

Market Pareidolia: a new categorization of international markets by human age

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Abstract

Purpose – The purpose of this study is to introduce Market Pareidolia, a conceptual and data-driven framework that categorizes foreign markets according to human age stages: adolescence, adulthood and seniority. The framework is designed to support early-stage International Market Selection (IMS) by helping internationally active firms interpret, compare and communicate foreign-market heterogeneity before undertaking more detailed entry-mode, investment and risk analyses.

Design/methodology/approach – This study adopts a conceptual framework combining cognitive psychology with international business strategy. Drawing from human age categorizations, 18 human developmental markers were matched to corresponding international market indices across 175 countries. Using Z-score normalization and Factor Analysis, four main factors and two standalone variables were identified, forming a composite “market age” for each country. The approach integrates quantitative data with conceptual reasoning to create a new typology.

Findings – The study successfully attributes a corresponding “human age” to 175 countries by aligning market indicators with human developmental markers. This anthropomorphic classification facilitates an intuitive understanding of market maturity stages and helps firms relate to international markets more instinctively. The resulting profiles reflect market stability, adaptability, risk and potential for growth through a humanized lens. Market Pareidolia could introduce future new studies on market profiling.

Research limitations/implications – This study is conceptual and based on data from 2021 to 2022 only, limiting historical comparison. The assumption that human developmental stages can universally represent market traits was not tested across cultural and economic contexts. Further empirical research is needed to validate the model’s applicability and potential biases in different regional or sectoral settings.

Practical implications – Market Pareidolia provides managers and policymakers with a front-end IMS heuristic. It translates heterogeneous country-level indicators into intuitive market-age profiles, supporting country prioritization, entry-mode deliberation, resource commitment, partner governance and risk calibration. The framework is intended to improve early-stage decision conversations without replacing rigorous market analysis.

Social implications – This model promotes more empathetic, human-centric market analysis. By conceptualizing markets as evolving entities akin to people, it encourages respectful, adaptive and socially aware engagement. This may influence how firms consider socio-cultural dynamics, sustainability and development goals when entering or operating in diverse markets.

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Originality/value – This paper introduces a novel conceptual framework for foreign-market categorization based on the human age spectrum. By combining cognitive psychology, country-level indicators and International Business Strategy, the study offers a complementary heuristic for IMS. Its originality lies in translating complex market data into an intuitive market-age language that can support managerial sense-making and internationalization decision-making.

Keywords Market Pareidolia, International business, Internationalization, Market categories, International market categorization, International business strategy, Cross-cultural market dynamics, Market behavior profiling, Anthropomorphic market analysis, Strategic decision-making, International market age, International business penetration

Paper type Research paper

Introduction

Firms engaged in international business activities face a persistent strategic challenge (Khojastehpour and Jamali, 2021; Vallone *et al.*, 2019): how to identify, compare and prioritize foreign markets before committing resources, selecting entry modes, building partnerships or adapting business models across borders. While literature on internationalization predominantly highlights positive development and progression (Martins *et al.*, 2022), internationalization decisions are rarely based on objective market attractiveness alone. They are shaped by uncertainty, institutional and cultural differences, information asymmetries, managerial cognition and the firm's ability to interpret foreign-market signals (Sayed and Gherissi Labben, 2024; Lukason and Vissak, 2019). For both small and medium enterprises (SME) and multinational enterprises, the early stages of International Market Selection (IMS) therefore represent a critical moment at which firms must transform heterogeneous country-level information into actionable strategic judgment (Durand and Khaire, 2017).

In this context, firms are increasingly exposed to a proliferation of country indices, sovereign ratings, risk classifications, competitiveness rankings, institutional indicators and socio-economic measures. These tools are informative, but they often serve different purposes and audiences. For example, country-risk classifications may be useful for export credit pricing, while sovereign ratings may inform financial risk assessments. However, neither directly resolves the managerial problem faced by internationalizing firms: how to convert fragmented foreign-market signals into a coherent understanding of market maturity, strategic fit, timing and acceptable commitment. The result is not a lack of information, but a difficulty in translating information into a shared International Business decision narrative. This aligns with the prototype-based categorization theory posited by Durand and Paoletta (2013) and Paoletta and Durand (2016), which suggests categories evolve over time to cater to audience needs.

