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The law of economic surplus in action systems

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Abstract

This paper is an attempt to define the law of economic surplus (ES) in action systems (AS). Categories similar to ES are studied in particular by economics, praxeology (forms of efficiency) and management sciences. These sciences attribute the long-term success or failure of AS to various sources, but not directly/mainly to ES. Profit/loss, as forms of positive or negative ES respectively, can be a source of success/failure of AS. These, in turn, have their own sources and conditions.

So far, it has been assumed that profit need not be the guiding principle for the management of any (all) AS. None of the scientific theoretical concepts make claims that recognise and solve the broader problem of the sources of longevity of any (all) AS. I try to offer a solution using a praxeological and systemic approach, prognostic-diagnostic methodology and hypothetical-deductive reasoning.

I argue that the most important source of longevity is ES. The efficiency of the AS must always be greater than that required to repeat the cycle of action at the initial level and to make the necessary changes. Over the long term, a surplus must be achieved by any (all) AS. Civilisational success/failure depends on solving the problem of determining how to manage action systems and supersystems. This concerns particularly the proportions, parities and priorities in the mutual relations of the following: the activity portfolio, ES, non-economic values and goals, and security.

Keywords

- action system
- energy surplus
- economic surplus
- longevity

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Introduction

The theoretical foundation of this paper is particularly complex, hence the precise determination of its domain.

First, it touches on the relationship between the laws of natural sciences, including the laws of thermodynamics, and the laws of AS in social sciences. Second, every action is an integrated structure of activities, focused around fundamental activities. The others are the activities of managerial and executive causing, auxiliary activities, economic activities, communications, as well as meta-action (Witczak, 2008). Third, the background is the formation (creation, existence, decline and changes) and running (structure, functional mechanisms, behaviours, actions) of any AS and reference to the foundations of its longevity. A special role is played by changes, including self-referential changes (meta-changes). Management is the combination and mutual interactions of creation, evolution and self-organisation of AS, their supersystems and the civilisation system (CS). Every AS in existence deals with the problem of addressing its longevity. This paper is not about AS that have a single cycle of activity with a predefined horizon (e.g. projects).

It is not the problem or aim of this paper to delve into categories such as profit and its relations with other categories related to human action. Profit is an economic category, a form of ES. I argue that ES is a necessary category for determining how any AS is run (material scope). Its functions are not limited to aspirations. Its necessary function is to fund the longevity of the AS. This requires the role of ES to be shaped in relation to the activity portfolio, non-economic values and security.

The aim and expected outcome of this paper is only to formulate the law of EC for any (all) AS in relation to longevity.

The paper also includes a review of the current state of knowledge in the relevant field, identification of the rationale for the scientific argument, formulation of the law of ES, and it ends with conclusions and recommendations. The paper is based on a theoretical examination of the state of the science, trying to find the key factor in the longevity of AS. My answer here is that this variable, this factor is ES.

The law of ES represents a step forward in understanding that economic surplus is not an optional source of longevity for selected AS. It is an absolute requirement for the longevity of all AS.

1. Overview of the state of sciences relevant to the research domain

A reference to the review is my preliminary definition of economic surplus.

'Economic surplus is a form of energy surplus. The energy surplus of any AS is tentatively defined by me as the positive balance of total energy gained and lost from all sources throughout the cycle of given activities (activity portfolio), including energy inputs from the environment, the transformation of these inputs within the AS and the emission/exchange of energy to and/or with the environment'.

Questions of energy are relevant in many sciences. Below I provide references for AS ES in selected sciences. Economics and management science are discussed more extensively because of the distinctive links with the research domain.

Physics. The category of "energy surplus" is not discussed directly in physics (thermodynamics). The first and second law of thermodynamics play a crucial role here. The first law says that in an isolated system, energy cannot be created or destroyed, it can only be transferred or changed from one form to another. According to the second law, the ultimate destination of the isolated system is entropy. The problem of the potential for shaping energy and economic surplus and their relationship to longevity is an indirect consequence of the laws of thermodynamics in relation to AS.

Praxeology deals with actions and work, and therefore with energy. At the universal level, these actions are regarded as categories, and this is the first connection to the general systems theory. Another stems from the interpenetration of systems theory, praxeology, management sciences and economics. Nevertheless, none of these sciences directly address the objective role of ES in longevity. Here, I analyse key papers dedicated to systems, including action systems, trying to find theorems of relevance to the domain of this paper[2].

Social systems science. Luhmann (2007) deals with social systems and tries to link sociological theory up to general systems theory. He does not address the question of ES, and his analysis of self-reference and rationality (Luhmann, 2007, pp. 407–444) has nothing to do with it. Parsons (2009) does not address economic surplus directly, either, though he recognises the economic aspects of roles in social systems (Parsons, 2009, pp. 91–199). His analysis of the place occupied by sociological theory among analytical theories of action does not refer to the problem, either, even though the author explores the relationships between social systems and problems of rationality (Parsons, 2009, pp. 403–405).

[2] Research work in praxeology and systems theory has moved towards a drill-down approach (specialisation) rather than universalisation, hence as of the end of the 20th century there has been a standstill in the development of general theories.

