

These service activities can take the form of functions performed within industrial firms, or of autonomous activities carried out by special outside firms.

There is a third dimension in the process of complexification which today has become even more important: with the multiplicity of stages observed in the processes of production and distribution it becomes increasingly necessary to co-ordinate all these separate activities. In other words, we have not only encountered a progressive development of specialization in an increasing number of fields, but also the corollary of that phenomenon

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in the form of the problems posed by the needs for information, co-ordination and organization between all the parts of the system. This is a kind of horizontal complexification, which added to the vertical one clearly indicates that the economy has become a system, or rather a network, of increasing complexity.

Compared to biological systems, this complexity may appear rudimentary, or embryonic. The present day economy must be perceived nevertheless as a network of increasing complexity, with both vertical and horizontal lines of communication, in which the components have to be able to integrate with each other. Within the system itself the problems of information and organization have become more and more dominant.

This same perspective allows the best appreciation of the contributions made by contemporary technology: the latest technological advances have their greatest impact on systems concerned with the communication and organization of information, which is exactly what is needed in order to better manage the development of the present day economies.

All this is quite different from the direction which technology had taken during the classic industrial revolution, when all that appeared to matter was how to investigate and improve the stages of production which transformed raw materials into finished products.

One can thus define the contemporary economy as a service economy in the following way: as a situation in which resources (or factors of production) are used in service functions of which those relating to storage, transmission, and the processing of information represent an increasing part of the whole. It is at this stage that the notions of vulnerability and of risk management become economically extremely relevant.

Uncertainty and vulnerability

The notion of systems becomes essential in the service economy. Systems produce positive results or economic value when they function properly.

The notion of systems operation (or functioning) requires the consideration of real time and the dynamics of real life. Whenever real time is taken into consideration, the degree of uncertainty and of probability which conditions any human action becomes a central issue.

The economics of the industrial revolution could, in contrast, rely on the fiction of a perfect equilibrium theory (outside real time and duration), based on the assumption of certainty. During most of the economic history of the industrial revolution, risk and uncertainty have been a subject for historians and sociologists. The first systematic attempt to take risks and uncertainty into consideration, and with great timidity, was made by Frank Knight only during the 1920s.[6]

Any system working in order to obtain some future results is by definition in a situation of uncertainty, even if different situations are characterized by different degrees of risk, uncertainty or even indetermination. But risk and uncertainty are not a matter of choice: they are simply part of the human condition.

Rationality is therefore not so much a problem of avoiding risks and eliminating uncertainty, but of controlling risks and of reducing uncertainty and indetermination to acceptable levels in given situations.

Furthermore, the very systemic nature of modern economic systems and the increasing degree of the complexity of technological developments require a deeper and deeper economic understanding and control of the increasing vulnerability and complexity of these systems.

Unfortunately, the notion of vulnerability is generally misunderstood. To say that vulnerability increases through the increase of the quality and performance of modern technology might seem paradoxical. In fact, the higher level of performance of most technological advances relies upon a reduction of the margins of error that a system can tolerate without breakdown.

Accidents and management mistakes still happen even if less frequently, but their effects have now more costly systemic consequences. Opening the door of a car in motion does not necessarily lead to a catastrophe. In the case of a modern airplane, it will.

This shows that the notions of system functioning and of vulnerability control become a key economic function where the contributions of people like economists and engineers must be integrated. In a similar way, problems of social security and savings for the individual have to take into account vulnerability management.

Thus, the notion of risk and the management of vulnerability and uncertainty become a key connotation of the service economy.

Moral hazards and incentives

The risk taking attitude was not studied in detail by the first great economists: it was rather taken for granted in a given cultural environment, even if Schumpeter made some more explicit references to the risk-taking entrepreneur. Only in 1921 did Frank Knight write a first comprehensive book on the subject of *Risk, Uncertainty and Profit.*[7]

But again, the risks that he discussed were more or less limited to the entrepreneurial type. The field of the pure risks linked to the vulnerability of systems, was still considered too secondary to be treated as a priority among the managerial objectives of the firm.

Only more recently have economists such as Kenneth Arrow[8] begun to take a closer look at the reality of the uncertainties that may undermine any economic policy or managerial decision. Just as Ricardo and Smith drew practical examples of their theories from agriculture and small-scale manufacturing, and as the later generation of economists up to Samuelson took their examples from large-scale industry, the most advanced economists of today use the management of risk and uncertainty by insurance institutions and in the social welfare or health sectors as natural reference points.

This has led to a widespread reconsideration of some basic concepts in economic activity, where the fundamental point is the need for a better understanding of the conditions and reasons for modern economic risks and uncertainties that enable the human entrepreneurial talent and creativeness to meet the present challenges in a more successful way.

