

## TIME CAPITAL IN STRATEGIC PLANNING AND SUSTAINABLE MANAGEMENT

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### **Abstract**

In this paper we propose an emerging vocabulary to approach strategic planning and sustainable management in terms of time capital at four levels of analysis: (1) individual, (2) microsocial, (3) mesosocial, and (4) macrosocial. Besides proposing a taxonomical granularity, the paper brings conceptual clarifications by using equations as cognitive resources, as well as by discussing issues of convertibility between time capital and other forms of capital (economic, human, social and cultural capital). A paradigm of time capital has significant implications for administrative measures and strategic management. Moreover, such a paradigm might guide the practice of sustainable planning by providing information in the decision-making process. Last but not least, a paradigm of time capital integrates forms of mathematical intelligibility in which the social world is shown as a predictable and controllable universe with effects on the manner in which material and symbolic resources are distributed across individuals, groups and communities.

**Keywords:** time capital, strategic planning, sociology of time, commodification of time, mathematical formalizations, predictability, sustainability.

## 1. Introduction

'Social capital' (Bourdieu, 1986) and 'human capital' (Coleman, 1988) are two influential concepts that have been firstly theorized in the academic community, but which were later infused in public policy, administrative practices and strategic management. Starting from those two analytic concepts, various international organisms, academic authorities, institutions of public administration and private organizations have developed initiatives to identify the mechanisms and laws that might support the monitoring and evaluation component of strategic planning and inform the governance of sustainability in public administration (Böhringer and Jochem, 2007; Hák, Moldan and Lyon, 2007; Morse, 2015; Strezov, Evans and Evans, 2017). Specifically, the Human Capital Index (developed by the World Bank) and the Social Capital Index (developed by OCED), as well as the Economic Capital Index, Civic Capital Index and Cultural Capital Index (developed by Global Ties U.S) have subsequently become key resources in designing policy interventions.

Starting from this observation, we consider that a Time Capital Index might complement and support administrative approaches by acting as a composite measure of sustainability that functions both as a heuristic tool in knowledge production and as a cognitive device in strategic management. As long as strategic planning indices and sustainability metrics are key planning instruments in present-day society, we discuss the concept of 'time capital' and propose a multileveled 'theory of time capital' based on mathematical formalizations as instruments to make sense of various social processes and phenomena that might translate different realities into sustainable systems.

This paper represents a programmatic and conceptual outlook that might establish a tradition of thought and inform administrative practices. The first part of the paper elaborates on how time capital might be understood as a cognitive tool in the effort of knowledge production and as a heuristic device to make the world more intelligible, more controllable and more predictable through strategic planning and scientific management. The second part of the paper presents the concept of time capital by outlining its main attributes (multicausality, convertibility, and transferability) and levels of analysis (individual, microsocial, mesosocial, and macrosocial). This conceptual clarification is followed by a discussion of the implications of a 'theory of time capital' for strategic planning and public administration.

## 2. Foundations for a mathematical theory of time capital

An understanding of the world in terms of time capital relies on a paradigm that assumes a mathematical intelligibility of collective life and depicts the social world as a measurable, controllable and predictable space (Fararo, 1997). The theoretical models that are based on the interpretation of social reality in terms of time capital support the production of meaningful metrics and analytics that might be used to explore the relationship between various social phenomena that impact the sustainability of socio-cultural and economic systems. Therefore, the paradigm of time capital

facilitates the production of explanatory models able to capture laws and regularities of the social world in a process that has both theoretical and practical implications, as well as ethical and political ones.

The concept of time capital is a cognitive instrument that plays a representational and depictive function in the production of scientific knowledge in public administration and strategic management. As a cognitive instrument, time capital offers a conceptual resource to think about various aspects in the social world through simplification. In general, simplification is used in social theory to make various phenomena and processes accessible to human thought. Therefore, the concept of time capital helps researchers navigate the complexity of the social world by revealing reality as a coherent system that might become known and understood through mathematical models and analytical reasoning.

Moreover, the theoretical advantages of a paradigm of time capital correspond largely to the advantages of introducing mathematical formalizations into the practice of knowledge production. As any mathematical formalizations, time capital has a performative character (Matei and Preda, 2019) thus representing a conceptual instrument that acts on and upon the practice of knowledge production.

The social theory of time capital is based on a commodification of social processes and material instantiation of temporal resources by constructing reality as an object that becomes intelligible through measurement practices. A theory of time capital is useful especially in the current context of real-time and interrelated data collection processes in which more and more actions and parameters are measured, recorded and stored. Such an understanding of the world relies on rationales, representations, methods and instruments through which knowledge is gathered, accumulated and used based on mathematical formalizations. In this sense, the instruments through which time capital is measured contribute to the very definition of time capital and make time capital possible as a reality in the actual world.

The notion of time capital is not only valuable because it contributes to the production of systematic and articulated knowledge, but also because the notion of time capital favors practices of knowledge production in applied research. Accordingly, the paradigm of time capital facilitates interdisciplinary collaborations because it comprehensively assimilates the conceptual repertoires of various scientific fields and provides a common language through which social issues might be addressed (Matei and Preda, 2019). Therefore, the constitution of a community of practice formed by academics, researches, practitioners and public officials who assume time capital as an object of interest facilitates the circulation of ideas and contributes to the improvement of decision-making in public administration and management.