Economics. The writings of von Mises (2011) has been given special attention. The author explicitly accentuates in the very title that his work is a *Treatise on Economics*, that is an economic treatment of action as a category (a praxeological approach). His is practically the only work containing a comprehensive elaboration on action at the categorical level from the economic point of view. In part, von Mises directly addresses the problem of the nature of economic surplus. His take on value points to its relational and psychosocial nature: "Value is not intrinsic, it is not in things. It is within us; it is the way in which man reacts to the conditions of his environment. Neither is value in words and doctrines, it is reflected in human conduct" (Mises, 2011, p. 81). And further: "The difference between the value of the price paid (the costs incurred) and that of the goal attained is called gain or profit or net yield. Profit in this primary sense is purely subjective, it is an increase in the acting man's happiness, it is a psychical phenomenon that can be neither measured nor weighed" (Mises, 2011, p. 82). Von Mises then goes on to note that "Economics deals with action as such, and not with the psychical facts that result in definite actions". The negative "difference between the valuation of the result and the costs incurred is called loss" (Mises, 2011, p. 83). On page 336, von Mises claims that "There is in nature no such thing as a stream of income. Income is a category of action; it is the outcome of careful economizing of scarce factors. […] Changes in the market data can frustrate every endeavor to perpetuate a source of income". The latter claim is true, though not exhaustive for the law of economic surplus. On pages 552–553, von Mises refers to war and conquest, not seeing them clearly as sources of energy, or even resources. His thoughts on social collaboration without a market and about the hampered market economy are fully convincing. Von Mises presents a consistent theory of economic action, which, however, does not venture beyond market dominance, liberalism and the principle of rational economisation as a source of success. Aware of income inequality in a capitalist economy, he concludes that it is mainly a consequence of uncontrolled population growth, which is difficult to accept unconditionally. Von Mises disagrees with the statement (by Montaigne) that "the gain of one man is the damage of another; no man profits but by the loss of others," except with respect to certain situations in the financial market, "robbery, war, and booty" (Mises, 2011, p. 564). I can only agree with this opinion *ceteris paribus*. He goes on to assert that "the ultimate source of profits is always the foresight of future conditions". This assertion also applies to losses, however it does not exhaust the list of "ultimate" sources. Von Mises criticises socialism, especially planned economy, because of the absence of economic calculation (Mises, 2011, pp. 591 *et seq.*) and I agree with him. Throughout the volume, he raises the problems of the possibility, difficulty and impossibility of economic calculation – and does so aptly. He also refers to the relations between the market and common good, arguing that a welfare state based on the normative approach has no advantage over

market mechanisms in this area. I would agree with this statement, up to a point: provided that we can find a solution that preserves the benefits of the market and keeps the risks of over-regulation at bay.

For von Mises, income, which is a form of economic surplus, is the outcome of economising under conditions of limited resources, alignment of market conditions and – to use contemporary language – enterprise, with its ability to predict the alignment of future conditions. This theorem fits into the framework of this paper, while not exhausting the problem of the essence of economic surplus.

There are hardly any papers dealing strictly with energy surplus and economic surplus, while the question of the "law of economic surplus" is not raised at all. Apart from my own writings (Witczak, 2008, 2017, 2018, 2023), the problems of energy surplus have been the subject of scarce studies (e.g. Chakrabarti & Ramasvamy 2014; Włodarczyk 2008), though not according to the terms undertaken in this paper. In my previous papers, I have discussed, among others, the transition from the category of "energy surplus" to that of "economic surplus". In the field of economics, studies on economic surplus are largely confined to the financial domain and profit-oriented action systems. Such categories as financial accumulation, profit (separate, average, marginal, economic, operational – EBIT, EBITDA), added value (in various forms, cf. Mazzucato, 2018), return on investment, diminishing marginal productivity of factors of production, diminishing marginal cost, scale of production, break-even point, etc., feature significantly in economic theory and practice. There are certain papers on the edge of the present domain (in Poland: Machaj, 2013; Szkutnik, 2014).

Management sciences touch upon economic surplus in praxeological management studies, especially into the category of "efficiency", involving two out of three "forms of efficiency" – benefit and economy, as well as their combination – effectiveness (Kotarbiński, 1973; Zieleniewski, 1972).

Population theory and the *contingency approach.* The above assume that the success/failure of the organisation depends mainly on situational variables and adaptability to the environment. These theories, derived from the concepts of Malthus (late 18th century), linked to needs and resources as well as the pace of population development, place particular emphasis on the role of the environment and context for the success/failure of the AS.

Life-cycle theory is built on two categories: the broadly defined "life" and "cycle". Basically, it assumes that the life of an object (subject) has a beginning and an end, raising questions such as where it comes from and what purpose it serves. One of the classic answers to the latter question is "survival" (cf. Gościński, 1989). However, this theory does not clearly explain the sources of survival (including longevity).

Strategic management is a level of management, below political management but above tactical and operational management. These levels are inextricably linked and form the management system. Management systems theory is under-

developed, with no consensus even on the term "management system" itself. Neither management systems theory nor its component, strategic management (cf. Meyer & de Wit, 2007), provide a clear explanation of the sources of longevity.

Change management is one area of management where one would expect the issue of longevity to be addressed. However, it focuses on internal, operational and contextual systems, the success/failure of change. It does not specifically explore the relationship between change, energy and longevity (cf. Kotter, 1995).

The overview of the body of knowledge in the research domain lends itself to the following conclusions. The law of ES is not formulated or discussed directly, including in the categories of scientific, praxeological and systematic synthesis. As a consequence, it is not known whether ES refers (and if so, how) to any AS, and why. In science, there is no category of the "law of ES", except for the author's own writings. Vertical value chains are primarily associated with trophisms [*nutritional relationships*] between action systems and supersystems, and the CS. Systems of such trophisms may, but do not have to, indicate that economic surplus is achieved at the same time. The role of ES viewed as limited almost exclusively to an optional cognitive and normative function as an indicator in the business context. Critical economic sciences analyse the question of determining how any AS are run on the grounds of behavioural sciences, neurosciences, postmodernism, advancing ever new ideas and concepts. Their criticisms include the *homo oeconomicus* concept, neoliberalism, they study the relations between the classical surplus theory and heterodox economics (Martins 2013), present new ideas, such as sustainable development, gift economy, sharing economy, papers in the area of green economy (for instance by J. Rifkin, 2002, 2014) and circular economy. Such approaches, limited to efficient energy transformation, mainly in business, do not provide a clear view of the sources of longevity of any AS. The measurement, calculation and accounting for energy are not complete. As a matter of principle, concepts such as external benefits, added value or goodwill make sense from the axiological point of view rather than cognitive-objective. They do not exhaust the energy potential of the given system, e.g. the additional potential of unacceptable practices vis-a-vis competitors and customers. The human capital and outlay, cost and expense of nature is not fully accounted for, either.

The sources of ES and their relationship to longevity are not directly addressed by Coase (1937). His transaction cost or external cost theory (Coase, 1960) is intended to justify the reasons for the creation of firms and the market-based solution to external costs. This is a lower level analysis than the one proposed in this paper, with no links to ES and its relationship to AS longevity. The absence of transactions does not in any way contradict the law of ES, there are other rules that govern the management of AS energy.