This study introduces a novel framework for market categorization that aims to bring clarity to the first stage of the internationalization process: the selection of the target markets. The approach draws on the sensory human phenomenon of pareidolia, leveraging cognitive tendencies to recognize familiar patterns in complex data. The aim is not to replace rigorous IMS models but to precede them with an intuitive, communicable screening heuristic that structures subsequent analysis and choice. This responds to the managerial need for early-stage discipline without technical overload and connects with recent IMS work that systematizes decision criteria yet remains analytically demanding (Vanegas-López *et al.*, 2021). Despite the abundance of country-level indices, ratings and classificatory tools available to firms, the early stages of IMS remain characterized by cognitive overload and communicative fragmentation. Existing approaches are analytically robust but often difficult to translate into a shared strategic narrative across managerial, functional and organizational

boundaries. As a result, decision-makers frequently rely on informal intuition, experiential judgment, or simplified mental models when screening and prioritizing markets. However, international business literature offers limited guidance on how such intuitive processes can be structured without sacrificing analytical discipline. This represents a gap between the technical sophistication of IMS models and their practical usability in real decision contexts. By simplifying the complexity of market data, fostering strategic familiarity and providing actionable insights, this study proposes a groundbreaking market categorization framework termed Market Pareidolia.

Pareidolia is a phenomenon in which familiar patterns are perceived despite not actually existing, reflecting a complex neurocognitive process whereby external stimuli act as triggers for the perceptual construction of non-existent entities (Liu *et al.*, 2014, p. 60). Sometimes “individuals report seeing a face in the clouds, Jesus in toasts, or the Virgin Mary in a tortilla” (Liu *et al.*, 2014, p. 61). Historically, pareidolia served as a defense mechanism, aiding humans in discerning the presence and intentions of others in their surroundings (Adams *et al.*, 2011). This deeply ingrained cognitive response (Palmer and Clifford, 2020; Adams *et al.*, 2011; Liu *et al.*, 2014) assists the human brain in deciphering ambiguous or overwhelming data. This study leverages this human proclivity not to induce illusions but to encode a complex bundle of country-level indicators into a familiar metaphor (human age), thereby improving cross-functional communication and accelerating managerial sense-making in IMS. In short, Market Pareidolia translates multi-indicator complexity into a shared language that managers can use to screen, compare and stage internationalization decisions before applying more technical models. As stated by Rita Aricò (interviewed on January 7, 2025), senior Export Manager at Wide Range, applying pareidolia to sales, marketing and advertising offers a novel, psychology-grounded lens. In today’s fluid markets, rigid audience segments underperform; assumptions that held even recently may no longer apply, and strategies should adapt to context and lived experience.

The human drive to categorize objects, concepts and processes stems from our inherent desire to progress towards a more efficient society, as categorization streamlines organizational interactions (Hsu *et al.*, 2009; Rao *et al.*, 2005; Granqvist *et al.*, 2013; Pontikes, 2010; Negro *et al.*, 2010). Following Durand and Kahire’s distinction (2017) between category emergence and category creation, this study adopts a category-emergence approach: where existing taxonomies are inadequate for early-stage managerial decisions, a new, empirically anchored category is introduced to re-express the same reality in a more usable form (Durand and Khairé, 2017). When presented with the concept of Market Pareidolia categorization, Mariella Pinto (interviewed on January 8, 2024), senior export manager at IC&Partners, replied that “Market Pareidolia is a phenomenon I have repeatedly observed in my work. Every time I negotiate with a foreign partner, analyze trends in an emerging market, or decide to invest in a new sector, I am attributing almost human characteristics to that market, product, or interlocutor.” While prior studies have conceptually discussed the role of cognitive metaphors and pattern recognition in strategic sense-making, this paper advances the literature by operationalizing pareidolia into a replicable, data-driven country classification framework grounded in established international indices and validated through factor analysis across 175 countries.