### **3. Time capital: a conceptualization and taxonomy**

Time capital is understood as a measure of sustainability or durability. Time capital is a measure of sustainability that defines the individual or collective potential for action projected into the future. Time capital is a numerical measure of durability

that operationalizes a generic potential of action, thereby representing an estimation of an emerging capacity to perform individual or collective actions.

Accordingly, time capital is a performative abstraction that assimilates a generic potentiality to circulate and control tangible or intangible resources. Time capital is a teleological concept that bears a heuristic function and influences the direction towards which individuals, primary groups, communities and societies evolve, as well as the momentum of their development process.

Actions are concrete manifestations of the social and environmental affordances, being dependent on the positions that different agents adopt in relation to these possibilities. Actions are possible if certain types of capital (economic, human, social, relational) are circulated and materialized either in tangible assets (money, objects) or in intangible resources (power, knowledge, prestige). Accordingly, time capital is the ultimate resource beyond which any other type of capital would become irrelevant: all the other material or symbolic resources are useless unless they are assigned with the time capital of individuals, groups or societies. Time capital is not only an umbrella term that incorporates various resources that define the temporal horizon for action, but is itself the *sine-qua-non* condition for the manifestation of agency. In this sense, time capital is distributed in a flow in and through which change occurs, but which also gives direction to change.

Moreover, time capital incorporates a capacity for acceleration and deceleration. As such, our approach to time capital is inspired by Stephen Hawking's perspective on acceleration and deceleration of the flow lines to relativistic velocities (Hawking, 2010). Stephen Hawking introduces the principle of 'agency over acceleration' that might be used as an analogy for the social world: the elements that could be accelerated or decelerated are not only physical phenomena but also social phenomena where the human component plays an essential role. Therefore, this principle might be applicable when conceptualizing sustainability in terms of time capital. Time capital is a resource that is subject to transformation, so that sustainable change and development might be achieved by assuming and working with a commodified notion of time. Consequentially, strategic planning and public administration might be understood as modes of directing human actions towards certain goals through temporal acceleration and deceleration. In other words, the work of strategic planning and the practices employed in public administration do not lie only in the effective management of resources, but also in the exercise of 'agency over acceleration'.

Time capital integrates an acceleration and deceleration potential over which people might gain control in order to create sustainable systems. Figuratively, we might consider that strategic management could be put into practice by controlling the laws upon which the time passes within our individual and social world. Sustainability implies a specific form of 'time work' (Flaherty, 2003) accomplished through mathematical formalizations, thus creating and enforcing a sense of direction, with ethical implications in establishing a more responsible view towards the future.

Based on the above mentioned rationales, we consider that the variation in time capital has two components: (1) a quantitative component (chronological duration, which is a quantification of temporal resources -  $\Delta t$ ) and (2) a qualitative component (time velocity, which is a measure of acceleration and deceleration in the accumulation and consumption of temporal resources -  $\gamma$ ).

- a) *The duration of actions*: Time capital has a conventional unit of measurement (seconds, minutes, days, years) depending on the object to which it is applied, being referred either to a specific situation or to the broader society. This quantifiable character creates a sense of objectivity and turns time capital into a controllable and actionable object. Chronological duration might be understood as a length of time: it is the time consumed or invested in performing individual or collective actions, being related to the agency of individuals, families, communities, organizations, nations, etc. Chronological duration is the amount of time consumed in the actions consecutive to that moment, not being affected by the contextual factors in which actions are performed.
- b) *The velocity of actions*: Time velocity is a tempo which modulates the effect of various actions on sustainability: different actions could accelerate or decelerate the consumption of temporal resources. Velocity is a qualitative component as a measure of the extent to which the contextual factors and actionable qualities additionally affect the stock of capital and have an effect on the sustainability of an entity. From this perspective, velocity is an attribute that influences how time capital is distributed. Consequently, velocity represents a measure of acceleration and deceleration, functioning as a rhythm that widens or narrows the horizon of possibilities. Thus, a coefficient of velocity could be assigned to each action, practice or interaction. Moreover, the logic according to which velocity describes and acts back on time capital is largely defined through causal processes, so that a better definition of velocity could be accomplished by understanding these causal processes.

Time capital has three properties: multicausality (susceptibility to the impact of different factors on the accumulation and consumption of time capital), convertibility (conversion between time capital and other forms of capital), and transferability (the capacity of time capital to be transferred between different social actors or agents). First, time capital is both a product of human agency and of other factors that exert a constraining influence on action. Therefore, the main challenge for a social theory of time capital is to capture causality processes that might be used to determine the temporal horizon for exercising agency. Secondly, time capital is convertible into other forms of capital (social capital, cultural capital, economic capital), and other forms of capital are convertible into time capital. Thirdly, time capital is totally or partially transferable between different agents based on formal or informal conventions. The metrics of time capital, along with its finite or potentially infinite character, depend on the relation between individual action and social structures.

