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Formalization of the Awareness Variable (C) and the Rate of Evolution in Integrated Reality Theory (IRT): A Dynamic Framework for Systemic Analysis

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ABSTRACT

Introduction: *The increasing complexity of contemporary systems requires theoretical frameworks capable of explaining how awareness and systemic change interact dynamically over time. Existing systemic approaches often treat awareness as a static or secondary element, making it difficult to explain how changes in awareness influence the evolution of an integrated system. This study aims to formalize the Awareness Variable (C) and the Rate of Evolution within Integrated Reality Theory (IRT) and to develop a dynamic framework for understanding their interaction in systemic processes.*

Methods: *This study employed a theoretical and conceptual research approach based on mathematical formalization and systemic analysis. The Awareness Variable (C) was conceptualized as a dynamic component representing the degree of awareness within an integrated system, while the Rate of Evolution was formulated as a measure of the speed and direction of systemic transformation over time. The relationships between awareness, systemic conditions, and evolutionary change were examined through conceptual modeling and dynamic formulation to establish a coherent framework for analyzing interconnected systems.*

Results: *The findings demonstrate that the Awareness Variable (C) can be formalized as a dynamic component that influences the capacity of an integrated system to respond, adapt, and evolve. The Rate of Evolution is identified as a function of changes in awareness and the interaction among relevant systemic components. The proposed formulation indicates that increasing levels of awareness may accelerate adaptive transformation when supported by favorable systemic conditions, whereas low or fragmented awareness may constrain evolutionary processes. The*

framework further demonstrates that awareness and evolution should not be treated as independent variables but as mutually interacting dimensions within an integrated reality.

Conclusion and suggestion: *This study contributes to the development of Integrated Reality Theory by providing a formal conceptualization of awareness and evolutionary dynamics within a systemic framework. The proposed model offers a basis for examining how changes in awareness can influence the trajectory, stability, and transformation of complex systems. Future research is recommended to operationalize the proposed variables using empirical data, develop measurable indicators of awareness and evolutionary rates, and test the model across different social, economic, technological, and organizational systems.*

Keywords: I*ntegrated Reality Theory, Awareness Variable, Rate of Evolution, Systemic Analysis,*

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INTRODUCTION

Integrated Reality Theory (IRT) comes into existence in response to the fragmentation of modern knowledge that separates disciplines from each other. IRT views reality as something "breathing"—a continuous movement in which energy, information, barriers, consciousness, and learning are intertwined in an inseparable dance (Shoim et al., 2026a). In the framework of IRT, the reality outcome () is formulated as a function of the interaction of five fundamental variables:R

$$R = f(E, I, S, C, v)$$

Although these five variables have been identified, the validity of the constructs on and on the variables is still a significant methodological challenge. These two variables are often considered too abstract to be measured empirically, so there is a risk of making IRT a philosophical framework rather than an operational analytical tool.$Cv\ C$ and is the foundation of a long-term transformation. Without both, the addition of energy () and information () is simply "adding gasoline to a leaky tank" (Shoim & Choris, 2026a). is the system's ability to self-monitor, choose direction, and intervene in trajectory. Without , the system runs automatically without awareness of its own destination—like an airplane without a pilot, even if the engine is on. While it is the speed of learning, adapting, and self-renewal. Without , the system will never improve itself from past mistakes—like a ship that continues to sail on the wrong path because the rudder is never moved.$vEICCvv$

This article does not replace the initial operational formulation of IRT, but rather expands on it. The equation is retained as a systemic efficiency index, while the formulation is used to model evolutionary dynamics when treated as a parameter of the acceleration of change. Both formulations have different functions: the first measures the current capacity of the system, the second models the trajectory of the system's change.$\Phi = \frac{E \times I \times C \times v}{S} R = \left(\frac{E \times I \times C}{S}\right)^{v} v$. This article aims to formulate operational definitions and measurable indicators for the and variable and , with three main contributions:Cv

Positioning and in critical dialogue with classical and contemporary social theories (Giddens, Bourdieu, Ostrom, Putnam, Fukuyama, North, Schumpeter, Argyris, March, Weick, Cohen & Levinthal, Besley & Persson, Henrich), so that IRT does not simply "give a new name to old concepts."Cv Improve and clarify the mathematical formalization of IRT, in particular by defining as a power (not a multiplier) and formulating a dynamic $v$feedback loop between and

that takes into account the friction of entropy () as a system of coupling differential equations.CvS