With regard to non-business management, including "public governance", they assume *a priori* that public bodies operate on the assumption that needs take precedence over ES, in line with the principle: provide the necessary public

services, but according to the requirements of rational economy. It is argued that it is more advantageous for public management to apply and use business management principles, without further justification ("business tends to be more efficient"; it is difficult to measure public governance). Efforts to manage its energy run counter to efforts to meet public needs.

In conclusion, it should be emphasised that the problem of the key factor(s) determining the long-term success of AS has still not been resolved within economics or management. I would argue that there is a problem of the nature and law of ES in relation to AS longevity. More broadly, and beyond the scope of this paper, the problem relates to the role (status, situation and significance) of ES in the structure of the activity portfolio, AS values and aims (proportions, parities, priorities) and its role in their development.

2. Methodology

Although I have briefly outlined the problem and its rationale (Witczak, 2008, pp. 170–173, 2017, pp. 75–79), there is a need to define the problem more precisely, to advance research and to identify selected consequences. In this paper, I focus closely and exclusively on two research questions:

- What is energy/economic surplus in relation to any AS and their longevity?
- What is the relationship of ES to AS longevity?

The domain of this paper spans four scopes. The material scope of the paper comprises AS and supersystems, including CS, which are a complex sum of AS and "nature systems" (NS). The objective scope is the theorem on the essence of the law of ES in relation to running any (all) AS. The scope of space and time (space-time) is universal. As a result of all the above, the domain of the paper is categorical and synthetic. The paper will not investigate any determinants of ES, or any other consequences beyond AS longevity.

I use a praxeological and systematic approach, which is necessary when attempting a scientific synthesis with the aim of universalising the given theorems. Action is the fundamental category of the praxeological approach. I approach the research problem from the point of view of management sciences, trying to formulate theorems at the level of management science[3]. I use the prognostic-diagnostic

[3] Management sciences should not be confused with teaching management skills, that is an educational function aimed at enhancing the potential for managing people. Moreover, the term "management sciences" reflects specialised diversity, while "management science" is an attempt at synthesis and universalisation of that diversity.

method, where "prognostic" means that the research is based primarily on logic, heuristics and deductive reasoning. The object of the "diagnosis", which plays a secondary role in this arrangement, is exclusively an overview of the state of science in the field (desk research). It involves the exploration of the body of knowledge, value assignment and identification of basic research obstacles. Reasoning is hypothetical-deductive (cf. Witczak, 2023, pp. 335–385).

A diagnosis of the state of science in the field of research cannot, by its very nature, be developed further. I am adopting the principle that the overview will only include those disciplines, trends and concepts that I recognise as being related to the nature of the ES.

The problem-solving model begins by pre-defining the problem, determining the state of science in the relevant field and identifying the resulting research gap in the problem. I then construct a problem-solving model consisting of two components. First, based on certain premises (subsection 3), I establish that the essence of AS ES is a set of certain variables and relationships between them. Secondly, based on these premises and the essence of ES, I deduce its relationship to the longevity of all AS.

3. Premises for the theorem on the law of economic surplus

Premises determine the underlying foundations (assumptions) that are relevant to the given model of theorems, as well as reasons. On their basis, the given theory has a specific scientific value.

3.1. Identity of action systems

A system is a set of components that, as a whole, have system characteristics. I divide them into two groups.

Categorical system characteristics (applicable to any system): 1) generic identity of the set; 2) probabilism; 3) relationality; orderliness; structure, integrity, coherence; 4) interaction with the environment (openness; relative isolation); 5) functionality;

Generic system characteristics (specific to AS): 1) a complex set including the human being; 2) fuzziness (indeterminate boundaries); 3) particular complexity,

including hybridity; 4) mutability; 5) autopoieticity; 6) *in statu nascendi*; 7) evolutionary and teleological; 8) autonomous self-control (Witczak, 2023, p. 25).

Action is conscious and purposeful behaviour of a given entity towards itself or the environment. *Action system* is a framework of action of at least one human being, consisting of six interrelated subsystems: 1) AS aspiration subsystem; 2) AS doctrine subsystem; 3) AS core subsystem; 4) AS situation subsystem; 5) AS constraints subsystem; 6) AS meta subsystem (cf. Witczak, 2023, pp. 34 *et seq*.). Under the systemic-praxeological approach to AS, action is viewed as the main object of study, shaped and managed using the category of the "system" and systemic approach.

The *longevity* of a given AS is defined by me as the potential to arbitrarily and efficiently shape how it conducts its own multi-cycle activity (its material, objective and spacetime scope), including its ES, over an unlimited space-time horizon. The opposite is *ephemerality* (low potential for shaping). Longevity is a purely cognitive category, as opposed to survival. Survival is a form of longevity, but with a clear axiological recognition: the difficulty of existing, at whatever level, what matters is that one exists.

I derive the definition of energy from that of a "random event", that is any change of the state of any particular thing. The *energy of a given object* (here: AS) is its potential to make conscious and purposeful changes internally and in its relations with the environment. The direction, the magnitude, the quality, the structure and the dynamics of the way in which the potential is utilised are determined teleologically. The energy of the AS is the sum of *inherent potential* and its *readiness and ability to be applied and used* (quality of individuals and communities). The source of energy springs from the diversity of any AS, their heterogeneity, resulting in movement and change. *Initial energy* is the total starting potential of the given AS, necessary and sufficient to engage in operational activity in the given domain and under the given conditions, for further functioning, behaviour and activity.

Praxeology (Kotarbiński, 1973; Zieleniewski, 1972) distinguishes three forms of *efficient action*: *effect, benefit and economy*. "Effect" results from the ability to achieve goals. A positive difference between the value of a useful outcome (positive) and the value of costs (negative) represents "benefit", while a negative difference – represents a *"loss"* in action. "Economy" is the product of division of the value of a useful outcome by the value of costs, equal or greater than one. *"Effectiveness"* is the product of division of benefit (numerator) and value of the cost/potential (denominator). Benefit is in fact a form of ES.