Time capital is applicable to four levels of analysis. Thus, it is possible to differentiate between:

1. *Individual time capital*: The individual time capital represents the temporal resources and actionable capacities of humans seen in their individuality.
2. *Microsocial time capital*: The microsocial time capital represents the temporal resources and actionable capacities within primary groups (families or households made up of members who share a common descent or who are linked together by affinity);
3. *Mesosocial time capital*: The mesosocial time capital represents the temporal resources and actionable capacities of secondary groups, organizations and local communities understood as social systems with formal structures and well-defined boundaries.
4. *Macrosocial time capital*: The macrosocial time capital represents the temporal resources and actionable capacities of complex societies made up of interdependent social systems. The accumulation and consumption of macrosocial time capital depend on the potential for social, cultural and technological innovation and on the forms through which social resistance to change is manifested.

Individual time capital is a resource that can accumulate according to the actions undertaken by individuals. Both microsocial and mesosocial time capital represent a measure of sustainability that depends on various practices through which groups or communities act together as collective actors. The macrosocial time capital represents a potential for coordinated action that might be assigned to societies as forms of social organization consisting of interdependent systems.

### **3.1. Types of time capital**

#### **3.1.1. Individual time capital**

Individual time capital (iTC) is a temporal horizon in which humans could manifest their agency. It designates a human potentiality transposed into a lifespan that is continuously configured and reconfigured both under the qualities of individual actions and decisions, as well as under the proprieties of the context in which these actions are taken. Therefore, individual time capital serves as an instrument of self-management and resilience.

Preda (2013) defines the concept of individual time capital as a raw resource that people have to organize their life: time capital is 'an (or the) existing asset of any individual that is the only clear convertible capital that a person is born with' (Preda, 2013, p. 34). Our conceptualization starts from the equation of individual time capital proposed by Preda (2013). However, we bring some clarifications by reconsidering the names of the two components. Firstly, the duration of an action ( $\Delta t$ ) corresponds to the quantitative component (the variation in chronological time). Secondly, the velocity of an action ( $v_i$ ) corresponds to the qualitative component (the measure of agency over acceleration and deceleration).

Individual time capital takes the form of an individual life expectancy and is understood as a chronological time span which an individual might possess (Equation 1). Individual actions performed during the lifespan have a coefficient of velocity that defines the rate at which time capital is distributed and consumed. The coefficient of velocity might be seen as a coefficient of acceleration or deceleration in the passage of time. Each action decreases individual time capital with its duration. However, the coefficient of velocity contributes to a change in the rate of individual time capital consumption. This change is dependent on the consequences that an action brings to the individual life or health.

**Equation 1:** The individual time capital and its components

	<div style="text-align: center;"> <i>quantitative</i>  <i>component</i>            (duration)         </div>	<div style="text-align: center;"> <i>qualitative</i>  <i>component</i>            (velocity)         </div>
Mathematical formalization	$iTC(y) = iTC(x) - [\Delta t(xy) - \Delta t(xy) \cdot \gamma_i(xy)]$ $\gamma_i(xy) = e\gamma_i(xy) + s\gamma_i(xy) + h\gamma_i(xy) + n\gamma_i(xy) + t\gamma_i(xy)$	
Notations	<p><math>iTC(y)</math> = <b>individual</b> time capital at the moment <math>t_y</math></p> <p><math>iTC(x)</math> = individual time capital at the moment <math>t_x</math></p> <p><math>\Delta t(xy)</math> = <math>t_y - t_x</math> = the <b>chronological duration</b> of the aggregated actions performed between moment <math>t_x</math> and <math>t_y</math></p> <p><math>\gamma_i(xy)</math> = the coefficient of <b>velocity</b> (the rate of acceleration or deceleration in the distribution of temporal resources determined by the context in which individual actions are performed during the time passed between the moment <math>t_x</math> and <math>t_y</math>)</p> <p><math>e\gamma_i(xy)</math> = the quantified impact of <b>economic capital</b> (financial resources) on individuals</p> <p><math>s\gamma_i(xy)</math> = the quantified impact of <b>social capital</b> (stock of social relations) on individuals</p> <p><math>h\gamma_i(xy)</math> = the quantified impact of <b>human capital</b> (acquired skills) on individuals</p> <p><math>n\gamma_i(xy)</math> = the quantified impact of <b>natural capital</b> (physical/natural environment) on individuals</p> <p><math>t\gamma_i(xy)</math> = the quantified impact of <b>technological capital</b> (technological resources) on individuals</p>	

**Source:** Authors' own conceptualization

In terms of multicausality, individual time capital is dependent on a set of factors which are within the control of individuals, as well as on factors over which individuals cannot intervene (genetic inheritance) or could partially intervene (environmental conditions, social conditions, economic conditions).

Individual time capital can be converted into economic capital (e.g., time spent on performing activities that generate revenue), cultural capital (e.g. participation in cultural activities), social capital (e.g., networking) or human capital (e.g., engaging in



educational activities that lead to the accumulation of knowledge and skills). At the same time, economic, cultural or human capital might be (re)converted into individual time capital: people could access resources that decrease the rate of time capital consumption or even increase individual time capital through information or social networks, healthy eating, medicine, medical treatments, healthy lifestyle, etc.