It is important to clarify the epistemological status of the proposed correspondences. Market Pareidolia does not claim that psychological processes in individuals are causally or ontologically identical to institutional processes in countries. Rather, the framework adopts an analogy-based heuristic: human age markers are used as cognitive scaffolding to organize heterogeneous country indicators into a more communicable and comparable structure. The mapping between constructs (e.g. autonomy in adolescents and political autonomy captured

by the Democracy Index) is therefore not intended as a statement of psychological equivalence, but as a functional analogy grounded in conceptual similarity of outcomes. In other words, the model aims to translate complex multidimensional market data into an intuitive narrative form that supports managerial sense-making and early-stage IMS, while fully recognizing that national institutions emerge from historical, political and socio-economic dynamics distinct from individual human development.

International Market Selection

International Business research has long examined how firms identify, evaluate and commit to foreign markets under conditions of uncertainty (Oh and Oetzel, 2011; Oetzel and Oh, 2021). The internationalization process is not merely a geographic expansion decision; it involves the gradual acquisition and use of foreign-market knowledge, the management of perceived uncertainty and the progressive commitment of resources across borders (Oh and Oetzel, 2017). In the Uppsala tradition, firms increase their international involvement as they learn about foreign markets and reduce uncertainty through experience, knowledge accumulation and network relationships (Johanson and Vahlne, 1977, 2009; Vahlne and Johanson, 2017). This perspective remains central to International Business because it links foreign-market understanding with commitment, risk and strategic action. IMS is therefore a core decision area in International Business. Firms must compare foreign markets that differ in institutional quality and economic development, cultural and psychic distance, infrastructure network, different legal systems and socio-political stability. These sources of heterogeneity are central to IB research because distance and institutional differences shape how firms perceive and evaluate foreign-market uncertainty (Beugelsdijk *et al.*, 2018; Hernández *et al.*, 2018; Donnelly *et al.*, 2024). Existing IMS models offer structured ways to evaluate country attractiveness and risk, often through quantitative indicators, multi-criteria decision tools or staged screening procedures (Papadopoulos and Denis, 1988; Cavusgil, 1985; Francioni and Martín Martín, 2024). These models are valuable because they impose analytical discipline on foreign-market evaluation. However, they may also generate outputs that are technically robust but difficult to communicate across managerial, functional and organizational boundaries. This difficulty is particularly relevant for SMEs and internationalizing firms with limited analytical resources. Prior research shows that foreign-market and entry-mode decisions are not always made through highly systematic procedures. Firms may rely on managerial judgment, previous experience, networks, opportunity recognition or simplified decision rules. SME internationalization research shows that firms often recognize foreign opportunities through weak ties, trusted relationships and experiential knowledge (Kontinen and Ojala, 2011), while foreign-market entry, exit and re-entry decisions may combine knowledge, network relationships and decision-making logic in non-linear ways (Vissak *et al.*, 2020; Dominguez and Mayrhofer, 2017). Recent evidence also suggests that IMS mediates the relationship between foreign-market entry knowledge and international performance, particularly when combined with network capability. As a result, the challenge is not only to collect more information about foreign markets, but also to convert heterogeneous information into a shared interpretation that can guide strategic choices. The early phase of IMS therefore requires both analytical structure and managerial sense-making.

Market Pareidolia contributes to this International Business discussion by addressing the interpretive front end of IMS: the stage in which firms must transform fragmented foreign-market information into a shared managerial representation before detailed entry-mode, governance and resource-commitment analysis can occur. The framework does not replace established IMS, entry-mode or risk-assessment models. Instead, it provides a preliminary

categorization device that helps firms interpret foreign-market heterogeneity through the intuitive metaphor of market age. By classifying markets as adolescent, adult or senior, the framework supports early comparison, market prioritization, internal discussion and preparation for subsequent entry-mode, resource-commitment and governance decisions. This positioning is consistent with entry-mode research showing that ownership, control, resource commitment, uncertainty and performance are interdependent rather than isolated decisions (Arregle *et al.*, 2006; Dow *et al.*, 2020; Wan *et al.*, 2023). In this sense, Market Pareidolia connects cognitive categorization with a practical International Business problem: how firms make sense of complex foreign-market environments before committing strategic resources.