I shall not delve into a detailed analysis of such processes exclusive or crucial to the development of AS as primary economy, including the Aristotelian natural chrematistics (*ways of acquiring wealth: gathering, hunting, agriculture, barter*) (cf. Arystoteles, 2001; Cendejas, 2018).

3.2. Significant systemic premises

Significant systemic premises, objective and volitional, can be found/may be adopted in all subsystems of the AS. There are interactions between the premises, e.g. doctrinally high sensitivity to constraints and risks can result in orthodox conservative AS formation. This, of course, translates into results in the AS ES domain. Below, I discuss a selection of systemic premises below.

1. Selected laws of natural sciences and formal sciences can be analogously applied to AS science, including in this study (cf. Witczak, 2018). The distinctiveness of the subject matter does not preclude such an approach, despite the difficulties, e.g. with measurement, or the incomplete ability of social sciences to provide scientific syntheses at the level of natural sciences. In particular, I refer to the laws of: thermodynamics (physics), K. Gödel's incompleteness theorems (logic), W. Heisenberg's uncertainty principle (physics), law of ignorance (M. Planck; H. A. Simon; I. H. Ansoff – physics, cybernetics, systems theory), the law of requisite variety (R. W. Ashby – cybernetics, systems theory).
2. Each AS exists in and through its environment. In practice, the only existing AS are relatively isolated and interact with the environment through AS inputs (X) and AS outputs (Y). The output sphere (Y) refers to the trophic relationships of the AS with the downstream environment. It emits energy, including meeting the needs and expectations of the environment. The environment endorses it, transmitting its energy to the AS, or not. The same applies to the input sphere (X), but in reverse: here the AS endorses the *raison d'être* of the AS that is upstream in relation to it.
3. Energy relationships between the AS and its environment. The arrangement of (transactional and non-transactional) conditions between the AS and the environment can induce self-supply, active supply and passive supply. For example, there may be no transactions, only active supply. Energy transformations occur throughout the XTY cycle of activity. With *self-supply*, the energy harvested in Y is the only source of energy transformation throughout the cycle. *Active supply*, in its pure form, is active and self-reliant sourcing of energy, under any principles, including non-transactional (for instance, appropriation). *Passive supply*, in its pure form, is energy flow from the environment with the AS remaining completely passive. The most important and ultimate source of the energy flow structure is NS. Energy effects in the environment also include the dissipation of energy into the environment; purposeful discharges of energy into the environment, etc. AS always have to contend with limited resources (rational economy), in which they can be more or less successful. For instance, self-supply may lead to the objectivisation of energy exchange under certain conditions (see below: foundations of energy transformations). Active and pas-

sive supply do not provide for it at the same level, because of the inability to fulfil certain conditions, referred to as market conditions.

4. The principles for measurement, calculation and accounting, including references to: 1) balance and equivalence of energy flows; 2) non-transactional, non-rational and non-normative attributes of the flows; 3) dialectic nature of the energy exchange at the inputs and outputs. The AS must be clearly distinguished from the environment so that diagnostic operations, normative operations (development of models) and their implementation can be carried out. The relevant measurements, calculations and accounting also apply to active supply (e.g. we appropriate the energy from the environment at X and Y, calculating that we will ultimately achieve a positive energy balance) and passive supply (the environment calculates a positive energy balance and consequently supplies the given AS). Such non-transactional (non-reciprocal) operations are less precise, more voluntary and risky, but they do take place.

4. The basis of energy transformations of any action systems

4.1. Energy of action

ES is an objective concept, referring to the AS separated from its environment. It is determined by performing cognitive operations, i.e. defining concepts; here: energy, the principles of its detection, exploration, classification and explanation. Specific categories are then subject to measurement, calculation and accounting, e.g. performing the relevant cognitive operations on the content, size, structure, quality, dynamics of energy and its transformations.

Other operations that we can undertake with respect to energy surplus involve its psychosocial aspect. They are: value assignment, determination of further action following value assignment, determination of the normative magnitude, and lastly, implementation of the energy norm of choice.

Energy of action is applicable to any AS. It is dependent both on the relationships of all internal subsystems and on the relationship of the AS as a whole with its environment. For instance, the aims subsystem produces part of the aspirational motivation of any AS, which may be higher or lower, depending on the interdependent conditions. The energy of action is also a non-simple sum of three components: energy of nature, energy of artefacts and psychosocial energy. Psychosocial energy (some of its constituents being the energy of aims, energy of doctrines,

energy of meta-management of the AS) is the key determinant shaping the AS, their supersystems and the CS, using creation, evolution and self-organisation. The energy of NS is rudimentary, physical, real and natural, and – apart from certain instances (like dark energy) – it has been thoroughly studied. The energy of artefacts is real (material and virtual), secondary to the energy of NS, saturated with psychosocial elements. Psychosocial energy, in turn, is derived from the connection of the energy of the brain and consciousness with the physical energy of the human being. Its essence is the virtual mental energy and that of social relations, e.g. authority, social tensions and the relations of exchange of money and goods, including transactions. Potentialisation (a form of authority limited to the manifestation of a certain potential) is pure psychosocial energy (without a physical core). It must be manifested by "someone" (a subject), using specific methods and tools, like e.g. body language, that is elements of the energy of NS and/or artefacts. The parties, when transforming energy, shape their objective (physical), artefact-oriented and subjective (psychosocial) potential for change. Energy potential is a relative measure (internal potential in relation to the potential of the environment with axiological and normative attributes). The magnitude of axiological-normative energy potential may fluctuate around the objective potential of the energy of NS and artefacts. It can also deviate, for various reasons, from the requirements of equivalence and balance. These deviations may have a significant impact on the dynamic and static energy balance of the AS. The energy expected by an AS, whether in the form of goods or money, is measured against the energy lost, which is necessary to acquire the energy expected. Other comparisons relate to references to self-organisation, competition and testing of alternative efficiencies. Another reference is testing of efficiency in the given situation and spacetime context, including the future. Only when the energy balance has been achieved, a flow of energy between the sides is possible.