Moreover, individual time capital is transferable between individuals or between individuals and other social actors. For example, organ transplantation is an example of a process in which time capital is transferred between individuals, which results in the accumulation of time capital for one individual and reduction for another one. Instead, contacting a contagious disease is an example of transferring individual time capital between individuals, which results in a reduction of time capital for both individuals.

Such a conceptualization of individual time capital might contribute to the development of self-management projects by favoring empowered forms of subjectification. An understanding of the self in terms of time capital invites people to take control over their own life, which is a process that implies a high level of awareness of the implications of individual decisions on everyday life.

This form of subjectification is in line with an individualization process characteristic to modernity, which favors the development of a self-concept based on personal autonomy and agency. Moreover, the social imaginary of individual time capital is accomplished through ‘lifelogging’ technologies and wearable sensors that cultivate a vision of a ‘quantified self’ (Lupton, 2013; Nafus and Sherman, 2014). These technologies mediate a self-concept which is articulated through a mathematical formalization of various aspects of body functioning, lifestyle and subjective well-being. As such, the coefficient of velocity can be interpreted in the form of a cost-benefit analysis under the logic of an economy based on investments to generate profit.

### *3.1.2. Microsocial time capital*

Microsocial time capital ( $\mu$ TC) is a potential that might be assigned to primary groups (families, households, couples) whose members organize their life together and share their resources. As such, microsocial time capital characterizes small groups formed based on kinship and affiliation, which represents the main social setting for the manifestation of agency. The microsocial time capital of primary groups is the sum of the individual time capital of the group members and the sum of the time capital embedded in the assets produced or accumulated by the group itself (Equation 2). These assets are the result of previous capital investment of the group members, including the influence of past generations. Predominantly, microsocial time capital characterizes families as social institutions in which children appropriate identities and worldviews. Through intergenerational relationships, families contribute to the perpetuation of social values and norms, and therefore play an important role in the accumulation of time capital at the societal level.



**Equation 2:** The microsocial time capital and its components

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <i>quantitative</i> component </div> <div style="text-align: center;"> <i>qualitative</i> component </div> </div>
Mathematical formalization	$\mu TC(\alpha)t(y) = \mu TC(\alpha)t(x) + \gamma\text{-gro}(\alpha) + \gamma\text{-a}(\alpha) =$ $= \mu TC(\alpha)t(x) + \sum_{j=1}^n iTCj(x) + \sum_{k=1}^c iTCk(xy) - \sum_{m=1}^l iTCl(xy) + \sum_{p=1}^a \Delta iTCa(xy)$
Notations	<p><math>\mu TC(\alpha)t(y)</math> = the <b>microsocial</b> time capital of the ‘<math>\alpha</math>’ primary group at the moment <math>t(y)</math></p> <p><math>\mu TC(\alpha)t(x)</math> = the microsocial time capital of the ‘<math>\alpha</math>’ primary group at the moment <math>t(x)</math></p> <p><math>\gamma\text{-gro}(\alpha)</math> = velocity determined by the variation in <b>group</b> size</p> <p><math>\gamma\text{-a}(\alpha)</math> = velocity determined by the variation in the number of <b>assets</b></p> <p><math>iTCj</math> = the <b>individual</b> time capital of the ‘<math>j</math>’ member of the primary group</p> <p><math>n</math> = the <b>number of members</b> belonging to the primary group at time <math>x</math></p> <p><math>c</math> = the number of <b>comers</b> (members added to the primary group) in the <math>ty\text{-}tx</math> time interval</p> <p><math>l</math> = the number of <b>leavers</b> (members who left the primary group) in the <math>ty\text{-}tx</math> time interval</p> <p><math>a</math> = the number of <b>assets</b> in the primary group</p> <p><math>\Delta iTCa</math> = the quantified impact of various assets on microsocial time capital</p> <p><i>The assets of primary groups might be classified into five categories corresponding to the five types of capital:</i></p> <ul style="list-style-type: none"> <li>• <i>Economic assets (inherited or accumulated goods, movable property);</i></li> <li>• <i>Social assets (norms, values, support);</i></li> <li>• <i>Human assets (distributed knowledge);</i></li> <li>• <i>Natural assets (immovable property);</i></li> <li>• <i>Technological assets (equipment, supplies).</i></li> </ul>

**Source:** Authors' own conceptualization

Microsocial time capital depends on factors which are internal or external to the primary group. Member actions and decisions have consequences on microsocial time capital. Such actions and decisions might be related to the group culture and lifestyle, the quality of the social relations within the group, the strategies for group resources allocation and management, etc. In addition, microsocial time capital is influenced by a series of factors that work outside the primary groups. If we consider family as the primary group, such external factors might include public policies on children and families, family-work reconciliation initiatives, public support services, gender norms, etc. External factors have an impact on the socio-cultural, economic/material and technological assets within the primary group.

At a microsocial level, convertibility is closely related to transferability. For example, within a family, the time capital of parents may be transferred to children (e.g., the situations in which parents are directly involved in the education of their children). In addition, the forms of convertibility that derive from a series of tech-

nological innovations might contribute to a transformation of 'committed time' into 'personal time' (Robinson, 2002).