Formulating strategic falsification conditions—distinguishing between hard core and protective belt—IRT qualifies as a progressive scientific research program in the tradition of Lakatos (1970), not as a dogma immune to criticism. Before formulating indicators, we must answer the critical question: Why do we need concepts when the literature already has concepts such as Cvsocial capital, organizational learning, and adaptive efficiency? This section answers this question by showing that IRT offers an integrative synthesis that has not existed in previous theories. C and Structuring Theory (Giddens, 1984): Giddens emphasizes that human agency occurs within a structure that is constrained and at the same time made possible by the rules of the game. However, Giddens has no concept of the speed of reflexivity—how quickly the collective agent realizes the structural consequences of his own actions. The IRT fills this gap by defining it as a measurable capacity for collective reflexivity. If Giddens asks "How does structure enable agency?", the IRT asks "How is the agency aware of its own structure, and how quickly does it correct it?"$C.\ C$ and Habitus (Bourdieu, 1990): Bourdieu introduced habitus as a disposition embedded in the body and social practices. However, habitus tends to be reproductive—it perpetuates existing structures. IRT goes a step further by proposing that it is the ability to break the reproduction of habitus when it produces high entropy (). not just cognitive awareness, but the capacity to intervene in the trajectory of the habitus itself.CSC

C and Institutional Analysis and Development (Ostrom, 1990; Ostrom, 2005): Ostrom proved that communities can manage shared resources without having to be privatized or authoritarian states. The key to Ostrom's success is self-governance and monitoring. IRT summarizes Ostrom's findings into variables: the capacity to self-monitor (reflective behavior) and the capacity to internalize rules (normative awareness). However, IRT adds a cognitive dimension () that Ostrom does not explore very much.$CCC_3C_2C_1\ C$ and Social Capital (Putnam, 1993; Fukuyama, 1995): Putnam defined social capital as a network, norms, and trust that enable coordination and cooperation. Fukuyama expands on this by emphasizing that social capital is a shared informal norm that enables cooperation. The IRT goes further by proposing that it is not just a stock of social capital, but a dynamic capacity to use that social capital reflectively. Social capital can be Cinertia (if it reinforces the status quo), whereas it is the capacity to reactivate social capital as a transformative force.$C.\ C$ and Cross-Cultural Norms (Henrich, 2020): Henrich points out that prosocial norms—trust, cooperation, and adherence to rules—evolve differently across societies due to historical and ecological factors. The IRT integrates Henrich's findings by acknowledging that (normative awareness) cannot be measured by rigid universal benchmarks. Societies with low levels of C_2interpersonal trust (e.g. in post-conflict environments) may have low ones not because they are "less aware," but because their prosocial norms have been eroded by a history of conflict. Therefore, the IRT emphasizes that it should be measured relative to C_2C the historical baseline of each society, not by an absolute cross-cultural standard.

LITERATURE REVIEW

v and Creative Destruction (Schumpeter, 1942): Schumpeter saw capitalism as a process *of creative destruction* in which innovation destroys the old order. However, Schumpeter focuses on *individual entrepreneurs*. IRT adapts this logic to the level of institutional systems. is the speed at which systems collectively destroy outdated routines and build new ones. A high means that the system has a high vv*absorptive capacity* (Cohen & Levinthal, 1990) for policy innovation. v and Adaptive Efficiency (North, 1990; Besley & Persson, 2021): North argues that effective institutions are those that have *adaptive efficiency*—the ability to change in response to external shocks. However, North does not provide a measurable proxy for *adaptive efficiency* other than long-term economic output. The IRT fills this gap by defining through structural indicators that are independent of economic output, such as periodic $vreview$ mechanisms and civil servant rotation. v and Organizational

Learning (Argyris & Schön, 1978; March & Olsen, 1976): Argyris and Schön distinguish *between single-loop learning* (correcting errors in an existing rule framework) and *double-loop learning* (questioning the rules framework itself). IRT adapts this distinction: low means the system is stuck in v*single-loop learning*; high means the system is capable of doing v*double-loop learning* on an ongoing basis. March and Olsen emphasize that organizations learn through experience, but also forget about lessons. IRT captures this "forgetfulness" through a parameter (entropy friction) that erodes learning.$\theta\ v$ and Sensemaking (Weick, 1995): Weick shows that organizations survive not because they have a perfect plan, but because they have the capacity for *sensemaking*—giving meaning to ambiguity. IRT relates to the speed of collective v*sensemaking*: how quickly the system detects disruptions and forms new task forces to respond to them (structural plasticity).v_3