Throughout the XTY cycle, each AS keeps account (by deduction and/or division) of energy efficiency in terms of its ability to satisfy needs and achieve objectives in the context of probability. The given AS aspires to achieve the expected energy, having had to lose some energy to acquire it. For the system, energy acquisition makes sense only when the difference between the energy expected and the energy lost is equal or higher than zero and/or the ratio of the two types of energy is equal or higher than 1. Similar accounts are kept by the counterparties of the given AS, but in reverse. The energy expected by the given AS (for instance, the price in exchange for the products and services offered to the environment – the expected amount of money) should be as high as possible (fair price, etc. – the minuend/numerator), while the products and services represent the sum of energy lost by the given AS – the subtrahend/denominator. In turn, for the counterparties, the price of products and services from the given AS is regarded as the subtrahend/denominator (energy lost: the amount payable), while the energy of the products

and services (their potential for satisfying needs and interests) – as the minuend/numerator. The given AS and its counterparties aim to maximise and minimise the opposite sides of the equation. In this context, energy surplus becomes economic surplus (ES): measured, calculated and accounted for in relation to external conditions. In its essence and accounting, it is necessary to consider the value in use, benefit (the difference between energy gained and lost), economy (the ratio of energy gained to energy lost and to total potential) and effectiveness (the ratio of the difference between energy gained and lost to energy lost/potential).

Energy flows and external conditions form the foundation for repeating the cycle of action by way of self-supply, active supply or passive supply. Exchange, including transactions, may generate insufficient demand to achieve the desired balance of exchange. For certain reasons, e.g. social policy, communities decide to satisfy needs despite the inability to achieve transactional equivalence (supply, transfers). Some transfers are not socially accepted (for instance, energy in the form of waste), but AS "discharge" such energy into the environment (pollution). Exchange, including altruism, is the only form of energy transformation (under specific conditions) where the environment authorises and endorses the AS. Incomplete or no exchange at the system output results in the AS emitting energy in the form of unapproved discharges (e.g. "forced" or covert energy emissions to the environment) or in such energy not being expended. A similar, but reversed, mechanism operates at the input of the given AS. Here, too, the system may resort to force or covert activities to obtain the necessary energy. Lastly, sources of energy also include transformation efficiency and the environment.

4.2. Systems of energy transformation conditions

The relations of any AS with the environment take place within specific *systems of internal and external conditions*, including expectations, fulfilments and meeting needs and objectives of the parties. Characteristically, the variables of the conditions are interrelated, while the levels of their properties fluctuate and may discretely span the opposite extremes. I include the following categorical variables (with each category consisting of sub-variables):

1. Identity, singularity (e.g. level of development, variation, culture; location, stability, etc.) and ultimately potential, including energy bargaining power of the parties. The internal potential confronted with that of the other parties determines the relational potential of the interaction. The balance of the parties and the equivalence of the energy transformations mark a level from which the energy potentials and the bargaining power of the parties can diverge.

2. Freedom of organisational behaviour. Fluctuates between zero (absolute lack of freedom) and one (absolute freedom – authoritative decision-making energy unconstrained from the outside). Freedom is *primus inter pares*, the fundamental concept among all the variables co-determining the potential authority of AS. Without freedom, no other variables can develop fully.
3. Congruence of activities, that is the suitability of all the components of a given activity, focused around the acting subject (e.g. values and goals, resources, obligations, authority and responsibility). Higher/lower congruence refers to a broader/narrower span of coherence, organisation, integration of these components and activity as a whole. This makes for more/less focused direction of psychosocial energy and its remaining properties and parameters (content, magnitude, quality, structure, form, dynamics), and thus, ultimately, its potential of influence.
4. Freedom of access to energy, including matter and information. A complete lack of access to energy is self-cannibalism and collapse of the system. A transition of the parties towards equal access, and further on towards monopolisation, might trigger negative phenomena (e.g. dependence, conflict).
5. Arrangement of energy relations between inputs and outputs (self-supply, active and passive supply). Complete freedom of these arrangements creates the risk of illegitimate, non-ethical, non-normative behaviours, including those incompatible with the laws of science. Complete lack of freedom entrenches the given solution, even in forms that are unacceptable to the parties and the public.
6. Relations between creation, evolution and self-organisation. AS management is formed not only through creation. Management of the CS is, essentially, using and applying specific proportions, parities and priorities between creation, evolution and self-organisation. Their extreme forms (completeness or absence) are out of the question. Pure evolution signifies completely free selection and propagation of development, with no regulators or regulations. Pure creation, in turn, is the complete elimination of evolution, the pursuit of an acting machine. Pure self-organisation of AS supersystems excludes regulation. As a result, systems integrate at different levels, ranging from addition to the social machine (Witczak, 2008, 2017, 2023).
7. Interdependencies between AS subsystems and supersystems, such as dominant doctrines, technical levels, legal and cultural norms, etc. Extreme dominance of the aims subsystem can lead to a management style that can be summarised as “achieving values and goals at all costs”, or doctrines that focus on activity (e.g. communism), constraints and risks (e.g. defensive-orthodox orientation), situations (e.g. monopoly strategy), or compliance with operational requirements (e.g. technocratic dominance). Unfocused combination is also a possibility (without dominance: interstage crossing and its forms, e.g. drift).

8. Conformity of shaping the conduct of the AS with the laws of science. It is necessary – otherwise, we would not be able to progress as a human civilisation. While the natural and formal sciences define the laws of science, the social sciences and humanities mostly produce regularities, principles, rules, indications, guidelines, recommendations. This leaves room for manoeuvre in various areas of shaping the conduct of the AS, including justifying certain activities with opposing arguments, creating stalemates and decision-making dilemmas.

It is important to balance the status of the parties, the level of variables and their interdependence. The parties, with the exception of NS, negotiate, argue and compromise in an attempt – not always successful – to reach satisfactory (e.g. balanced) positions. The above conditions are crucial for the context of objectification, measurement, calculation and accounting of energy. Only then can the exchange/transfer and flow take place (or not) on an equal footing, close to or far from the objective measurement, calculation and accounting of energy. There is, of course, a crucial and very difficult problem of the interactions of AS and their supersystems in the absence of the ability to exchange and transact (non-transactional interactions), i.e. active and passive supply.