A better understanding of microsocial time capital can contribute to a better understanding of the processes that lead to the continuity of certain values and forms of symbolic authority. As long as the family is an important setting for social identity and social status formation, microsocial time capital measures the potential of a society to ensure the sustainability of its social institutions. This is because primary groups play a role in primary socialization, which is a process that ensures the legitimacy of various norms and values through intergenerational transmission.

### *3.2.3. Mesosocial time capital*

Mesosocial time capital (mTC) is a potential that a system has at its disposal to achieve its purpose. In this case, we refer to a social system as a form of collective organization whose boundaries are clearly delimited, with strong membership ties, with clear norms assimilated by its members, and with distinguishable practices of identity displays. In comparison to small groups, in this case a sense of collective identity is constructed through formal structures based on social norms and elements of the group's material culture. Even if such a form of organization is socially understood and collectively recognized as a distinct entity, it does not exclude the capacity of the system to establish and interact with other external agents (Bouckaert and Halligan, 2008). Thus, mesosocial time capital is considered applicable to organizations, local communities, or other forms of collective organizations whose members share a sense of belonging to the group. Mesosocial time capital is not limited to the sum of the community members' individual time capital, but it also represents the sum of the microsocial time capital of the primary groups and the time capital embedded in the assets produced or accumulated by the community itself (Equation 3).

Communities are social systems that depend not only on individual actions, but also on collective and coordinated actions that produce specific social dynamics. Therefore, mesosocial time capital is understood as a resource that emerges within the social system, being related to a form of collective agency that transcends the individuals' separate actions. In this case, the coefficient of velocity, which regulates the acceleration and deceleration rate in the process of time capital consumption, is used as a descriptor for joint actions and is determined by the extent to which these joint actions contribute to the sustainability of the system. In other words, the mesosocial time capital concept might be understood as the capacity of a system to turn itself into a sustainable form of social organization by supporting the perpetuation of those individual, collective and coordinated actions that minimize the risks within the system and ensure a set of material and symbolic resources (assets) that lead to the survival of the system.

**Equation 3:** Mesosocial time capital and its components

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <i>quantitative</i> component </div> <div style="text-align: center;"> <i>qualitative</i> component </div> </div>
Mathematical formalization	$mTC(\alpha)t(y) = mTC(\alpha)t(x) + \gamma-com(\alpha) + \gamma-a(\alpha) =$ $= mTC(\alpha)t(x) + \sum_{j=1}^n \mu TCj(x) + \sum_{k=1}^c \mu TCk(xy) - \sum_{m=1}^l \mu TCi(xy) + \sum_{p=1}^a \Delta iTCa(xy)$
Notations	<p><math>mTC(\alpha)t(y)</math> = the <b>mesosocial</b> time capital of the ‘<math>\alpha</math>’ community at the moment <math>t(y)</math></p> <p><math>mTC(\alpha)t(x)</math> = the mesosocial time capital of the ‘<math>\alpha</math>’ community at the moment <math>t(x)</math></p> <p><math>\gamma-com(\alpha)</math> = velocity determined by the variation in <b>community</b> size</p> <p><math>\gamma-a(\alpha)</math> = velocity determined by the variation in the number of <b>assets</b></p> <p><math>TCj</math> = the <b>microsocial</b> time capital of the ‘<math>j</math>’ primary group</p> <p><math>n</math> = the <b>number of primary groups</b> belonging to the community at time <math>x</math></p> <p><math>c</math> = the number of <b>comers</b> (primary groups formed within the community) in the <math>t_y-t_x</math> time interval</p> <p><math>l</math> = the number of <b>leavers</b> (primary groups dissolved within the community) in the <math>t_y-t_x</math> time interval</p> <p><math>a</math> = the number of <b>assets</b> in the community</p> <p><math>\Delta iTCa</math> = the quantified impact of various community assets on mesosocial time capital</p> <p><i>The community assets might be classified into the same five categories corresponding to the five types of capital:</i></p> <ul style="list-style-type: none"> <li>• <i><b>Economic assets</b> (community-owned property such as buildings, works of art);</i></li> <li>• <i><b>Social assets</b> (community-level institutions, norms, practices, habits, tradition);</i></li> <li>• <i><b>Human assets</b> (knowledge transfer systems in the community);</i></li> <li>• <i><b>Natural assets</b> (community-owned property such as natural resources);</i></li> <li>• <i><b>Technological assets</b> (technologies introduced in public transportation, public utilities, public health services, internet access infrastructure).</i></li> </ul>

**Source:** Authors' own conceptualization

Mesosocial time capital is also multi-determined. On the one hand, the accumulation of mesosocial time capital depends on strategic decisions taken under authoritarian or democratic leadership regimes developed within the system. These factors are within the direct control of community members. On the other hand, the accumulation of mesosocial time capital depends on the actions which individuals undertake within the system and that might be more or less aligned with collective interests or the overall purpose of the system. These factors are partially within the control of community members. Moreover, mesosocial time capital depends on factors external to the system (legislation, environmental conditions, and elements of force majeure). These factors are not within the direct control of community members.

Still, they have consequences on the sustainability of the system and on its capacity to accumulate mesosocial time capital through socio-cultural, economic/ material and technological assets.