Table 1. IRT Synthesis: C-v Co-Evolutionary Loop with Entropy Inhibitio

Concept Theory	Established Literature	IRT (Novelty)
Agency vs Structure	Giddens (1984)	IRT adds the speed of reflexivity () and the capacity of intervention () as dynamic bridges, as well as friction that hinders the agency's conversion into action.vCS
Habitus	Bourdieu (1990)	IRT transforms habitus from reproductive to transformative through (awareness to break the cycle), but is inhibited by (structural entropy).CS
Self-Governance	Ostrom (1990; 2005)	IRT adds the cognitive dimension (), adaptation speed (), and corruption/$C_1 v$*rent-seeking* factor () as inhibiting variables.S
Social Capital	Putnam (1993); Fukuyama (1995)	IRT distinguishes social capital as a stock (static) from as a reflective (dynamic) capacity to reactivate social capital.C
Cross-cultural Norms	Henrich (2020)	The IRT recognizes that (normative awareness) should be measured relative to C_2 *the historical baseline* of each society, not by absolute standards.
Institutional Change	North (1990); Besley & Persson (2021)	IRT provides a measured proxy for *adaptive efficiency*() and adds a mechanism of consciousness () as a propellant, with frictionvCS.
Organizational Learning	Argyris & Schön (1978); March & Olsen (1976)	IRT quantifies *double-loop learning* as high, and adds parameters as $v\theta$*forgetting rate* due to entropy.
Sensemaking	Weick (1995)	IRT quantifies *sensemaking* into structural plasticity indices () and normative awareness ().$v_3 C_2$

The main contribution of this section is to formalize the reciprocal relationship between and , while also acknowledging that entropy () inhibits the conversion of consciousness into rapid action. To ensure dimensional consistency, we define it as a normalized entropy index (range 0 to 1). This normalization is important because if it maintains its original scale (e.g. 0–100 in $CvSS^*(t)S$*the Fragile States Index*), the friction coefficient will be very numerically small and difficult to interpret across contexts.θ Consciousness () is the collective reflective capacity to recognize the need for change—the system's ability to self-monitor, choose direction, and intervene trajectories. It is the capacity (not output) inherent in social systems. differs from social capital (Putnam, 1993) in that social capital can be CC*an inertia* that maintains the status quo, whereas it is the capacity to reactivate social capital as a transformative force. it also differs from cross-cultural norms (Henrich, 2020) in that it is a reflective capacity to evaluate and change norms, not the norms themselves.CCC

METHOD

Speed of Evolution () is the institutional capacity to execute change—the speed at which systems learn, adapt, and renew themselves. differs from economic growth because it measures the speed of structural transformation, not the accumulation of output. It also differs from $vvvv$*absorptive capacity* (Cohen & Levinthal, 1990) in that *absorptive capacity* is the ability to recognize the value of new information, whereas it is the speed at which it transforms that information into continuous procedural change.v In other words: is the reflective capacity to recognize the need for change, while it is the institutional capacity to execute the change.Cv

Table 2. Three-Dimensional with Structural Indicators$v$

Dimensions	Definition	Qualified Structural Indicators	Data Source
v_1: **Institutional Memory**	Depth of storage of policy knowledge.	1. Stagnation Index = Age of Regulation × (1 - Frequency of Periodic Review). Regulations that are 30 years old with a sunset clause mechanism (review every 5 years) show high. Regulations that are 30 years old without a review mechanism show low (ossification).vv 2. Ratio of career civil servants vs political positions (higher career = strong memory).	Ministry of Law and Human Rights, BKN, LAN
v_2: **Consistency Across Regimes**	The ability of the system to maintain a strategic direction.	RPJPN Continuity Index (how much the Long-Term Development Plan is maintained between presidents).	Bappenas
v_3: **Structural Plasticity**	The speed of the system forms a new work unit.	Frequency of cross-sectoral task force formation per year (measuring cognitive mobilization capacity).	Coordinating Ministry of Finance, Cabinet Secretariat

RESULT AND ANALYSIS

Strategic Falsification Discussions and Conditions

C and is the "operating system" of the nation. The formalization v *of the feedback loop* with resistance shows that systemic transformation is not a smooth process; it is always dealing with structural friction. Adding and without decreasing (entropy) is simply a waste of energy. Only with the high (awareness to intervene) and the fast (capacity to learn) can the system overcome friction and achieve $SEISCvS$*increasing returns*. The relationship between and can be illustrated as follows:Cv C high, low:v Society is aware of problems (e.g. corruption), but the institutional system is too rigid to change procedures. This is a condition of collective frustration—consciousness without the ability to execute. C low, high:v The system changes rapidly, but without a clear direction—reactive, not reflective change. This is a blind adaptation condition. C high, high:v Healthy system—reflective and adaptive at the same time.