5. Energy transformation models

5.1. Model of permanently invariable energy transformations

There is a problem of the relationship of any AS with longevity, and then a problem of the necessary and sufficient energy for longevity. This problem must be resolved, as it is broader than the volitional decision of the AS to self-eliminate.

The energy transformation in a given XTY cycle requires that the given AS in the spacetime of the transformation should remain, as a matter of principle, in a permanently invariable condition, i.e. it should be a kind of machine. Let us assume that this period is marked by invariability and a balance in the status and the above-mentioned systems of conditions underlying the parties' activities in XTY spheres.

Moreover, operational energy transformations in this cycle are also permanently invariable and occur automatically – the parties approve and accept permanently invariable transformation rules, reaching an equilibrium point without discussion or delay. In fact, the permanent invariability of the approach to the management of the AS (cycle repetition) means that the freedom of organisational behaviours at a given level is solidified, and deviations from it are equal to zero.

Excellence, that is perfectly efficient transformation of any potential and form of energy into any other potential and energy without losses, is incompatible with the laws of science. In the first (initial) cycle understood in this way, and in subsequent cycles, the lost energy cannot be fully recovered. AS energy can be lost through the following mechanisms: 1) ageing of the potential; 2) wear of the potential; 3) incomplete efficiency of the energy transformation. In order to fully restore the initial energy; 4) additional energy is required for restoration, while some forms of transformation also produce; 5) irrecoverable energy (e.g. some heat losses). The AS reduces its initial energy potential by the sum of recoverable energy lost (items from 1 to 3 above) and the additional and irrecoverable energy (items 4 and 5 above).

The initial *energy of action* minus the *energy of restoration* leaves the *energy available*. The depletion of the energy potential available to the AS is gradual, initially imperceptible, and it affects all types and forms of energy. The energy of nature is only renewable in a certain sphere and up to a certain level. So is the energy of artefacts, such as infrastructure. The same is true of psychosocial energy: the permanent invariability leads to an inevitable decline in the energy of aims, erosion of doctrines, potential for reception, perception, commitment, lack of prospects. The well-known phenomena of frustration and fatigue increase, while innovation decreases, etc. The aggregate decline is equally complex, but, unlike the energy of NS and the energy of artefacts, it can still fluctuate. As a consequence of the permanently invariable energy, the AS must gradually fade away until it finally loses its static (amount of energy) and dynamic (process and outcomes of transformations) ability to exist.

5.2. Model of variable energy transformations

The situation changes when, upon repeating the cycle, we do away with the permanence and invariability of energy transformations (including the conditions for action), as well as the invariability, balance and status of the parties in the XTY spheres.

The sum of energy materialises in the form of products/services offered to the environment, in order to satisfy the needs and interests of the environment. The AS will try to exchange these products/services with the environment, thereby gaining energy to repeat the cycle and possibly serve other non-operational activities (e.g. capital acquisition). The sum of energy is formed partly through exploiting relationships with the environment, e.g. strategic positioning. The parties attribute a certain meaning to the actual and/or expected energy exchange in which they are (will be) involved, subject to certain conditions and contexts.

Psychosocial energy features importantly in this attribution, notably in terms of accounting for expectations, the fulfilment of expectations, and their balance – the satisfaction of subjects. The sum total also includes energy gains and losses from non-transactional, non-normative sources and outside the laws of science.

The operational horizontal activity of the system must refer to objective energy transformations, independent of the attribution of any meaning and importance (value) to them. They are founded on the laws of science. No energy is created by itself or from nothing, it can only be transformed from one form to another. During spontaneous and/or active transformation, energy losses occur throughout the XTY cycle, and the characteristics of objective and necessary energy losses are codependent on the systems of conditions and energy transformation efficiency (management). The shift from permanent invariability to total dynamism, however, changes the potential of psychosocial energy. It couples and self-couples, forming a positive feed-back and feed-forward loop, "awakening from its slumber", starts to look around, swell and grow, fluctuating powerfully. Due to changes in the systems of conditions, the conduct of other sources, types and forms of energy and the efficiency of energy transformations can be much better shaped. In particular, the increase in freedom (freedom of organisational behaviour) promotes the growth of the aggregate potential for action in the AS, though only up to a certain level. Too much freedom, on the other hand, can lead to an exponential increase in the spread of diversity, the distance between the extreme opposite sides of the remaining elements, properties, and relationships of the systems of conditions. The bargaining power of monopolies and monopsonies, deficiencies in congruence and other changes can trigger negative events and negative energy of change in terms of direction and other properties. As a result, negative synergies arise, lowering the potential for community, bringing about an overexploitation of the energy of nature, artefacts, as well as psychosocial energy itself (e.g. excessive and unreciprocated exploitation of people). At the same time and in parallel, the energy potentials of nature and artefacts are declining, at significant levels, albeit gradually, unevenly, and progress may not completely offset this decline.

For these reasons, throughout the cycle we may in principle be dealing with reversed processes in terms of the directions and rates of shaping the management of natural and artefactual energy on the one hand, and psychosocial energy on the other. Regardless of how an AS measures, calculates and accounts for the final energy presented to the environment for exchange at the output, the value of its properties (content, size, quality, structure, etc.) is assigned by the environment. The environment evaluates these properties in terms of its own accounting of expectations, fulfilment and satisfaction. The outcome of the account may be threefold: satisfaction on a par, below par (deficiency of energy fulfilments), above par (excess of energy fulfilments). As a result, inside these three nominal levels of action energy we will find a necessary and objective decrease in the en-

ergy of nature and artefacts and a fluctuating potential of psychosocial energy. These levels are nominal in nature because the actual potential depends on the input-output relationships of the potentials of the AS and their environment, the efficiency of transformation (management) throughout the cycle, and the forms and sustainability of energy transformations (transactional, non-transactional, non-normative). For instance, the bargaining power of a monopoly/monopsony enables it to effectively impose unequal terms of exchange and achieve energy surplus in excess of par. I assume that in the spacetime of the starting activity, the initial level of energy of nature, artefacts and psychosocial energy is equal. If we have not exchanged anything (by way of a transaction, barter) and did not gain anything under non-transactional terms (appropriation, transfer, etc.), there are no grounds to differentiate, or at most – nominal grounds. The distinguishing quality of psychosocial energy and the energy of artefacts is their purpose-orientation, unlike the energy of nature. The energy of nature and that of artefacts, on the other hand, have one objective and distinguishing quality: their predominant direction of change is the decline of the energy potential.