Just like individual and microsocial time capital, mesosocial time capital is characterized by convertibility and transferability as drivers of sustainability. The mesosocial time capital could be also converted into other forms of capital: economic capital (e.g., through profit-making activities), human capital (e.g., through investment in staff training), social capital (e.g., through team-building sessions or other similar activities that aim to improve a team's cohesiveness). Moreover, different forms of capital could be converted into time capital (e.g., hiring highly qualified staff, adopting innovative techniques to improve work productivity). The conversion processes influence the coefficient of velocity that might be assigned to collective actions, so that the conversion processes transform the relationship between the resources distributed within the system and the finalities of the system. For example, some investments in mesosocial time capital may require considerable effort and resources in the short term, but in the long run those activities may have positive consequences contributing to an accumulation of time capital at the system level, even if they were initially associated with a loss.

Mesosocial time capital is also transferable. On the one hand, mesosocial time capital is transferable between individuals and the systems to which they belong (communities, organizations, groups, etc.). On the other hand, mesosocial time capital is transferable between distinct systems that work within their own borders and have specific fields of action. For example, at the organizational level such practices include financial loans, consulting services, establishing strategic partnerships, etc. The transfer processes influence the acceleration and deceleration rate in the consumption of time capital. Moreover, the actions that have been an object of time capital transfer play a different role within the system (e.g., the investments in technological upgrades might receive different coefficients of velocity based on the source of funding: self-funded investments, investments funded through loans). Consequently, mesosocial time capital depends not only on individual and collective actions, but also on different practices that might be judged as processes of time capital transfer and conversion.

Such a conceptualization of mesosocial time capital is especially useful in strategic management at the organizational level. Organizations are therefore understood as distributed systems that might become sustainable by intervening upon the processes through which mesosocial time capital is accumulated. The understanding of mesosocial time capital as a functional potential introduces a new vocabulary to make sense of organizational processes, which favors the development of an organizational culture grounded on but not limited to commercial or business-related rationales. The concept of mesosocial time capital provides decision makers with a framework for strategy development, both by disclosing the object of management as a controllable universe as well as by favoring a holistic approach to the management process in relation to issues of multicausality, convertibility, and transferability.

#### 3.2.4. *Macrosocial time capital*

Macrosocial time capital designates the potential of complex societies to achieve sustainability and structural stability at a social, economic or political level. Complex societies are understood as networks of interdependent national, transnational or global systems. While mesosocial time capital is assigned to collective forms of organization with recognizable and well-established boundaries, macrosocial time capital corresponds to interconnected networks that transcend local communities, formal groups or organizations. At the macrosocial level, individuals are not aware of how their actions produce mutual influences on the system by enforcing and reinforcing a particular social order. In this case, macrosocial time capital might be defined as a time capital of different societies and social systems (e.g., the time capital of the industrial society, the time capital of feudalism, the time capital of communism, the time capital of a nation, etc.). In a broad sense, macrosocial time capital might be understood even as a time capital of the humanity or as a global time capital.

The macrosocial time capital of a society is the sum of the mesosocial time capital of the communities at that time and the sum of the time capital embedded in the national assets. These national assets, as well as the communities' or primary groups' assets, are products of national and global importance. They are determined by human creativity, by national investments in education and culture, and by the influence of past generations. Thus, macrosocial time capital has a very important historical component. National assets also have an impact on the mesosocial and microsocial time capital (Equation 4). These assets affect the sum of individual time capital within the society by having implications on the immigration and emigration processes.

In the context of an interconnected system, macrosocial time capital is a condition for the accumulation of individual, microsocial and mesosocial time capital. In this case, the multicausality component is cumulatively operationalized. On the one hand, macrosocial time capital is impacted by historical, social, political and environmental factors. On the other hand, macrosocial time capital depends on individual and collective actions, as well as on the aggregated consequences of those actions. Last but not least, macrosocial time capital is shaped by the forms of resistance that affect the legitimacy of dominant institutions and thus determine the direction of social change.

As other forms of capital, macrosocial time capital is described by convertibility. For example, economic capital could be used to identify technologies that increase the well-being of a society and minimize environmental and health-related risks. Social capital might be used to organize social movements, which contribute to the accumulation or reduction of macrosocial time capital. Similar examples could be given by reference to the ways in which human or cultural capital enforces social or political ideologies or support dominant regimes of attention. According to this perspective, the coefficient of velocity depends on how individual and collective agency is distributed and propagated in and through processes of time capital conversion.