Human age markers

Nithyashri and Kulanthaivel (2012) have defined four main evolutionary stages in human life: childhood, adolescence, adulthood and seniority. Combining their framework with further nuances and details by other scholars (Fitton *et al.*, 2013; Benson and Furstenberg, 2006; Freund and Smith, 1999), this research has enriched this classification by delving deeper into each category, providing a more granular understanding of human age markers. Using the combined insights from these scholars, 18 age markers were identified, leading to the objective of establishing a correspondence between these human age markers and existing market indicators (or indices). Essentially, for every nuanced stage or marker in human development, the study tries to match a corresponding stage or marker in market development. In essence, this approach to market classification seeks to merge insights from human developmental stages with traditional market understanding. The goal is to provide a richer, more layered perspective on market dynamics by drawing parallels between human age progression and market evolution. Out of 51 pre-selected market indices, 18 were selected and proposed to represent (or correspond) the previously identified age markers, ensuring a one-to-one correspondence between human age markers and market indices. It's crucial to note that this analysis exclusively considered data from 2021 and 2022, thereby excluding any information from preceding years.

Understanding the markers that distinguish a child from an adolescent, an adult and a senior is crucial for grasping the characteristics of a specific age. Nithyashri and Kulanthaivel (2012, p. 1) classify human age into four categories: child (0–12 years), adolescent (13–18 years), adult (19–59 years) and senior adult (60 years and above). The study will delve into each age category, identifying its primary markers and comparing them with market traits to discern their (plausible) equivalent indices. However, the childhood stage in human life possesses unique characteristics that are not compatible with the measurable market indices. Evans (2012) describes children as innocent, vulnerable and in need of adult protection and care because of their physical and emotional immaturity. They require formal education and must be separated from adult domains such as work, sex and politics. Although this concept is historically and culturally specific, it is frequently regarded as natural and universal. Consequently, as market indicators are inherently unable to capture the developmental complexities of childhood and are better suited to reflect life stages associated with economic independence and activity, this study will focus on adolescence, adulthood and seniority only. To identify the distinct characteristics of each human age stage, it will draw from the work of Fitton *et al.* (2013), Benson and Furstenberg (2006) and Freund and Smith (1999) to identify specific age markers that define the stages of adolescence, adulthood and seniority to match them with market indices.

Mapping age to markets

Mapping human traits to market indices required a rigorous, multi-stage procedure. From an initial pool of 51 indices drawn from authoritative sources, we retained 18 that showed the strongest conceptual and empirical fit with the human age markers. Please refer to [Appendix 1](#) for the selection criteria and the mapping protocol.

Adolescence

[Fitton et al. \(2013, p. 207\)](#) identified six primary markers of adolescence that reflect the developmental characteristics of this life stage: desire for independence and autonomy, aspiration to develop or maintain individual identity, preference for association with peers, high susceptibility to peer influence, willingness to take risks and increasing detachment from parents or guardians. [Table 1](#) shows the corresponding market indices associated with each of the [Fitton et al. \(2013, p. 207\)](#) human age markers. The correspondences proposed in [Tables 1–3](#) are grounded on functional similarity rather than literal equivalence. Each human age marker is translated into a market indicator that reflects a comparable systemic outcome. For example, adolescents express autonomy through personal agency and independence from parental authority; at the national level, democratic institutions, civil liberties and political participation represent collective expressions of societal autonomy. While the origins of these phenomena differ (psychological development versus institutional evolution), the resulting behaviors share an analogous structure: increased capacity for self-determination. This principle of outcome-based analogy guides all subsequent mappings.