6. Synthesis of the essence of the law of economic surplus

The question of ES is one of the reference points: what level (potential) of energy must we achieve and surpass in order to have the energy necessary and sufficient for longevity? The possible reference points can be: the unattainable, perfect (complete) energy conversion; the energy lost by a given AS, necessary to successfully complete the intended operating cycle. Neither loss nor gain occur automatically or without energy input. Other possible reference points include: comparison of the energy with the level of realisability (possibility, desirability, feasibility), comparison of follow-up energy with the initial energy of the AS.

The first prerequisite for ES is the difficulty or impossibility of fully reproducing an activity cycle with the given parameters. Furthermore, the optimal conversion efficiency of the AS under given conditions is always imperfect. An energy surplus must be obtained that makes up for the irrecoverable losses at least to the level of "complete reproduction". The only source of this surplus, with the optimal transformation referred to above, is ultimately the environment.

The second prerequisite for ES is the indispensability of new changes – beyond the routine and permanently invariable operational and reproductive changes in the cycle and XTY spheres. Carrying them out requires additional energy, ultimately also originating from the environment. It serves to adapt/transform the

AS itself and its relationships with the environment. Shaping the change process also entails analogous energy losses – due to the incomplete efficiency of transformation, wear of the potential for change, and ageing of potential in the course of change. On aggregate: 1) the impossibility of complete reproduction of a cycle of activity with specific parameters; 2) the necessity of implementing new changes in the system; 3) the limitation of the available energy; 4) the diversification of the systems of conditions; 5) and the incompleteness and varied operational efficiency are the fundamental, *necessary and sufficient reasons for defining the essence of the problem of economic surplus*. In the case of a random AS, these necessary and sufficient conditions may differ in size, structure, other characteristics and relations to longevity.

ES primarily refers to the balance of energy gained and lost in the XTY cycle, expressed in the form of subtraction (benefit) and/or division (economy, effectiveness). Over the long term, the AS can acquire energy exclusively from the environment, through transactional and non-transactional means, it cannot supply itself.

In reality, a permanently invariable status and balance of the parties and the system of conditions do not exist or exist ephemerally, they are constantly being sought and transformed. This calls for additional energy to enable change. It must apply to the entire cycle of activity, encompassing a complete reproduction of the initial potential as well as new, innovative changes. Ultimately, the energy of change must exceed the energy of reproduction by a certain unique, categorically and generically different quantity. Add to that random, abrupt, revolutionary changes. In this situation, the role (status, situation, significance) of ES is not revealed immediately upon the completion of the initial cycle, but in the long term. Every AS may be subject to unique and separate conditions of fluctuation around the point of energy equilibrium. The energy balance (arrived at through subtraction and/or division) emerges over the long term, revealing zones of ES (energy surplus), loss (energy deficit) and interstage crossing. The law of ES is a necessary and sufficient condition for longevity. An AS may find itself in the ES zone, but the system of conditions may prevent the use of the surplus (e.g. constraints), and in such a case the system may decline despite the ES. The economic calculation of ES, provided we are fully able to measure, calculate and account for activity, is a necessary basis for shaping the conduct of any AS in the long term. Risk and uncertainty are constants in this process, but it is not clear and certain that the system will operate in the ES zone in perpetuity. The inability to measure, calculate, and account for the activity of any AS and to satisfy the conditions of exchange does not invalidate the law of ES, serving merely as a stimulus for research. The efficiency of transformation and positive/negative energy balance are unique, derived from a complex system of interactions, including energy transformations occurring according to non-objective, non-transactional, non-economic, non-legal requirements and constraints, and/or under conditions of ignorance.

The law of ES applies to all AS, and ES is a derivative and a constituent of the complex energy of action – natural, artefactual, and psychosocial energy. The differentiation and variability of the internal and external systems of conditions and levels of efficiency of energy transformations impact accordingly on the rate of changes in the energy structure and total relational energy potential.

Conclusions and recommendations

As a product of *subtraction*, energy surplus is the sum of the energy gained over the energy lost (energy held minus energy lost) by the AS in action. As a product of *division*, it has two forms: economy (total energy held divided by energy lost >1) and efficiency (total energy surplus divided by energy lost). Economic surplus (ES) is the form and measure of energy surplus, a conscious, professional and scientifically compliant shaping of the energy of the AS in relation to its longevity.

ES and its relationship to longevity have the status of a law, regardless of the AS energy transformation model. The important difference is the attainability of ES. According to the model of permanently invariable energy transformations of the AS, ES attainability does not exist (relationship certainty). Under conditions of change, the attainability of ES has the status of regularity (relationship probability), with dialectical, paradoxical and chaotic characteristics. This is due to the alignment of ES and the mutually interacting conditions, management efficiency and environment. ES can only be achieved if the alignment of conditions, management efficiency and environment is conducive to it.

The alignment of conditions, management efficiency, environment and ES forms a network system of feed-back and feed-forward interactions. ES as a derivative and function of purpose is only a probability, and is not given in advance or prescribed.

In practice, without ES, neither AS nor CS can exist in the long term if the alignment of conditions, management efficiency and environment is unfavourable and uneconomical. There is a problem of resolving this alignment. The problem of achieving ES is not optional – it is an absolute prerequisite for longevity.

Ultimately, the environment is the only source of energy for the longevity of the AS and the CS and their ES, especially the NS. In fact, AS and CS, forced to seek perpetual growth and ES, are parasitic on the NS, gradually devouring it. From this point of view, concern for the NS cannot be optional. In the light of the law of ES, the role of the NS becomes an essential priority factor for the longevity of AS and CS.

