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Article

Artificial and Natural Systems: A Look-Ahead and Dynamic SDG Scheme Exploring Post-Cybernetics Theory and Ternary/Pair-Map Frameworks

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Abstract

This study extends the application of the 3M&I (human, Material/Machine, Money, and Information resources) body science framework to explore the wisdom law of body wealth and energy in additive-multiplicative systems, integrating both artificial and natural bodies. The research formalizes the mechanisms underlying body intelligence and survival through look-ahead and nano-transforming schemes grounded in a static-stable system perspective, modeled across two- and three-dimensional spaces. We propose refinements to Matsui's original motion equations by introducing an ad-renewable formulation (ME) and a generalized version, $MW = ZL$, to capture both cumulative and progressive dynamics in body schemes. A ternary/pair-map framework is developed to address three-body systems and dualism-based challenges, extending beyond traditional two-body models. The framework also incorporates a wealth-additive scheme, reinterpreting the flow retention concept to prioritize energy/wealth maximization over cost minimization. Finally, we introduce Chameleon's objective function—defined as $(\text{revenue} \times \text{lead time}) / \text{departure}$ —as a metric for optimizing marginal diversity within sustainable development contexts. The proposed model offers a theoretical foundation for predictivity versus sustainability processing and integrates body system modeling with broader eco-entropy and sustainability goals.

Keywords: wisdom (additive) law; 3-body dualism class; ternary/pair map; energy/wealth; post-cybernetics

1. Introduction

Modern digital life is progressively evolving from machine learning and knowledge extraction toward generative AI and e-managerial scopes. The transformative impact of digital technologies promotes multidisciplinary life research across diverse fields. [1]. In this context, the present work addresses the interaction between digital frameworks and systemic development through the lens of transformative and "sandwich" body systems.

Amid humanity's pursuit of sustainable development goals (SDGs) focusing on body systems and look-ahead cyclic developments for speed and sustainability, recent research has emphasized a shift from differential feedback [2] toward incremental look-ahead approaches [3]. The look-ahead approaches are defined as the ability to foresee the effects of choosing an option in order to evaluate its outcomes, and their origins can be traced back to CSPS issues in the material handling class [4,5], evolving through stochastic process considerations in many IE/OR-related studies [2,6]. This transition aligns with broader trends in adaptive control systems, where predictive models outperform reactive feedback in dynamic environments [7]. Similarly, in sustainable manufacturing, model predictive control, which is a look-ahead strategy, has reduced energy waste by 15–30% compared to conventional feedback systems [8]. In a recent book [9], this new academic disciplinary perspective is examined for its utility in understanding Earth and human society. It discusses enterprise, economics, and nature management through input–output and win–win sharing methods

from a scheduling perspective, further extending the discussion toward e-management and self-driving within the post-cybernetics discipline.

At the core of this work lies the 3M&I framework, which integrates three key resource domains of huMan (labour), Material/Machine (manufacturing process), and Money (capital) with Information resources ('I'). This framework provides a holistic approach to analyzing artificial and natural body systems by emphasizing incremental wisdom laws and ad-renewable (support scheme) mechanisms to model cumulative and progressive developments [10].

Despite the foundational work, including Matsui's equation (ME), the ternary/pair map method, and flow number management [6,11–13], the existing literature remains fragmented and lacks an accessible presentation suitable for a broader interdisciplinary audience. Moreover, while previous studies have laid important groundwork, the analysis of three-body systems within the 3M&I framework has not been sufficiently extended beyond earlier efforts. Key elements, such as applying the wisdom law to concrete systems like childcare, the solar system, and DNA, as well as their implications for sustainable digital life, remain underexplored. This gap in the literature limits the wider comprehension and practical adoption of the 3M&I body science framework in both academic and applied domains.

Therefore, this paper aims to address these gaps by providing an accessible examination of the 3M&I body science framework. The focus is on extending the ternary/pair map and body scheme theory of the wisdom law into three-dimensional systems. It demonstrates the practical significance of the wisdom law and flow number management for survival, well-being, and sustainable development. This work also aims to bridge theoretical constructs with their applications to artificial and natural bodies, digital life, and sustainability goals.

The novelty of this study lies in its integrated approach, explicitly extending the 3M&I body science framework to analyze three-body system classes that have not been comprehensively addressed before. It further provides a rigorous yet accessible explanation of core concepts, enabling broader interdisciplinary adoption. Moreover, it connects theoretical advances, such as the wealth-additive scheme and ad-renewable increments (ADREW), to practical frameworks like flow number management and Chameleon's objective [10,14], thereby enhancing the understanding of body intelligence and sustainable development within digital and natural ecosystems.

To elaborate, this study uses the wisdom law to differentiate and prepare the equation of motion known as Matsui's equation with an ad-renewable base [6,12,13]. It also includes the overflowing generalized equation $MW = ZL$, where MW represents departure multiplied by wait (workload), and ZL represents cycle multiplied by amount (lead time) [3,15]. These equations apply to bodies' cumulative processes such as flow number graphs, scheduling, and regeneration [11,12], as well as to progressive schemes like the flow number management formula, ODICS (On-demand Inventory Control System), and myxomycete [12,16,17]. ODICS is an on-demand inventory control system that has been operational since 2005. While classical queueing laws of Little's type exclude lost items [18,19], Matsui's and new Matsui's laws explicitly include lost items (cycle Z , amount L , departure M , and workload W). Analogous to physics, lost items resemble energy losses (like resistance), often ignored in Newtonian mechanics.

Sublation is proposed through the ternary/pair-map scheme [10,14] to model triangular relationships, which expands beyond the two-body problem, and addresses specific three-system class (dualism) issues such as subject-object unions, childcare systems, the solar system, and DNA. This approach is particularly effective when the lot size of the body is equal to or greater than one. More broadly, well-being (eco-entropy) is achievable under the ad-renewable (support scheme) method, which functions as a wisdom law 3D digital engine leveraging autonomous bodies on a ternary/pair map.