Adulthood

[Benson and Furstenberg \(2006\)](#) offered a nuanced interpretation of adulthood by proposing markers that reflect the increasing emphasis on responsibility and independence. Their work moved away from traditional indicators such as parenthood, focusing instead on

Table 1. Proposed human age marker’s correspondence to adolescent market indices

Human age marker	Acronym	Corresponding market index	Source	Motivation for the correspondence
Desire for independence and autonomy	LOD	Democracy index	The economist	Political voice and institutionalized civil liberties proxy a society’s autonomy, an apt analogue for adolescents’ drive for independence
Desire to develop/ maintain individual identity	EFI	Economic freedom	The heritage foundation	Economic self-determination (control over labor/property) mirrors identity formation and self-definition
Desire for association with peers	IAU	Internet access usage	World bank	Digital connectivity captures network density and peer affiliation at scale
High susceptibility to peer influence	GSP	Global soft power index	Brand finance	Cross-national reputation and influence signal impressionability to peers and external perceptions
Willingness to take risks	CGD	Central government debt in percentage	International monetary fund	Higher leverage reflects collective risk acceptance akin to adolescent risk-taking
Increasing dissociation with parents/guardians	LFA	Net official aid received divided by their GDP	World bank	Lower aid reliance indicates growing autonomy from external “parental” support

Table 2. Proposed human age marker's correspondence to adult market indices

Human age marker	Acronym	Corresponding market index	Source	Motivation for the correspondence
Legal emancipation	RLI	Rule of law index	World Justice Project	Robust constraint of power and enforceable rights parallel legal independence in adulthood
Emotional maturity	PGR	Demographic indications	United Nations	Balanced demographic dynamics proxy collective self-regulation and maturity
Educational maturity	AYS	Average years of schooling	United Nations Development Programme (UNDP)	Accumulated human capital represents advanced educational development
Financial maturity	EAF	Country rating	Moody	Creditworthiness/ease of attracting finance reflects financial discipline and resilience
Social maturity	SPI	Social progress index	Social Progress Imperative	Societal capabilities and inclusion mirror adult social functioning and cohesion
Economic independence	RFE	Foreign exchange reserves	CIA	External buffers and self-sufficiency signal macro resilience (economic independence)

Table 3. Proposed human age marker's correspondence to senior market indices

Human age marker	Acronym	Corresponding market index	Source	Motivation for the correspondence
Integrity	CPI	Corruption index	Transparency International	Institutional probity/low corruption aligns with integrity emphasized in later life
Coping with physical decline	URI	Unemployment rate	World Bank	Lower unemployment indicates labor-market resilience, capacity to "cope" with shocks
Confirmation/loss of professional status	EDB	Ease of doing business rank	World Bank	Operating climate and procedural ease reflect a market's "professional standing"
Confirmation/decrease in professional and family roles and obligations	GDS	Gross domestic savings divided by GDP	World Bank	Savings behavior captures intertemporal discipline and ability to meet obligations
High quality of life	QOL	Quality of life	World Data	Lived well-being and service quality mirror seniors' prioritization of life quality
Life's achievements	WHR	World Happiness Report by country	World Happiness Report	Aggregate life satisfaction proxies reflective assessment of achievements

characteristics that better define contemporary adulthood. These markers include emotional, educational, financial and social maturity, as well as legal and economic independence. [Table 2](#) shows the corresponding market indices associated with each of the [Benson and Furstenberg \(2006\)](#) human age markers.

Seniority

[Freund and Smith \(1999\)](#) explored how seniors perceive their own identities, emphasizing the profound role of self-definition in shaping their experiences. According to the authors, self-definition is not merely an objective portrayal of one's characteristics but instead focuses on the self-conceptions that individuals deem most fundamental to their identity. This perspective underscores the importance of certain aspects of life that senior adults prioritize, reflecting the culmination of their lived experiences and values. Compared to other age groups, seniors place heightened importance on several facets of their lives, which align with specific market indicators that provide valuable insights into the maturity and stability of markets. [Table 3](#) shows the corresponding market indices associated with each of the [Freund and Smith \(1999\)](#) human age markers.