The world-wide discussion on risk management is a

sign of this process. Basically, it represents reaction to the new nature and dimension of the risks that condition our economic and social environment.

Non-entrepreneurial risks

The activities of the service sector, and insurance in particular, have been regarded as secondary or marginal in the national economy, even if they have existed for centuries. Theories and even attitudes have not yet adapted to the new facts in this field.

Some types of non-entrepreneurial risks have nevertheless become more important due to changes in social philosophy: this applies to risks covered by social security and workers' protection in industrialized countries. As early as the 1850s, the government of Prussia had in fact organized the first compulsory insurance schemes for mineworkers. But at the time of the great depression in 1929, this type of risk management was still in its infancy.

Since World War II, one of the greatest silent revolutions of history has begun: at present the social security 'turnover' in all Western European countries is above 20% of GNP. While authors such as Peter Drucker have labelled this type of development in the United States as the "Unseen Revolution" and "The American Way to Socialism", traditional economic thinking has only recently started to consider this phenomenon in depth.[9]

The development of social security can be attributed mainly to changes in social philosophy, which in turn are conditioned by the changing levels and characteristics of risks and vulnerability produced by the modern environment. Indeed, the growth of risks and vulnerabilities intercut in the functioning of the economic system largely explains why we are now living in a new risk dimension and why we are facing a fundamental change in the expectations and possibilities of traditional growth.

During the last 30 years, statistics of insurance losses and insurance activities show increases at a rate often twice as high as the rate of growth of GNP in almost all the industrialized countries.[10]

Unexpected events are increasingly producing unexpected results. The view of Professor Jay Forrester [11] on the behaviour of social sciences and activities is clearly applicable to the present trends in risks and uncertainties, where the indirect effects of an event become more important than the direct.

Where does this increased uncertainty come from? Is it a purely psychological and cultural phenomenon?

The period we are living in, which is characterized by a slower growth of GNP and an increasing growth of vulnerability and risks, is largely influenced by that complex phenomenon which we can define as the "Diminishing Returns to Technology".

Diminishing returns to technology

Modern technology has been at the source of the increasing risk management problems in many ways:

- Increases in the economies of scale have been mainly due to progress in technology. The gains in productivity throughout the period of the industrial revolution were enormous, but the increased concentration of production also increased its vulnerability to small disturbances. This is the area where risks and vulnerability are increasingly of the 'pure', insurable type.
- Specialization has been a key factor in this progress, but an excess of specialization has today resulted in systems that are increasingly interdependent and vulnerable, leading to a high growth of consequential losses (losses deriving from the non-functioning or mal-functioning of a system). Furthermore, specialization can reduce the adaptability to changing market conditions of a machine or installation, and can impose more severe maintenance and repair requirements that may be difficult to implement in some operating conditions. Gains from specialization may be partly offset or even outweighted by the lack of flexibility that results.
- Operating reliability has made great progress due to advances in technology. However, minor variations and small accidents in one component can lead to disasters in a complex system, even if these accidents occur less frequently due to the higher operating reliability.
- The quality of many products has been greatly improved by modern technology. However, this same improved quality for a specific task may increase the problem of its recycling when a product is thrown away. The human and economic environment, as Alfred Marshall puts it, is much more like a biological process than a mechanical one. An improvement in one sense may introduce disequilibria in another: this is the lesson brought home by the problems of pollution and hazardous waste management control.

These examples have in common a shift of emphasis from the traditional entrepreneurial risks to pure risks of the insurable type. We can thus expect to find a reflection of these developments in the insurance field, and, in fact, there are many examples, such as the following.

- The total cost of damages caused by fires in Europe is now about 1% of national income and is increasing (the part dealt with by insurance is about one-third of the total).
- The economic cost of crimes is several times higher than that of fire. This is due not only to an increase in the number of criminal offences, but even more to the vulnerability of systems to criminal activity. The same applies to natural catastrophes: losses from earthquakes and floods are higher today not necessarily because these are becoming more violent, but because they affect more vulnerable systems.
- According to a study[12] by the Geneva Association in Europe and by Skandia in the United States, the total economic costs of indirect damages made possible through the utilization of computerized systems is of the order of $5 billion per year. This has, of course, to be compared with the much higher benefits from using computers: but nevertheless, there is plenty of scope here for proper risk management.
- The Statfjord platform in the North Sea is an example of a trend towards increasingly complex and sophisticated industrial activities: in the 1960s it cost $1 billion to build, without taking into account the infrastructure and the cost of disposal of the platform at the end of its useful life. Further developments and new projects in this area indicate that the levels of investment from the financial or from the insurance coverage point of view are very difficult to fulfil.[13]

This shows that risk is today becoming concentrated at

levels where the vulnerability is such that the overall uncertainty of the economic process increases. How many Boards of Management today dream of the decision possibilities experienced 20 years ago?