Under this theory, the wealth-additive scheme assumes a universal law of knowledge. The "flow (retention) quantity" in the flow number management method undergoes a paradigm shift from minimization (inventory/cost) to maximization (wealth/energy), transitioning from a world defined by cost (*muda*) to one of value (gain), facilitating the realization of Chameleon's objective [20–22]:

$$SW = ZL/M,$$

Here, SW represents sandwich (zone), Z represents cycle (analogous to acceleration in Newton's law), L is amount (mass), and M is departure (output number), typically the sum of produced and lost items [3,15]. This ratio plays a central role in marginal diversity aligned with the SDGs, where SW corresponds to marginal value or profit and is close to bounded rationality (Simon). The SW value corresponds to Chameleon's criteria of efficiency (0.6) versus muda (0.4). Furthermore, Matsui's ME and M-equations [13,20] fulfill a role analogous to semi-Markov decision processes in stochastic management [10].

Altogether, these methodological steps and theoretical constructs provide an integrated pathway from abstract formulations to practical illustrations. This progression strengthens the case for the 3M&I framework as a foundation for interdisciplinary analysis. This paper represents the culmination of years of research, providing an integrated overview of the body and well-being scheme theory rooted in incremental wisdom law, illustrating its utility for survival and body intelligence from both two-dimensional and three-dimensional perspectives.

The remainder of this paper is organized as follows. Section 2 introduces the foundational body theory based on artifacts-nature dualism, framing it within a post-cybernetics and digital physics context, and highlighting its relevance to three-body systems such as childcare. Section 3 presents the classification of three-body types and details the application of the flow number method, including the wealth-additive scheme and Chameleon's objective. Section 4 proposes the ternary/pair-map scheme to model these three-body systems more effectively, using the SW (sandwich) approach to explore value dynamics. Finally, Section 5 concludes the paper by summarizing key insights and discussing the limitations and future scope of the study.

2. Introductory Artifacts-Nature Body Theory

2.1. A Post-Cybernetics Discipline and Digital Physics

After the post-war era, Wiener's cybernetics [2]. would lead to fair well-being, facing a world of difficulty, inconsistencies, and all-out contradictions under an academic but interdisciplinary black box. For example, there is still a world of variety (freedom) versus redundancy (constraints) since Ashby's cybernetics [23,24] will target diversity, collaboration, and the sustainability era [25–28] in a white (visible) box (body). We would be stuck in a difficult situation in a black-box-like university and might now be stalling at Nano (constraints) × intangible (freedom) class in 3M&I or artifacts versus natural bodies [9].

The need for this sublation originates from a post-cybernetics and digital physics point of view [3,29], moving toward a new academic interdisciplinary field in 1969 during the introduction of industrial engineering (IE). The post-cybernetics concept is initialized from animal-machine issues to a 3M&I-variety world [10], while its digital physics approach is performed by factory physics [3,20] towards the anthropic principle. A research gap necessarily appears between theoretical (similarity) and practice (university). The implications of this challenge could be visualized and identified by an artificial versus natural approach, and new information might exist at a visible and familiar therblig level (the basic unit of human motion in time-and-motion studies) despite the invisible and hard-to-reach level.

Matsui [9] presents a new academic discipline of 3M&I body science versus cybernetics. The former's history dates to the definition of IE by Taylor [30,31], and the 3M&I-body is a system consisting of a triplicate (i.e., human, material/machine, and money) and information. Indeed, it seems to be an intangible robot instead of a tangible one.

Currently, when various paradigm shifts are required in manufacturing, we explicate design thinking to derive equilibrium states so that excessive inflow, outflow, and redundant factors in production control and business management can be adjusted to achieve DX (digital transformation) and the SDGs.

The derivation is both logical and visual in terms of how the science of 3M&I is a post-cybernetic concept, as it relates to both natural bodies [23,28]. Furthermore, particular tools, such as ME, pair-matrix mapping, and the sandwich theory of enterprise body, play essential roles in the study.

Established on these backgrounds, one obtains the “middle states” (waist) between lower (physical) vs. upper (value-like/knowledgeable) levels of the body; that is, equilibrium states such as win-win relations, sharing systems, and a more equal distribution of wealth. The results contribute to a balanced, fair, and intelligent society, individual/body theory, and self-management, demonstrating that the science of 3M&I is a post-cybernetic concept related to both natural bodies. The basic idea of body science is closely related to the characteristics shown in Table 1: (a) Newton’s theory of conic curves, conic type; (b) micro and macro perspectives, nano-cosmic; (c) first and slow scales, clock-like; and (d) information gain and convergence (loss, look-ahead), concerning the representation of the stability and transiting of states in Matsui’s theory.

Table 1. Post-cybernetics concept and digital physics of the 3M&I-body scheme.

Characteristics	Brief explanation	Types
(a) Newton’s theory of the conic curves	The curves are obtained by the various conic sections and appear in various changes of the phenomena.	3-body(ternary)
(b) The micro and macro perspectives	This makes us imagine the Earth’s rotation (on its axis) and revolution (around the Sun), and it also leads us to understand the phenomena at the level of a molecule in the material object and on a grand scale in cosmic space.	Shukyaku-gouitsu Childcare Solar system
(c) The fast and slow scales	These behave as if the clock ticks with coordinating motions of a second hand and a minute hand, and then the rapid variable may affect relaxation oscillations.	Wealth-additive Cumulative
(d) The information gain and loss	This can be used to solve a sustainable entropy problem by looking ahead. Refer to Appendix A	Progressive

The interesting equation of post-cybernetics could be similar to the composition of Wiener’s cybernetics (feedback) versus 3M&L science (look-ahead).

The key from the classical CSPA model of the look-ahead type [3,17] is as follows:

$$\text{Post-cybernetics (LA; LB)} = \text{Efficiency/cost } 0.6: \text{ muda/profit } 0.4, \quad (1)$$

where the LA and LB are responded to the look-ahead and look-back, respectively, and Chameleon’s criteria (6:4) are assumed and noted by Matsui [20] and Matsui [21]. This criterion (median) could also be assumed physically at the convergence (overflow) versus divergence (delay) condition and would be similar to the event horizon at a black hole (bankrupt) case [9,32].