Building market age

The present study adopts a cross-sectional design based on the most recent comparable international data sets available at the time of analysis (2021–2022). This choice reflects the primary aim of the paper: to operationalize and test the internal coherence of the Market Pareidolia framework, rather than to provide a longitudinal assessment of market evolution. The objective is to demonstrate the feasibility of translating heterogeneous country indicators into a unified “market age” construct. Accordingly, the current results should be interpreted as a snapshot proof-of-concept classification, intended to establish methodological foundations for subsequent temporal applications. A database was constructed for all 195 UN-recognized countries using the 18 matched market indices ([Tables 1–3](#)). Countries with data prior to 2021 or with fewer than nine available indicators were excluded to ensure analytical reliability. This threshold resulted in a final sample of 175 countries. Missing values among included cases were handled through a mixed approach combining mean, median and K-Nearest Neighbors (KNN) imputation according to the distribution and extent of missingness. The 20 excluded countries are primarily micro-states or small island economies with limited statistical coverage rather than conceptually incompatible cases. Consequently, the results may modestly underrepresent very small or data-poor economies. For full transparency, [Appendix 2](#) lists all excluded countries.

For columns with less than 5% missing values, mean imputation was employed. This method, suitable for normally distributed data, replaces missing values with the means of the available data for that variable, thus preserving the overall distribution and reducing bias. Specifically, variables such as LOD, EFI and PGR, which exhibited near-normal distributions, were imputed using their respective means. Conversely, for columns with more than 5% but less than 20% missing data and those displaying skewed distributions, median imputation was deemed appropriate. This approach mitigates the impact of outliers and skewness, ensuring that the central tendency of the data is accurately represented. Variables such as GSP, CGD, RLI, EAF, SPI, QOL and WHR were subjected to median imputation due to their skewed distributions. For the column GDS, which had approximately 9.14% missing values, a more sophisticated imputation technique was necessary to maintain the integrity of the data set. Therefore, KNN imputation was used. KNN imputation leverages the similarity between observations, imputing missing values based on the weighted average of the nearest neighbors, thus preserving the multidimensional relationships within the data.

This methodological rigor ensured that the data set was rendered complete without significant loss of information or introduction of bias, enabling reliable and valid factor analysis.

Upon establishing a detailed database for the 175 selected countries, each delineated into 18 unique new categories, where the Z-score for every index was computed, setting a mean

of 0 and a standard deviation of 1. After establishing the Z-scores for each variable, a threshold range between -2.5 and 2.5 was set to identify outliers. Any data points falling outside this range were considered outliers and were subsequently adjusted. Specifically, outliers with positive Z-scores beyond the threshold were replaced with the maximum Z-score value within the acceptable range. Conversely, outliers with negative Z-scores below the threshold were replaced with the minimum Z-score value within the designated range. This methodological approach ensured a robust and consistent data set, minimizing the potential distortions caused by extreme values. A correlation matrix (Table 4) was created and revealed several strongly correlated variables ranging from 70% to 85%. However, these variables were kept, as the correlation threshold acceptance was set to 0.9 (or 90%), supporting the idea that any contribution above 10% could be accounted for a reasonable contribution for the final outcome. No other significant correlations were noted.

After the Z-score normalization process, the analyses continued by using the Kaiser–Meyer–Olkin (KMO) test to ascertain the appropriateness of conducting a Factor Analysis on the data set. The KMO test measures the adequacy of the data for factor analysis by comparing the magnitude of observed correlation coefficients to the magnitude of partial correlation coefficients. A value close to 1 indicates that the patterns of correlations are relatively compact, and factor analysis should yield distinct and reliable factors. The data set produced a KMO value of 0.913, which is considered excellent. This high value indicates that data is indeed very suitable for Factor Analysis, providing further confidence in the subsequent steps of the analytical approach.

Having established the suitability of the data for factor analysis, the Kaiser Criterion was used (also known as the Eigenvalue Greater-Than-One Rule) to determine the optimal number of factors to extract. This criterion suggests retaining only those factors with eigenvalues greater than one, as they explain a significant amount of variance in the data. Applying this rule to the data set, four factors were identified and met this criterion. Consequently, the factor analysis was conducted on the set of 18 variables, extracting these four principal factors to best represent the underlying structure and relationships within the data. However, during the factor analysis, with a set threshold loading between -0.4 and 0.4 , it was observed that two variables, namely, URI and GDS, did not load significantly onto any of the four factors. Given their lack of association with the identified factors, the decision was made to exclude these four variables from the factor structure and treat them separately as independent variables in subsequent analyses. Moreover, the variable CGD was the only variable that loaded in Factor 4. We adopted Promax rotation for factor analysis, as it allows for correlated factors, providing a more realistic representation of the underlying relationships between variables. Unlike orthogonal rotations, which assume factors are independent, Promax acknowledges that factors in real-world data often correlate. This oblique rotation enhanced the interpretability of our results, yielding clearer and more distinct factor loadings. By applying Promax, we achieved a simpler structure where variables load significantly on a single factor, aligning with theoretical expectations and improving the clarity of the factors, making our analysis more robust and meaningful.