In axiological terms, the complete set of consequences of any action is a success (a positive evaluation) or a failure (a negative evaluation). Longevity can be an overriding value, but also a condition (e.g. we need to exist for as long as possible

to fulfil our mission). ES and loss have positive and negative axiological connotations, respectively. AS also succeed by achieving favourable conditions, in terms of the sources of ES. This creates a feedback loop: ES conditions – achieving/not achieving NE – feed-forward shaping of ES conditions. ES can be situated, in terms of its axiological role for the AS, as a superior value, constraint and a subordinate value (we need to achieve ES to be able to achieve higher-order values).

This paper essentially opens up a scientific problem and has numerous limitations typical of pioneering scientific activity. It does not venture beyond deductive reasoning, with categorical considerations of a universal scope, combining the research fields of systems theory, praxeology, management sciences and economics. All this creates further problems of methodological and substantive corroboration, particularly scientific synthesis and universalisation. The fundamental issues in the verification and falsification of the formulated law include the synthesis of various forms of energy into a universal conceptual and empirical category, as well the measurement, calculation and accounting of ES. By itself, the conceptualisation of the law of ES does not provide a sufficient explanation of its causes, conditions and consequences.

The law of ES is reflected in the practice of shaping the conduct of profit-oriented systems. Here, I refer more broadly to any AS, their supersystems and CS. An AS may not be profit-oriented because of the obstacles to measurement, calculation and accounting, possibility (not every AS can generate ES under the given system of conditions) and desirability (not every system is supposed to generate it). This does not change the need for developing solutions to ensure general and absolute compliance with this law in practice.

The current body of knowledge in the domain of this paper, research constraints and practical implications also determine other directions for studies, e.g. 1) the problem of measuring, calculating and accounting of potentially all AS and their supersystems; 2) the problem of shaping the relationships between the activity portfolio, economic and non- economic values, security, rational and non-rational values; 3) the growth of civilisation in the context of the inexorable devouring and freeloading of the environment by the AS; 4) the (non-)achievement of ES for "(un-)justified" reasons due to the interrelation of the efficiency of transformation and the system of conditions; 5) shaping of proportions, parities and priorities in the zones of surplus, loss and interstage crossing; 6) the relations of the law of ES to other laws of science, legal and cultural norms, ecology and ethics; 7) the relations of ES to the management of countries, states and regulatory systems, as well as to competition.

In line with the assumptions, this paper does not aim for positive corroboration. Its claims must therefore be empirically verified and falsified in further research.

ES is neither a cause nor a result of everything. Its mutual interactions with other variables require additional scientific elaboration and corroboration. Only then will we be able to determine its role among scientific theorems and in the practice of shaping the conduct of the AS.

References

Arystoteles. (2001). *Dzieła wszystkie* (vol. 6). Wydawnictwo Naukowe PWN.

Cendejas, J. L. (2018). *Ekonomia, chrematystyka, oikos i polis u Arystotelesa i św. Tomasza z Akwinu*. https://www.researchgate.net/publication/326092583_Ekonomia_i_chrematystyka_-_powrot_do_Arystotelesa_I

Chakrabarti, A., & Ramasvamy, R. (2014). Re-thinking the concept of surplus: Embracing co-creation experiences of economics. *The B.E. Journal of Economic Analysis & Policy*, *14*(4), 1283–1297. https://doi.org/10.1515/bejeap-2013-0192

Coase, R. H. (1937). The nature of the firm. *Economica*, *4*(16), 386–405. https://doi.org/10.1111/j.1468-0335.1937.tb00002.x

Coase, R. H. (1960). The problem of social cost. *Journal of Law and Economics*, *3*, 1–44. https://doi.org/10.1086/466560

Gościński, J. (1989). *Cykl życia organizacji*. PWE.

Kotarbiński, T. (1973). *Traktat o dobrej robocie* (5th ed.). Ossolineum.

Kotter, J. P. (1995). Leading change: Why transformation efforts fail. *Harvard Business Review*, *73*(2), 59–67.

Luhmann, N. (2007). *Systemy społeczne*. WTS, Zakład Wydawniczy NOMOS.

Machaj, M. (2013). Czy *ceteris paribus* da się pogodzić z nauką ekonomii? *Studia Ekonomiczne*, *1*(LXXVI), 119–131.

Martins, N. O. (2013). Classical surplus theory and heterodox economics. *American Journal of Economics and Sociology*, *72*(5), 1205–1231. https://doi.org/10.1111/ajes.12045

Mazzucato, M. (2018). *The value of everything: Making and taking in the global economy*. Allen Lane.

Meyer, R., & de Wit, B. (2007). *Synteza strategii*. PWE.

Mises, L., von. (2011). *Ludzkie działania. Traktat o ekonomii*. Instytut L. von Misesa.

Parsons, T. (2009). *System społeczny*. WTS, Zakład Wydawniczy NOMOS.

Rifkin, J. (2002). *The hydrogen economy*. J.P. Tarcher.

Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. St Martin's Press.

Szkutnik, W. (2014). System ekonomiczny a samoorganizacja – zróżnicowania w kontekście teorii systemu, stabilności, rozmaitości i kryzysu. *Studia Ekonomiczne UE w Katowicach. Zeszyty Naukowe*, *181*, 62–101.

Witczak, H. (2008). *Natura i kształtowanie systemu zarządzania przedsiębiorstwem*. Wydawnictwo Naukowe PWN.

Witczak, H. (2017). *Strategiczne zarządzanie zasobami ludzkimi*. Wydawnictwo Naukowe PWN.

Witczak, H. (2018). Wprowadzenie do związku między wybranymi prawami nauk a skutecznością zarządzania strategicznego. *Management Forum*, *6*(1), 40–53. https://doi.org/10.15611/mf.2018.1.06

Witczak, H. (2023). *Nauka o zarządzaniu. W kierunku systemu syntezy*. CeDeWu.

Włodarczyk, J. (2008). Racjonalność gospodarowania a druga zasada termodynamiki. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, *48*, 75–92.

Zieleniewski, J. (1972). *Organizacja zespołów ludzkich* (4th ed.). PWN.