Here, note that if the ratio of the geometric series corresponds to the traffic density, q , in queues, the sum of progression becomes the efficiency (1): $1/M$ ($M=1+q$), nearly $q=0.6$, at CSPA of SRP type. Conversely, *muda* corresponds to $q/(1+q)$.

2.2. A Certain Dualism Type of Three-Body Class Childcare

Body research has progressed from the stochastic modeling [3,17] of systems awaiting production to the problem of collaboration between production and sales centers in a two-center system [10] to pioneer the basic science of supply chain management of modern body chains [12,20]. Overall, such a two-center system is the basic unit of a body chain called a “two-body system.” These two-center or “two-body” systems typically allow for potential win-win collaborative solutions [20,21]. However, such solutions remain elusive in more complex “three-body” systems, which introduce new challenges in coordination and dynamic interaction.

Within this context, a familiar and socially critical example of a three-body system can be found in childcare dynamics within a family system [29]. Recent neuroscience findings, such as those involving the functional trade-offs between Z-like eMPOA and L-like BST regions, have provided insights at the nano-scale level [10,14], giving rise to the application of a ternary or “pair-map” method. This method codes three interconnected entities, father (ER), mother (EC), and child (LT), within a framework of interactions that emphasize both redundancy and complementarity. The parent (Lm) emerges as a relational axis within the system, supporting dynamic interplays between other roles.

Figure 1 illustrates this approach by showing a 3D (or hexagonal) pair-map solution, capturing the system's relational geometry through an ellipse-cross mapping (ellipse-cross of economics Z and reliability L¹⁴). This model applies the ODICS framework [12,16,17], wherein the three-body relationship is expressed as $W = Z \times L \rightarrow up$ operationalized through the expression $O = D “Z” + MP “L” - I$. The model may also be interpreted metaphorically with analogues in gene-microRNA regulation, suggesting that ODICS could conceptually correspond to microRNA dynamics within DNA systems.

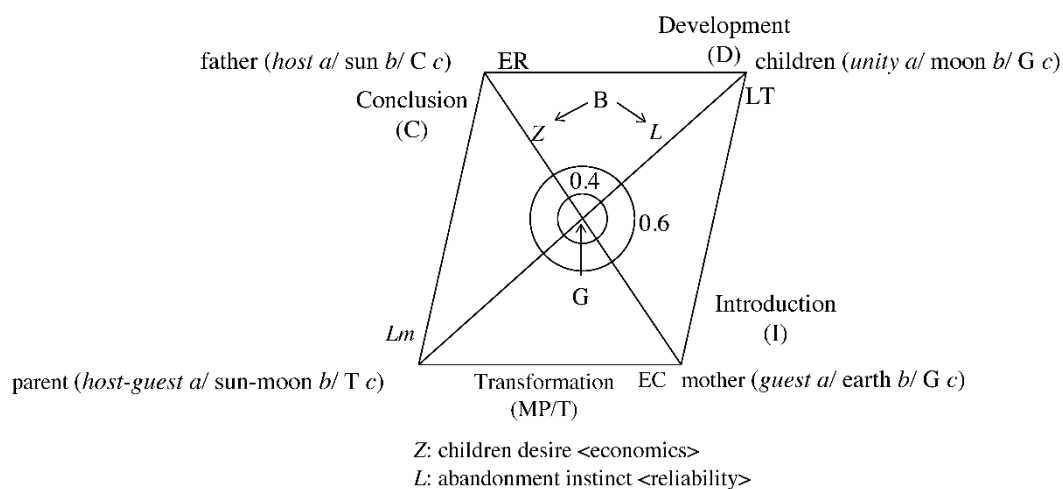


Figure 1. Childcare (*shukyaku-gouitsu a/sun-moon-earth b/gene-DNA c*) system: pair-map example (ellipse-cross theory); the three-body system $W = Z \times L \rightarrow up$, where $O = D “Z” + MP “L” - I$, ¹⁴by ODICS [12,16,17]. Note that the ODICS could correspond to operations of the microRNA on DNA².

¹ The relation $W = Z \times L$ represents the core ternary formulation, where W is workload (or fund), Z denotes economic input or desire, and L captures reliability or effort. The secondary expression $O = D(Z) + MP(L) - I$ describes a balance condition within the system: $D(Z)$ indicates deviation or divergence in the Z -direction (economic vector), $MP(L)$ refers to management planning on the L -axis (reliability), and I is the integrative adjustment. Together, these reflect the system’s dynamic equilibrium as framed in the ternary/pair-map method.

² While four nodes (father ER, mother EC, parent Lm, child LT) appear structurally, the functional dynamics operate across three systemic forces: Z (economics), L (reliability), and I (integration). These are consistent with the ternary/pair-map model.

Note: The figure illustrates a ternary/pair-map representation of the childcare system, where ER (father), EC (mother), LT (child), and Lm (parent) form the three-body structure; Z represents the child's desire (economics), L the abandonment instinct (reliability), B the balance between Z and L, and G denotes the Nash zone ($Z = L$); developmental roles are mapped as Introduction (I), Development (D), Conclusion (C), and Transformation (MP/T), with inner circles (0.4 and 0.6) indicating control thresholds within the ODICS (On-demand Inventory Control System) framework.

The modeling consists of both cumulative (planning) and progressive (management) schemes. In the cumulative scheme, the "Z" component is mapped to the father (ER) and mother (EC), while "L" corresponds to the parent (Lm) and child (LT). The progressive scheme proceeds from father (O: act, C) to mother (D: plan, I), to parent (MP: do, D), and finally to child (I: check, MP/T).

Cumulative scheme (planning); Z<father (ER), mother (EC)>, L<parent (Lm), child (LT)>

Progressive control is expressed as $O = D "Z" + MP "L" - I$, which connects directly to Matsui's logic of flow-retention quantity and wealth-additive formulation. Figure 1's matrix representation includes a balance point (B), as well as a marginal or Nash's zone (G), where Z equals L, representing a condition associated with *muda* class inefficiency [10,22] [discussed at the planning stage in Figure 2 later]. These tables and maps are considered in detail in Matsui [14].