Consumers are also reluctant to become increasingly consumers of risk. The unique situation in the field of product liability and malpractice in the United States although amplified by a specific legal environment, starts to have its effects on other parts of the world.

This is a typical trend of the service economy; the consumer is more and more conscious that tools and products which exist for given purposes and even experts are only of value when the results of their utilization are positive. The fact that their utilization might give negative results, is refuted and gives rise to requests for compensation.

Product liability is a great issue in the United States where litigation has led in some cases to extremely high and even excessive compensations. Chemical and pharmaceutical companies have a special problem.[14] Doctors, lawyers and other experts are sued in court for 'malpractice' and have to compensate their clients if found guilty.

At the European level, a recent Directive[15] is the result of ten years of discussions and preparations to manage the expanding phenomenon of the increasing perception by the public that producers of economic wealth have to be liable for delivering a 'product' yielding negative results.

Once again, in the contemporary economy, it is the performance which has economic value, which counts, rather than the simple existence of a product or service.

The problem of environmental hazards, which very often is linked with the question of transportation and storage of dangerous materials is part of the same kinds of risks and vulnerabilities that our modern society has to face.[16]

Pure and entrepreneurial risks

The connotations of the notion of risk in the service economy cover much more ground than the notion of risk represented in the industrial revolution. In the latter case, the key risk normally referred to is the so-called entrepreneurial or commercial risk; in the service economy, it is extended to the so-called pure risk.

The entrepreneurial risk is one in which the people involved in an action can influence its goals and the way the action develops by deciding to produce, to sell, to finance and so on.

The pure risk is out of reach of those involved in an action. It depends on the vulnerabilities of their environment or of the system they are working in, and it will materialize by accident and by hazard. This notion of pure risk is strictly linked to the notion of the vulnerability of systems which we have developed in the preceding paragraphs and its relevance is distinctive of the service economy.

One of the great differences between neo-classical economics and the new service economy is that not only the entrepreneurial risk is taken into account (as in the case of Frank Knight), but that the notion of the economically relevant risk is extended to include the notion of pure risk. The notion of risk, globally, has therefore two fundamentally different but complementary connotations.

For any important economic endeavour, the consideration of both notions of risk is today on an equal strategic level (again linked to the notion of systems and of vulnerability).

Many people talking and writing today of risk management[17] (meaning by it the management of pure risk) do not make a clear link with the global strategy of risk. Therefore, instead of showing clearly how the two risks are correlated, they tend to confuse or merge them.

Moral hazard and economic incentives

The demarcation line between pure and entrepreneurial risks is the notion of 'moral hazard'.[18] This notion has long been understood by insurers when they have to face damages produced by those suffering them with the purpose of making money out of them. For instance the case of somebody burning his own home to collect the insurance: such cases concern more than 20% of fires.[19]

Economists are looking at this notion from the opposite side as a spin-off of their studies on economic incentives: moral hazard is equivalent to studying the negative results of incentives. One important case concerns the level of social insurance for unemployed people who might stop looking for another job if the level of compensation is too high.[20]

Many ecomonists who have dealt with public policy are entering into the field of moral hazard (negative effects of incentives) and could profit from the old experience of insurers in this field.[21]

New entrepreneurs

Managers and entrepreneurs in the service economy should be prepared to have an overall view of risk in its two forms (entrepreneurial and pure). Even the most advanced management schools today (Harvard included) are often lagging behind in this respect, when reality is imposing heavy burdens on managers with regard to pure risks.

Risks have to be understood at all levels and have to be controlled as to their level of manageability. Vulnerabilities can, and have to, be diminished and protected. A strategic vision can then be developed and new challenges discovered.

If this vision, by both the entrepreneur and the public at large, is partial and inadequate as to the reality in which we live, the feeling will be that the risks and vulnerabilities of modern life are overwhelming us, whereas it is the consequence of a cultural inadaptation to identify and accept present realities.

Thus, it is very much a question of attitude. The incapacity of adaptation leads to pessimism and fatalistic attitudes, like those of a sailor who, instead of using the winds to steer his boat, lets the wind determine the direction into which his boat is pushed.

It is vital to recognize the new winds blowing in the service economy, to recognize how the challenges of the

Reality is posing heavy burdens on managers with regard to pure risks yet even the most advanced business management schools are lagging behind in this respect

new risks, of the increased concern for product quality and the value in use provide in fact an opportunity to define the new directions for stimulating and action towards real economic and social growth.

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