This refinement meant that the initial set of 18 variables was now represented by four factors (Table 5) and the two standalone variables.

Digging into the four factors, each set of variables explains a certain aspect of the market and is summed up in Table 6:

- (1) Factor 1 – Socio-Political and Economic stability index (SPE).

Table 4. Correlation matrix

Variables	LOD	EFI	IAU	GSP	CGD	LFA	RLI	PGR	AYS	EAF	SPI	RFE	CPI	URI	EDB	GDS	QOL	WHR
LOD	1.000																	
EFI	0.724	1.000																
IAU	0.531	0.658	1.000															
GSP	0.437	0.483	0.473	1.000														
CGD	0.083	-0.091	-0.037	0.079	1.000													
LFA	0.369	0.380	0.517	0.272	-0.094	1.000												
RLI	0.708	0.749	0.558	0.606	0.082	0.271	1.000											
PGR	0.397	0.391	0.627	0.329	0.036	0.443	0.388	1.000										
AYS	0.549	0.612	0.722	0.487	-0.051	0.545	0.592	0.694	1.000									
EAF	0.560	0.699	0.469	0.675	-0.165	0.264	0.709	0.291	0.505	1.000								
SPI	0.775	0.762	0.805	0.573	0.047	0.542	0.738	0.687	0.860	0.607	1.000							
RFE	0.163	0.205	0.254	0.682	0.063	0.244	0.181	0.251	0.285	0.386	0.290	1.000						
CPI	0.757	0.786	0.651	0.643	0.115	0.352	0.849	0.406	0.628	0.703	0.794	0.272	1.000					
URI	0.005	0.092	-0.016	0.131	-0.102	-0.005	0.020	-0.066	0.011	0.146	0.040	0.155	0.067	1.000				
EDB	0.587	0.715	0.695	0.588	-0.065	0.491	0.657	0.585	0.730	0.581	0.770	0.379	0.692	0.135	1.000			
GDS	0.155	0.300	0.298	0.276	-0.131	0.435	0.223	0.093	0.312	0.322	0.290	0.266	0.295	0.162	0.249	1.000		
QOL	0.646	0.699	0.629	0.654	0.045	0.330	0.751	0.487	0.613	0.715	0.752	0.305	0.769	0.099	0.634	0.303	1.000	
WHR	0.514	0.589	0.585	0.541	-0.039	0.333	0.653	0.438	0.616	0.646	0.684	0.223	0.634	0.077	0.562	0.281	0.634	1.000

Table 5. Factor analysis loadings

Variables	Factor 1	Factor 2	Factor 3	Factor 4
LOD	0.78	−0.08	0.25	0.13
EFI	0.84	−0.03	0.23	−0.16
IAU	0.58	0.08	0.60	−0.05
GSP	0.60	0.71	0.12	0.06
CGD	0.02	0.05	−0.03	0.69
LFA	0.27	0.08	0.53	−0.12
RLI	0.90	0.06	0.11	0.08
PGR	0.32	0.08	0.72	0.07
AYS	0.55	0.10	0.70	−0.05
EAF	0.78	0.30	0.02	−0.26
SPI	0.75	0.06	0.61	0.06
RFE	0.18	0.77	0.18	−0.01
CPI	0.90	0.10	0.18	0.11
URI	0.08	0.16	−0.06	−0.18
EDB	0.65	0.20	0.47	−0.09
GDS	0.27	0.19	0.16	−0.27
QOL	0.79	0.20	0.24	0.01
WHR	0.66	0.15	0.28	−0.10

Table 6. Final factors and independent variables

SPE	GIF	EDH	CGD	URI	GDS
LOD	GSP	IAU	CGD	URI	GDS
EFI	RFE	RFA			
RFI		PGR			
EAF		AYS			
CPI		SPI			
QOL		EDB			
WHR					

Variables: Levels of democracy (LOD), Economic Freedom Index (EFI), Rule of Law Index (RLI), Ease of Attracting Finance (EAF), Corruption Perceptions Index (CPI), Quality of Life (QOL), World Happiness Report (WHR).