Progressive scheme (management); father O (act, C) —mother D (plan, I) —parent MP (do, D) —child I (check, MP/T), Progressive control: $O = D "Z" + MP "L" - I$

While the childcare system serves as a concrete and practical example of the 3M&I framework applied to a three-body system, the same ternary/pair-map scheme is also extensible to more abstract and interdisciplinary systems. The study proposes the use of "sublation" as a conceptual strategy to reconcile or integrate contradictions inherent in these triangular relationships. This approach is particularly applicable to broader three-system class problems that lack straightforward dyadic solutions.

Examples include the philosophical subject-object union as described in Nishida's philosophy [34], the gravitational interactions in the Sun-Moon-Earth system (Newton's and Kepler's laws), and gene expression regulated through microRNA in biological systems [35]. These systems, although diverse in domain, share a structural resemblance to the childcare triad and can be similarly interpreted through the ternary/pair-map method. Such generalization not only validates the robustness of the 3M&I model but also demonstrates its capacity to connect micro-level (biological, familial) and macro-level (cosmic, philosophical) phenomena under a unified body science framework.

Figure 2 further extends the model, illustrating how the wealth-additive intelligence framework progresses from GDP-level economic planning to SDG-aligned sustainable control via ODICS. The relationship is formalized as $(D + MP)/2 \geq \sqrt{ZL}$, including a marginal or bounded rationality approach consistent with Simon's theory and Matsui's ME (matrix equation) formulation [12,33]. This figure helps visualize how ternary body systems can be analyzed not only within natural family systems but also in engineered socio-technical systems aiming at sustainability.

The "parent" node (Lm) is not a distinct biological entity but a synthesized functional body representing the management process (MP/T) that bridges the Z and L dynamics. Thus, the system is functionally a three-body class, represented by the profit relation: $ER = EC + EN$.

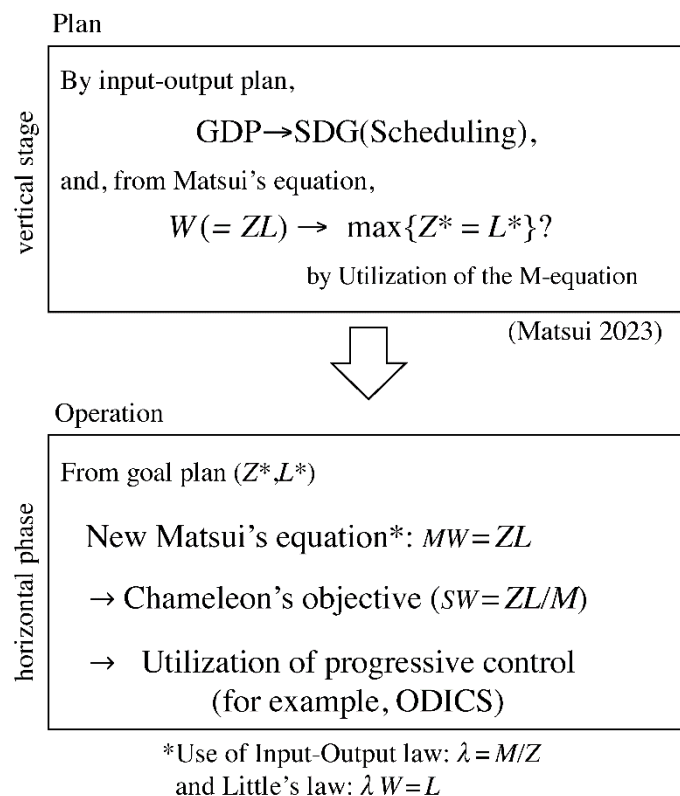


Figure 2. Outline and management of wealth-additive intelligence at $GDP \rightarrow SDG$ by ODICS: $(D+MP)/2 \succcurlyeq \sqrt{(ZL)}$.
Note: This figure illustrates the two-phase management approach of wealth-additive intelligence from GDP to SDG using ODICS. In the vertical planning stage, based on input–output planning and Matsui’s M-equation, the goal is to maximize the condition $Z^* = L^*$, where $W = ZL$. In the horizontal operational phase, the new Matsui equation $MW = ZL$ is applied to derive Chameleon’s objective $SW = ZL/MSW$, and progressive control techniques such as ODICS are employed. The model integrates input–output law ($\lambda = M/Z$) and Little’s law ($\lambda W = L$) for operational effectiveness.

3. Three-Body Types and Flow Number Method

3.1. Intelligence and Outline of a Wealth-Additive Scheme

Recently, Matsui [9,22] questioned whether global society is perpetual. Sustainable directionality oriented toward the wisdom law of body wealth/energy has also been questioned in the wealth-additive/multiplicative world increments of artificial and natural bodies, abbreviated as ADREW, which stands for ad-renewable Ene’wealth (wealth/energy) increments. In the proposed body theory [9], the “look-ahead” scheme and mechanisms from the static and stable framework system (which may also consider overflow eco-entropy and counter) are discussed, proposing the application of an SW-type 2-step plan-control sandwich method to the three-body type, as shown in Figure 2.

Generally, mathematics originated simply as similarity and isomorphic repetition tools. This approach may be better and sufficient as a starting point for a scientific hypothesis. This proof could be given by sign matching to a map, and the fundamental pair map and its shape are early and numerically considered at major queueing enterprise types described in Matsui [10]. Often, further physical meanings are valuable and desired from a practical perspective, but additional language could potentially increase the number of errors, and caution is thus required.

Using the wisdom law, this study differentiates and prepares the equation of motion, that is, Matsui’s ME (ad-renewable base) and the overflowing generalized equation $MW=ZL$ of “Matsui’s equation” (the new ME) for bodies’ cumulative (e.g., flow number graph, scheduling, and

regeneration process) and progressive (flow number management formula, ODICS, and myxomycete) schemes (see Appendix A).