**Equation 4:** Macrosocial time capital and its components

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <i>quantitative</i> component </div> <div style="text-align: center;"> <i>qualitative</i> component </div> </div>
Mathematical formalization	$MTC(\alpha)t(y) = MTC(\alpha)t(x) + \gamma\text{-soc}(\alpha) + \gamma\text{-a}(\alpha) =$ $= MTC(\alpha)t(x) + \sum_{j=1}^n mTCj(x) + \sum_{k=1}^c mTCk(xy) - \sum_{m=1}^l mTCl(xy) + \sum_{p=1}^a \Delta iTCa(xy)$
Notations	<p><b>MTC(α)t(y)</b> = the <b>macrosocial</b> time capital of the ‘α’ society at the moment t(y)</p> <p><b>MTC(α)t(x)</b> = the macrosocial time capital of the ‘α’ society at the moment t(x)</p> <p><b>γ-soc(α)</b> = velocity determined by the variation in <b>society</b> size</p> <p><b>γ-a(α)</b> = velocity determined by the variation in the number of <b>assets</b></p> <p><b>TCj</b> = the <b>mesosocial</b> time capital of the ‘j’ community</p> <p><b>n</b> = the <b>number of communities</b> at time x</p> <p><b>c</b> = the number of <b>comers</b> (communities formed within the society) in the ty-tx time interval</p> <p><b>l</b> = the number of <b>leavers</b> (communities dissolved within the society) in the ty-tx time interval</p> <p><b>a</b> = the number of <b>assets</b> in the society</p> <p><b>ΔiTCa</b> = the quantified impact of various society assets on macrosocial time capital</p> <p><i>The national assets might be classified into the same five categories corresponding to the five types of capital:</i></p> <ul style="list-style-type: none"> <li>• <i>Economic assets (national reserves, national public debt, national government assets);</i></li> <li>• <i>Social assets (national culture and its associated institutions);</i></li> <li>• <i>Human assets (national educational institutions);</i></li> <li>• <i>Natural assets (natural and environmental resources);</i></li> <li>• <i>Technological assets (military technologies, nuclear technologies, communication technologies).</i></li> </ul>

**Source:** Authors' own conceptualization

Macrosocial time capital can be transferable between generations: current generations can contribute to the accumulation of macrosocial time capital for future generations by adopting responsible measures and making decisions with long-term positive consequences in mind. Additionally, macrosocial time capital is strongly dependent on the inheritance that past generations leave to present and future generations. In this case, temporal horizons could be sharply and significantly contracted or dilated (e.g., the adoption of eco-friendly technologies, natural disasters, wars, or other events with long-term positive or negative impact that transcend the time span of a single generation).

A conceptualization of society in terms of macrosocial time capital has implications for public policies. Governance is thus understood as a set of regulatory practices in the distribution of resources, corresponding to a process in which different forms of authority exercise control over the (re)distribution of time capital. There-

fore, governance is to be understood as a function of time capital conversion and transfer: time capital might be converted into other material or symbolic resources for society, and vice versa. However, at the macrosocial level, convertibility acquires a distinctive significance: macrosocial time capital is potentially infinite, unlike individual time capital which is finite. Moreover, a conceptualization of society in terms of macrosocial time capital could change the definition of society as a governable space and transform the subject and object of governance. By approaching the social world in terms of time capital, new definitions of power are enforced, new relations of power are configured, and new forms of exercising power are attained.

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The equations mentioned above can contribute to a better conceptualization and clearer operationalization of sustainability indices through strategic planning and management. More and more complex predictive models can be elaborated as the coefficients of velocity for different actions can be determined based on advancements in real-time data collection and processing.

The proposed equations have a cumulative character: individual time capital is included in the equation of microsocial time capital, and microsocial time capital is included in the equation of mesosocial time capital. Thus, the equation of macrosocial time capital contains references to all the previous types of time capital. Such a mathematical formalization could not capture the characteristics of the situations in which the same individual belongs to multiple groups or communities, so we cannot determine the role of multiple affiliations in the distribution and accumulation of time capital. However, the equation of macrosocial time capital takes into consideration the aggregate role of communities, so its members are independently considered as part of several levels of analysis.

#### **4. Time capital as an object of state policies and instrument of public administration**

Not only macrosocial time capital but also other forms of time capital might be understood as objects of state policies and instruments of public administration. The concept of time as a state-level form of capital is relatively new in history, being facilitated by the 'rationalization of life' (Ritzer, 1993). All the four forms of time capital are rationalized as resources that might be managed for the well-being of a distinctive population and used in government decision making. In this sense, through effective and appropriate interventions, time capital might be converted into other forms of capital prone to generate economic, social or cultural development at a societal level.

In this sense, time is transformed into a political object and time capital becomes institutionally appropriated as a rationale of governing practices because of the introduction of evidence-based policy in decision-making processes. Evidence-based policy integrates time among the resources of government, and consequentially transforms time capital into an object of aggregated knowledge and political interventions.



**Table 1:** Types of time capital

	Individual Time Capital	Microsocial Time Capital	Mesosocial Time Capital	Macrosocial Time Capital
<b>Level of analysis</b>	Individual	Primary groups (families/ households)	Secondary groups (local communities/ organizations)	Complex societies (at a national, trans-national or global level)
<b>Object of sustainability</b>	Individual life expectancy	The legitimacy of norms, values, worldviews transmitted from generation to generation in the process of primary socialization	The institutionalized framework for achieving shared goals	Social order (a coherent ensemble of values, practices, ideologies)
<b>Examples of current initiatives that might take an advanced form as a matter of real-time data collection processes and record keeping procedures</b>	Life expectancy calculators	Household Consumption and Wealth Indices (World Bank)  Household Sustainability Consumption Index (Bartoli, Murovec, and Slabe-Erker, 2018)	NGO Sustainability Index (United States Agency for International Development)  Livability Index (developed by Public Policy Institute*)  City Sustainability Index and other similar indicators for measuring sustainable cities (European Commission, 2018)	Sustainable Society Index (developed by Sustainable Society Foundation)  Dashboard of Sustainability (Consultative Group on Sustainable Development Indicators)  Living Planet Index (World Wide Fund for Nature)  Measures for the survivability of languages and cultures (Terralingua/UNESCO)
<b>Implications</b>	Personal development/ carrier planning/ self-concept	Permanence and continuity of social institutions	Strategic planning and management	The articulation of complex, macro-social and global forms of governance

\* [Online] available at <https://livabilityindex.aarp.org>

**Source:** Authors' own conceptualization

The data culture leads to a politics in which time capital is understood both as a field of intervention (the realm to be worked on) and as a target of government (the ultimate goal to be acquired through state interventions).