Conditional Counterfeiting and Strategic Response (Lakathosian Approach)

Following Popper (1959) and Lakatos (1970), the IRT must determine the conditions under which it encounters a crisis, but the crisis is not death. In the Lakatosian tradition, *the IRT hard core* (as defined in Section 4) should only be abandoned if a series of improvement efforts on the *protective belt* (indicators, model specifications, and research design) fail consistently across contexts. We propose three critical conditions with a measurable strategic response: Confirmatory Factor Analysis (CFA) on cross-country datasets (N > 50) showed that indicators (cognitive, normative, behavioral) and indicators (Rule of Law, Regulatory Quality) contained the same factor (failed the Fornell-Larcker test).CI Improve operationalization: Indicators have been too close to them because they use institutional macro data (such as CPI). We will replace the indicators with individual-based survey data

(World Values Survey: C_2IC_2*interpersonal trust*, *civic voluntarism*, *prosocial orientation*) which theoretically more purely measures awareness, rather than institutional structure Test the hierarchical model: If a high correlation is still found, test whether it is a C*second-order factor* of —not removed, but positioned as a mediator or moderator in a structural path. Cross-context test: If it fails in ASEAN, test in a region with more extreme institutional variations (e.g., Sub-Saharan Africa vs. Scandinavia). If even in extreme contexts it remains indistinguishable from, then we revise the claim that it is an independent construct—being a psychosocial manifestation of , not a separate entity. However, it is still maintained as a theoretically relevant variable, only with a revised status.$CICCIC$

Crisis Indicators: Panel estimates show that the coefficient statistically does not differ from 1 in countries that are undergoing rapid structural transformation (e.g. Vietnam, Indonesia). Check the proxies: The indicators (age of regulation) and (frequency of the task force) may be too crude. We will replace with a more direct proxies: a survey of bureaucrats' perceptions of the speed of revision of procedures and vv_1v_3*time-motion* data of studies in the planning ministry Non-linearity test: If on average, there may be a $v = 1$*threshold* effect. We will test whether it is significant after passing a certain critical point (e.g.).$v > 1CC > 0$, Extend the time period: If T = 14 years (2010–2023) is too short to detect the acceleration of evolution, we will expand to 30 years (1995–2025) if data are available. Alternative specification test: Possible and not directly affecting, but through interaction with and (moderation effect). We will test the interaction model: .$CvREIR = f(E, I, S, C, v, C \times E, v \times I)$. Test with more granular data: If the country's aggregate data is too crude, we'll go down to the provincial/district level (for the case of Indonesia) or the organization level (for the public sector test), Acknowledge the limitations and revisions of the theory: If after 3–5 replication studies in different contexts (ASEAN, Africa, OECD) the full model consistently loses, then the IRT should be revised—not by discarding and , but by downgrading its status from an intervening variable that is only relevant under certain conditions (e.g., countries with). $CvS > 0{,}5$*The hard core* is retained, but the scope of its application is narrowed. The IRT will not be discarded because one test failed. The IRT will be revised gradually—from the indicators, to the model specifications, to the research design. If, after a series of systematic improvement attempts, C and v still do not show a unique contribution, then the causal claim of the IRT is revised. However, removing C or v from the framework is a last resort, once all the options for improvement have been exhausted. That is what distinguishes a research program from an ad hoc hypothesis. Perform CFA and discriminant validity tests on global datasets (WVS + WGI) to ensure stand-alone.C Build an index and for 10 ASEAN countries and test its relationship to political stability.Cv Develop standardized survey instruments to measure, and at the individual and organizational levels.C_1, C_2C_3

CONCLUSION

This article formulates operational definitions and measurable indicators for the two variables that have been considered the most abstract in IRT: Consciousness () and Speed of Evolution. Positioning and in critical dialogue with Giddens, Bourdieu, Ostrom, Putnam, Fukuyama, North, Schumpeter, Argyris, March, Weick, Cohen & Levinthal, Besley & Persson, and Henrich, shows that IRT can be positioned as an integrative synthesis that connects various traditions of social theory, rather than simply a redesign. Improves formalization by assigning as a rank and formulating a dynamic $v\left(R = \left(\frac{E \times I \times C}{S}\right)^{v}\right)$feedback loop between and that takes into account the entropy constraint () as a friction factor with normalization (). This article does not replace the initial formulation of IRT, but rather expands on it.$CvSS^{*}v(t+1) = v(t) + \alpha\Delta C - \theta$ Explicitly formulating IRT's hard cores (five basic propositions) and the strategic falsification conditions that distinguish hard cores and protective belts, IRT is positioned as a progressive Lakatosian research program—ready to be tested, ready to be revised, but not collapsed by one negative finding. With this formalization, the IRT now has a methodological bridge to econometric testing. If and passes the test of future construct and

prediction validity, the IRT has the potential to become an alternative analytical framework in the systemic social sciences. However, if it fails to be tested after a series of improvements, the IRT must be revised gradually—and that's what makes it scientific.Cv

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