3.2. Flow Number Method and Chameleon's Objective

Under this theory, the “flow (retention) quantity” in the flow number management method, which is the initial foundation, undergoes a paradigm shift from minimized (inventory/cost) to maximized (wealth/energy) and from a world of cost (*muda*) to a world of value (gain) so that Chameleon's objective is fulfilled (Figures 2 and 3). Moreover, in that new academic disciplinary world, Matsui's ME and M-equations play the same role as the formulation of the semi-Markov decision processes in the stochastic management method described by Matsui [10].

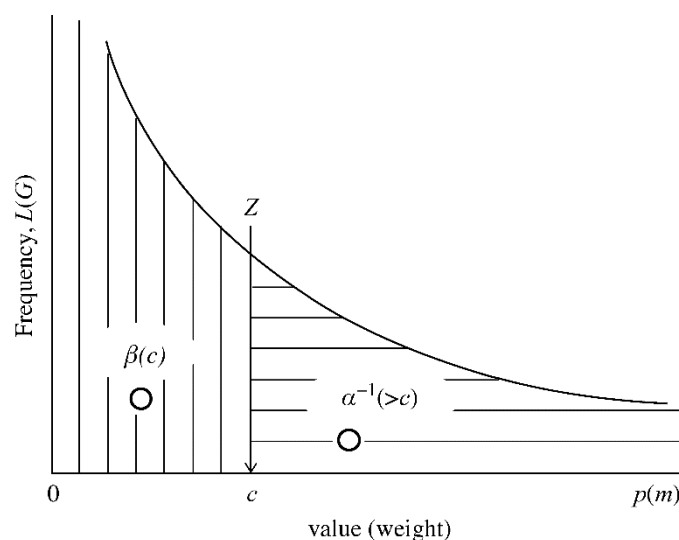


Figure 3. Chameleon's objective; $SW(=ZL) = \alpha^{-1}(>c) \times \beta(c)$, where c is a look-ahead criterion. The mean values, α and β , are truncated by the ranges, c , of numbers and values, respectively. Note that the frequency curve in Figure 3 was first utilized as long-tail marketing.

The following range of possible solutions (inferences) can be obtained from Figures 1 and 3.

$$ZL/M (\eta > 0) < SW(Z=L) > W (=ZL/M, \eta < 1), \text{ where } M=1+\eta(\text{overflows}), \quad (1)$$

where the SW zone (Nash's zone) is when $Z = L$ (an equilibrium between economic and reliability vectors), and EN corresponds to the limit value (max EN). The SW (equilibrium) in (2) would probably be related to or influenced by Simon's [35] bounded rationality and Chameleon's (marginal) diversity, but could also be more fitted or near to the marginal-value versus eco-entropy (redundancy) concept [14,20] on constraints or freedom (overflows, η).

4. Ternary/Pair-Map Scheme to Three-Body Type

4.1. Ternary SW Approach to Childcare Type

This study examines the ternary/pair map and its flow number management method, as reported in Matsui [9], as a body theory with a stochastic dynamic view regarding three-body problems. This occurs while also discussing wisdom law, which is useful for survival and can be seen as body intelligence in terms of body theory from 2D and 3D perspectives. Matsui [9] applies the wealth-additive scheme broadly, while the flow number management method is effective for general wealth/energy increments in motion, a universal law of knowledge in a general sense.

For the three-body type, there is a variant of the pair map from ICPR2019 (e.g., ICPR2021). A ternary SW of eigentype is a triangle consisting of three terms, as seen in the profit equation: revenue = cost + profit, and several typical types have recently been presented at JDL2023 [14].

The variant is a triangular diagram in which the reliability L (inverse diagonal Lm-LT) of the quadrangular pair map is folded around the axis, and position LT is aligned with the contrasting position Lm. In Figure 1, the position “child” of the inverse diagonal is superimposed on the position “parent” in Figure 4(b). In Figure 4(b), the position input (EC) moves to the left side of the pair map in Figure 1.

In contrast, Figure 4(a) is a lower (physical) level in the childcare system. In Figure 4(a), from the lower level, it would be remarked that the “processing” rate of flow, P(q) [15,28] in Figure 4(a), corresponds to the “sustainability” in SDG, as would the “eco-entropy” (redundancy) at Figure 4(b).

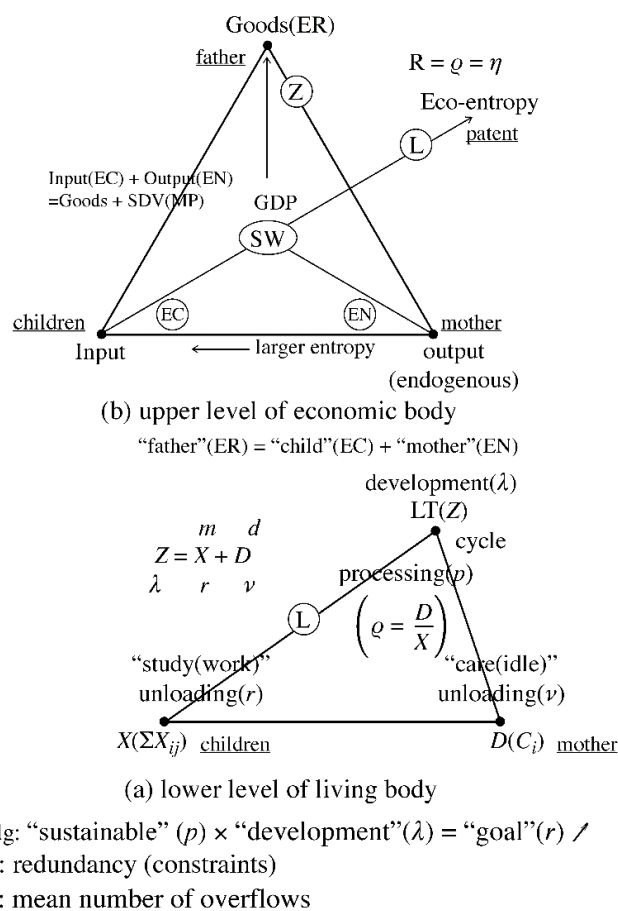


Figure 4. A Ternary SW type: Childcare (stay-at-home spouse) system with redundancy (overflows), $R(\eta) = p = \rho$ (M/M/1(1) Queue). Note some correspondence between SDG and physical systems at the lower level ($r = \lambda P$) [15,28].