The 'politics of time capital' does not operate with populations as bearers of a reproductive potential (translated into fertility, birth rate and mortality rate) but with populations as bearers of time capital. By considering time capital as a political object, individual and collective time becomes an object of regulation. Population is understood as being composed of 'working, trading, living' (Foucault, 1988) individuals whose lives are addressed through policy interventions. While biopolitics appropriates 'life as matter' (Fassin, 2011), the politics of time capital also implies 'life as meaning' (Fassin, 2011). When time capital evolves into a subject of governmentality, state interventions do not only focus on the quantity of life as a 'demographic reality' captured through life expectancy, but also on 'life as a social production' (Fassin, 2011). As Didier Fassin comprehensively explains, modern state politics focuses simultaneously on life as the product of existence and on life as the expression of living (2011, p. 187).

When population is the object of government and time capital becomes a resource to work within the governmental process and public administration, new forms of power take shape. The digitalization and computerization of population and collective behavior monitoring technologies not only establish time capital as an emerging feature, but also transform the state itself. Those rationalities of governance represent the state as an actor that is ultimately made to fragmentarily dispose of individual and collective time. By using evidence-based policy derived from population monitoring, the state is empowered to determine more and more how individual and collective life is organized and towards which societal outcomes and individual actions political intervention might be directed. Therefore, the concept of life expectancy, as well as that of collective well-being are transposed into integral parts of governmental rationalities and public administration (Hințea, Profiroiu and Țiclău, 2015). Moreover, we might consider the national retirement-income systems based on redistributive schemes as an example of public initiatives that operate with an understating of individual time capital at a state policy level (Lim, 2020). Both the calculation of the standard pension eligibility ages and the average minimum retirement benefits represent situations in which time-related indicators are taken into consideration in the process of decision-making connected to issues of sustainability and strategic management.

The 'politics of time capital' is a form of governmentality based on power strategies that includes knowledge about life (Lemke, 2011). This knowledge is acquired through the emerging digitalization of daily routines that make time capital manifest as an expression of individual and collective agency. The political power over time capital is a form of an emergent biopower caused by the increased use of digital and computerized technological infrastructure in governing processes. Individual and collective well-being are both aims, that might be attained through an efficient gov-

ernmental administration of time capital and the means necessary for the survival and development of the state as a governing agent (Foucault, 1988).

## 5. Conclusions

This paper discusses time capital as a measure of sustainability. Time capital might be understood as an actionable potential to direct individuals, communities and societies towards development and growth by establishing an effective flow of resource distribution and management.

A formalized 'social theory of time capital' and an approach to time capital in terms of acceleration and deceleration are both theoretically and practically relevant in building and thinking of sustainable systems.

- As an object of study, the concept of time capital enriches theoretical knowledge by highlighting regularities in the production of social phenomena and by identifying explanatory models based on processes of multicausality, convertibility, and transferability. At the same time, the concept of time capital acts on the practice of knowledge production by supporting the elaboration of innovative methodologies to increase scientific productivity. Moreover, the concept of time capital might be understood as a common language that favors interdisciplinary research and the formation of communities of practice in sustainability studies. Finally, however still important, the concept of time capital contributes to the formulation of social theories with an applicative character. This pragmatic character derives from the power of mathematical formalizations.
- As an object of strategic planning, time capital is a resource to be considered in the decision-making processes. New notions of controllability, predictability and intelligibility have emerged under the 'data economy' of today. On the one hand, a paradigm of time capital creates a sense of operability that might be used to elaborate effective management strategies by considering processes of temporal acceleration and deceleration in working with material and symbolic resources. On the other hand, time capital as an object of strategic management cultivates ethics of care and intergenerational support based on a responsible perspective towards the future.
- As an object of political intervention and public administration, the concept of time capital is compatible with the philosophy of 'libertarian paternalism' in which governmental bodies are legitimated to design policies that influence the accumulation and distribution of the individual and collective time capital. Therefore, new forms of power, power relations and ideologies of sustainability are developed in the practice of public administration.

Based on these considerations, this paper invites social scientists, researchers, practitioners and public officials to include the concept of time capital in the vocabulary grounded on the logic of commodification and consider the paradigm of time capital as a conceptual scheme used to analyze social reality and design sustainable

initiatives and interventions. Therefore, time capital might find its place among similar influential concepts such as social capital, human capital and cultural capital, and contribute both to an increased applicability of time-related knowledge and to a consolidation of the interdisciplinary practice of knowledge production in strategic planning and sustainability studies.

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