4.2. Ternary SW Approach to Three Body System and SW Remarks

Based on Figure 4(a), Table 2 presents a childcare case with the variety $\eta \neq 0/P \neq 1$, or $\lambda = r + v$ on SDG, by the ternary/pair-map scheme. In Table 2, the marginal point ($Z=L$) relates to Chameleon’s objective and is also located around marginal diversity (bounded rationality in Simon) on the pair map in diversity.

Table 2. A child case ($\eta \neq 0/P \neq 1$) on SDG by Ternary/pair-map method.

Development (λ)	~ 1 (child)	$\lambda > 1$ (adult)
Child (r)	Study	Work
Mother (v)	Care	Idle
Father & mother	Children desire	Abandonment instinct
Marginal point ($Z = L$)	$Z > L$	$Z < L$

For each proper SW (=ZL/M), the so-called “pair map” could allow/assign some buffer (redundancy), balancing, and rotation to its ternary SW type, from the ternary-SW (round) toward the pair-map (ellipse) shape of the 3M&I variety [10]. For the ellipse of the pair map, it would then be valuable to match their x-y notations as follows: $d(x)$, $m(y)$, $Z(a)$ and $L(b)$, $a \neq b$, in M/M (childcare/sun-moon-earth)/1(1).

However, the 3-body problem is then not generally solvable. For example, the sequencing solution in a series is not uniquely found. This problem is dependent and not solvable independently, similar to a kind of 3-body logic. Similar to the enterprise type, our study could formulate and develop the framework and decision-making strategy using the 3-body type logic toward pursuing Chameleon’s objective and a clockwise trajectory look-ahead.

Additionally, the ternary-SW is a triangular view on the profit equation: $EC+EN \rightarrow ER$ max and a particular class of pair map at the lower eco-entropy (higher redundancy/constraints).

4.3. Conceptual Applications and Extensions

The applicability of the ternary/pair-map scheme and Matsui’s equations can be further clarified through illustrative cases that demonstrate the potential for extension beyond theoretical formulations. A first example is the convenience store system, already modeled using Matsui et al.’s [36] ME in their earlier work. This case highlights how the flow number method and cumulative–progressive schemes can be applied to retail operations, providing a tangible reference point for wealth-additive management.

At the broader level, smart city systems can be interpreted as wealth-additive intelligence engines that balance freedom, equity, and income variety across sharing classes. Within this context, the ternary cycle-engine of rotary type offers a conceptual mechanism for linking diversified lot-sizing with sustainable development goals. While this study includes graphical demonstrations (Figure 3), quantitative analyses of such applications remain the subject of future work.

Another representative case is the on-demand inventory control system for new-PC product supply chains, verified using demand–sales data from a Japanese company [11]. In this case, look-ahead logics were first validated through simulation-based experimentation. ODICS achieved an approximately 42% reduction in inventory fluctuations, which demonstrates the utility of simulation in exploring the broader applicability of the proposed framework. This case also shows that Figure 2 functions as a virtual simulator with two core logical characteristics—look-ahead and cause–effect logics—within its body frame. The captured effect is the cumulative reduction of PC inventory on demand versus sales, which can be pre-reviewed via the virtual simulation processes embedded in Figure 2.

Healthcare provides another promising domain and can be considered conceptually similar to the above smart city and convenience store examples. For example, diabetes care can be represented within the same framework, in which patient monitoring, treatment scheduling, and lifestyle adjustments follow cumulative (planning) and progressive (management) schemes. As a simple illustrative case, different classes of insulin can be treated as inventory elements within this system. Matsui’s ME and the ternary/pair-map approach suggest how these dynamics could be formalized for the blood sugar level (as inventory), although empirical testing has yet to be undertaken.

These examples illustrate how the proposed body theory may be adapted to diverse domains, from retail and urban management to healthcare. Although this study remains primarily methodological, such cases outline pathways for future quantitative verification and practical validation of the framework.

5. Conclusions

The body theory has been argued for based on the “look-ahead” scheme and mechanisms from the static and stable framework system (which may also consider overflow eco-entropy and counter) [9] to propose moving toward e-management and self-driving with a stochastic dynamic view of wealth/energy (Ene’wealth) increments (the post-cybernetics discipline). In this context (especially

relating to clockwise physics), the incremental wisdom law has been discussed as being useful for survival, as well as body intelligence in terms of body theory and a focus on “flow (retention) quantity” shifting from minimized (inventory/cost) to maximized (wealth/energy) under the body scheme theory.

First, using wisdom law, this study differentiated and prepared the equation of motion, Matsui’s ME (ad-renewable base), and the overflowing generalized equation $MW=ZL$ of “Matsui’s equation” (new ME) for bodies’ cumulative (e.g., flow number graph, scheduling, and regeneration process) and progressive (flow number management formula, ODICS, and myxomycete) schemes. Next, it demonstrated a scheme where sublation using a ternary/pair-map scheme was proposed to address triangular relationships (beyond the two-body problem) and specific three-system class problems (including subject–object union, childcare systems, the solar system, and DNA), where it is believed to be particularly effective and relative to win–win and sharing. This existed in the context of a paradigm shift from a world of cost (*muda*) to one of value (gain), wherein the scheme provided Chameleon’s objective— $SW=ZL/M$ —plays a leading role in the marginal diversity in SDG, a universal principle.

Finally, well-being (eco-entropy) moving toward look-ahead SDGs and Matsui’s ME (matrix equation)/M-equation becomes possible with the ad-renewable (support scheme) method, which is also a wisdom law 3D digital engine that can make use of autonomous bodies on a ternary/pair map (main scheme). In this society, the so-called “Taylorism” in analog economics shifts from the classical criticism of the alienation of self and others in the separation of planning and management, which emerged in industrial society. Thus, humanity and granted happiness can be liberated with the sublation that comes from the sandwich (SW) theory of higher-order planning (cumulative scheme) and lower-order management (progressive scheme) in digital body theory.

In summary, our results propose that Matsui’s laws and the 3M&I framework can be extended to three-body system analysis through ternary/pair maps. The proposed formulations, including generalized equation $MW = ZL$, were applied to cumulative and regenerative processes such as flow number management, scheduling, and inventory control. These results illustrate the potential of the framework to model systemic interactions across diverse domains, ranging from childcare and DNA to the solar system and digital ecosystems, while emphasizing its implications for sustainability and well-being.

The main limitation of this study is that it is based only on theoretical work and lacks empirical data for corroboration. In addition, the study builds on the assumption that the 3M&I framework and Matsui’s equations can be universally applied across artificial, natural, and social systems. However, this generalization risks oversimplifying domains whose dynamics may not conform to industrial or mathematical models. Similarly, the assumption that predictive, look-ahead approaches are inherently superior to feedback control may not hold in highly uncertain or non-linear contexts. The extension of systemic analysis to three-body models also assumes that complex interactions can be sufficiently represented within ternary structures, which may neglect higher-order dynamics. Finally, this study assumes that sustainability and well-being can be quantified through constructs such as flow numbers or sandwich equations. While this approach offers analytical precision, it also risks reducing multidimensional phenomena to a mathematical form. Such a reduction may overlook cultural, ethical, or qualitative aspects that are not easily captured numerically. Additionally, this study is primarily methodological in nature and does not provide empirical or simulation-based verification of the proposed framework. While the equations and formulations are presented as logical extensions of established work, their empirical testing and quantitative validation remain subjects for future research. Future studies should thus theoretically and practically assess the value of these concepts to a wider society.

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Abbreviations

The following abbreviations are used in this manuscript:

3M&I	Human, Material/Machine, Money, and Information resources
SDG	Sustainable Development Goal
ME	Matsui's equation
MW=ZL	A generalized equation; a revised version of ME. MW represents departure X multiplied by wait (workload), and ZL represents cycle X multiplied by amount (lead time). Used as the overflowing generalized equation of "Matsui's equation" (new ME).
ADREW	Ad-renewable Ene' wealth (wealth/energy) increments. Ad-renewable increments.
SW	Sandwich (zone).
Z	Cycle (analogous to acceleration in Newton's law). Represents the child's desire (economics) in the childcare system. Used in expressions ZL , $Z=L$, Z^* , D "Z", $(D+MP)/2 \geq \sqrt{(ZL)}$.
L	Amount (m in Newton's law, mass).
M	Departure (the output number), typically the sum of produced and lost items.
W	Workload.
O, D, MP, I	Variables used in the Progressive control equation within the ODICS framework. D is associated with Mother (plan, I) in the progressive scheme description, MP with Parent (do, D), I with Child (check, MP/T), and O with Father (act, C).
ODICS	On-demand Inventory Control System
GDP	Gross Domestic Product.
DX	Digital transformation.
LA	Look-ahead
LB	Look-back
SCM	Supply chain management.
ρ (rho)	Traffic density in queues.
η (eta)	Overflows.
P	Processing rate of flow.
r	Child. Study (Child activity).
v	Mother. Idle (Mother activity).
λ (lambda)	Development. Used in $\lambda = r + v$. Also used as arrival rate in $\lambda = M/Z$ (Input-Output law) and $\lambda W = L$ (Little's law).
ER	Father.
EC	Mother.
LT	Child
Lm	Parent.
B	Balance point in the pair map.
G	Marginal zone or Nash's zone. The zone where $Z = L$ at the muda class.
c	A look-ahead criterion.
alfa (α)	Mean value truncated by the range c.
beta (β)	Mean value truncated by the range c.
Z^*	Optimal Z condition in the planning stage where $Z^* = L^*$.
L^*	Optimal L condition in the planning stage where $Z^* = L^*$.
MSW	Marginal Social Workload
2D	Two-dimensional. Used to describe perspective/analysis.
3D	Three-dimensional
SW(=ZL)	An alternative notation for SW in the expression $SW(=ZL)=a-1(>c) \times b(c)$.
$Z=L$	The condition for the Marginal zone or Nash's zone.
$\eta=0, P=1, \eta \neq 0, P \neq 1$	Conditions mentioned in Table 2 related to childcare case with variety and processing rate. $\eta \neq 0, P \neq 1$ means η is not equal to 0, $P \neq 1$ means P is not equal to 1.

$Z > L, Z < L$	Conditions related to marginal point in Table 2.
$\eta > 0, \eta < 1$	Conditions related to overflow (η) in the context of the SW zone.
$EC + EN \rightarrow ER$	A triangular view on the profit equation.
max	
ZL/M	The definition of SW.
$(D+MP)/2 \succ$	A relation formalized in the outline and management of wealth-additive intelligence framework at GDP \rightarrow SDG by ODICS.
$\sqrt{(ZL)}$	
$\lambda = M/Z$	Input-Output law.
$\lambda W = L$	Little's law.
$W = ZL$	The original Matsui's equation (ME) formulation.
$O = D \text{ "Z" } +$	
$MP \text{ "L" } - I$	The Progressive control equation within the ODICS framework.
$Z^* = L^*$	The optimal condition for the planning stage in the wealth-additive intelligence framework.

Appendix A

Key concepts

Concept	Explanation/Definition
Sublation	Proposed by a ternary/pair-map scheme to address triangular relationships (extending beyond the simple two-body problem) and certain three-system class problems (e.g., subject-object union, childcare systems, the solar system, and DNA), where it is thought to be particularly effective. In digital body theory, it can liberate humanity and grant happiness through the sandwich (SW) theory of higher-order planning (cumulative scheme) and lower-order management (progressive scheme).
Body Scheme Theory	Discussed in terms of its usefulness for survival and as body intelligence based on body theory from two- or three-dimensional perspectives. Relates to the incremental wisdom law and the paradigm shift in flow (retention) quantity.
Look-ahead Scheme	Defined as attempts to foresee the effects of choosing an option to evaluate the resulting outcome. It represents a reverse shift from differential feedback and is a mechanism from the static and stable framework system. It is a key concept of post-cybernetics and is used in the incremental wisdom law.
Sandwich (SW)	Represents the sandwich (zone). The objective ($SW = ZL/M$ or $SW = ZL$) plays a leading role. Corresponds to marginal diversity (near bounded rationality by Simon) in the zone of marginal value (profit). It is considered near Chameleon's criteria (efficiency 0.6 vs. muda 0.4). Utilized in the SW-type 2-step plan-control sandwich method and the ternary SW approach. In the wisdom law theory, the scheme where $SW = ZL/M$ plays a leading role exists in the context of a paradigm shift from a world of cost (muda) to a world of value (gain). SW is also the sandwich theory of higher-order planning (cumulative scheme) and lower-order management (progressive scheme) in digital body theory.
Incremental Wisdom Law	The wisdom law of body wealth/energy in the wealth-additive additive/multiplicative world increments of artificial and natural bodies. It is based on a "look-ahead" scheme and mechanisms from the static and stable framework system. Discussed in terms of its usefulness for survival and as body intelligence based on body theory from two- or three-dimensional perspectives. It differentiates and prepares the equation of motion, Matsui's ME, and the overflowing generalized equation $MW = ZL$. It is a 3D digital engine that can make use of autonomous bodies on a ternary/pair-map.
Flow (retention) Quantity	A concept in the flow number management method. It is the initial foundation. Undergoes a paradigm shift from minimized (inventory/cost) to maximized (wealth/energy) and from a world of cost (muda) to a world of value (gain).
Z	Represents cycle (a in Newton's law). Used in the equation $MW = ZL$ (Matsui's/New Matsui's equation). Used in the Sandwich (SW) objective $SW = ZL/M$. In the childcare system, Z represents father (ER) and mother (EC) in the cumulative scheme. In the pair-map, Z relates to economics. The marginal point is where $Z = L$.
L	Represents amount (m in Newton's law). Used in the equation $MW = ZL$ (Matsui's/New Matsui's equation). Used in the Sandwich (SW) objective $SW = ZL/M$.

Lm	In the childcare system, L represents parent (Lm) and child (LT) in the cumulative scheme. In the pair-map, L relates to reliability. The marginal point is where $Z = L$. Represents the parent in the cumulative scheme of the childcare system, part of L <parent (Lm), child (LT)>. In a variant of the pair-map, the position LT is aligned with the contrasting position Lm.
Lt	Represents the child in the cumulative scheme of the childcare system, part of L <parent (Lm), child (LT)>. In a variant of the pair-map (triangular diagram), the position "child" (LT) is superimposed on the position "parent" (Lm).
Ternary/Pair-Map Scheme	A scheme proposed for sublation to address triangular relationships (beyond the two-body problem) and certain three-system class problems. A method involving three interconnected systems or entities with mapping of interactions between pairs within the system. It is the main scheme where autonomous bodies can be utilized by the wisdom law 3D digital engine. Examined as a body theory with a stochastic dynamic view regarding three-body problems. Can allow buffer, balancing, and rotation to its ternary SW type. Presented as a Dx-like ternary/pair-map.
Post-Cybernetics Discipline	A new academic discipline focusing on self-driving with a stochastic dynamic view of wealth/energy (Ene'wealth) increments. Discussed as the discipline of 3M&I body science versus cybernetics. Considered a post-cybernetic concept related to natural bodies. Its equation could be similar to the composition of Wiener's cybernetics (feedback) versus 3M&L science (look-ahead).
Wealth-Additive Scheme	A concept where wealth (value/profit) in economic terms corresponds to "energy" in physics. Abbreviated as ADREW (ad-renewable Ene'wealth increments). Discussed in terms of enterprise, economics, and nature management, input-output, win-win, and sharing methods. The concept has a broad meaning and is considered a universal law of knowledge in a broad/general sense. Oriented toward the wisdom law of body wealth/energy.
Matsui's Equations (ME, MW=ZL, M-equations)	Matsui's ME (ad-renewable base) and the overflowing generalized equation MW=ZL of "Matsui's equation" (the new Matsui's equation) are differentiated and prepared by wisdom law for bodies' cumulative and progressive schemes. While classical queueing laws hold to exclude lost items, Matsui's and New Matsui's law hold to include lost items (cycle Z, amount L, departure M, workload W). MW=ZL is also referred to as the new Matsui's law (WZ=ZL). Matsui's ME and M-equations are thought to play the same role as the formulation of semi-Markov decision processes in the stochastic management method. ME is also referred to as Matsui's matrix method and matrix equation.

Summary of Matsui's formula in relation to nature versus artifacts science

A summarized form of the 3M&I artifact findings began with the time (queueing) and motion (method) study on muda (idle/delay) in 1969, while the generalized or universal form has been recently referred to as the new Matsui's law: $WZ=ZL$. The so-called Matsui's formulas consist of three laws (A, B, and C) as follows:

A. Muda's Law

(1) First law: Linear relation of delay (D) and overflow (η) <1976>
 $\lambda D = 1 - \rho + \eta$ ($\rightarrow \lambda Z = M, Z: \text{cycle}$)

(2) Second law: Chameleon's criteria of efficiency vs. muda <2018>
 Muda vs. Efficiency = 4 vs. 6

B. Matsui's Law

(3) First law: $W=ZL$ (\leftrightarrow Little's Law $\lambda W=L$ where $\lambda=1/Z$) <1977>
 $W(Q)=Z(Q)L(Q)$, lot type

(4) Second law: $\bar{W} = Z\bar{L}$ (or $\bar{W} = Z^2L$), where $W = \bar{L}$ <2011>
 (\leftrightarrow Newton's law: $F=am$)

C. New Matsui's Law

(5) Input-Output: $\lambda Z=M(=1+\eta)$ <1977>
 $1/\lambda:1/\mu:\eta(c)=1:\ln 2:\ln 2(\text{economy})$

(6) Nature-artifacts law: $MW = ZL$
 Eco-entropy (SW) = ZL/M
 (marginal point)

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