Context: This factor can be seen as representing a Socio-Political and Economic Stability Index. It aggregates various measures that collectively reflect the quality of governance and the general well-being in a country. It reflects a multidimensional measure of a country's overall socio-political and economic environment. Countries scoring high on this factor are likely to have strong democratic institutions, high economic freedom and a robust legal system:

(2) Factor 2 – Global Influence and Financial Stability (GIF).

Variables: Global Soft Power Index (GSP) and Foreign Exchange Reserves (RFE).

Context: This factor measures a country's global influence and financial stability. Countries with high scores exert significant cultural and diplomatic influence globally and maintain substantial foreign exchange reserves, reflecting economic resilience and stability:

(3) Factor 3 – Economic Development and Human Capital (EDH).

Variables: Internet Access Usage (IAU), Levels of foreign aid (LFA), Population Growth Rate (PGR), Average Years of Schooling (AYS), Social Progress Index (SPI), Ease of Doing Business (EDB).

Context: This factor measures a country's economic development and human capital. Countries with high scores have low population growth with higher educational attainment, in general terms, it has high social and economic progress:

(4) Factor 4 – Central Government Debt (CGD).

Variables: Only one variable has loaded into this factor; thus, CGD represents the factor by itself.

Each country was assigned a composite "human age" score. Z-scores for each factor and standalone variable were rescaled from 0 to 100, with the lowest value mapped to 0 and the highest to 100. Equal weights were then applied to the four factors and two independent variables, each contributing one-sixth to the total. The final age was obtained by summing these weighted components.

Discussion and conclusion

This study contributes to International Business research by proposing Market Pareidolia as a cognitive and data-driven heuristic for early-stage IMS. Internationalizing firms must interpret foreign-market heterogeneity before making decisions about market prioritization, entry mode, partner selection, resource commitment and risk exposure. Traditional IMS models offer analytical discipline, but their output may be difficult to translate into a shared strategic language across managerial, financial, commercial and operational functions. Market Pareidolia complements these models by transforming heterogeneous country-level indicators into an intuitive market-age narrative that supports preliminary screening, internal alignment and strategic sense-making before more formal IMS, entry-mode and investment analyses are conducted. Importantly, the framework does not imply that adolescent, adult or senior markets are inherently superior to one another. Rather, each market-age profile reflects a different configuration of maturity, risk, adaptability, stability and strategic fit, which firms must interpret in relation to their own internationalization objectives.

Theoretically, the paper extends International Business research on foreign-market selection by introducing cognitive categorization as a complementary lens for understanding how firms interpret country-level heterogeneity. While IMS research has traditionally emphasized criteria, indicators, screening procedures and decision models, Market Pareidolia highlights the role of metaphor-based sense-making in transforming complex foreign market information into a communicable strategic category. This does not reduce the importance of analytical rigor; rather, it suggests that the usability of IMS models may depend partly on the ability of managers to translate technical information into shared cognitive frames that support commitment, coordination and strategic action across borders.

Practically, Market Pareidolia can support internationally active firms in the early stages of foreign-market evaluation. For export managers, it offers an accessible way to compare unfamiliar markets and communicate market differences internally. For SMEs, it provides a disciplined alternative to purely intuitive country selection while remaining less resource-intensive than full-scale market analysis. For multinational enterprises, it can support headquarters-subsidiary dialogue by providing a common vocabulary for discussing market maturity, risk, timing and commitment. The framework is therefore best understood as a

preliminary decision-support device: it prepares firms for more detailed entry-mode analysis, partner evaluation, financial assessment and internationalization planning.

Interviewing Riccardo Fichera, Senior export manager for Società Cooperativa Fattorie Garofalo, an Italian leading buffalo mozzarella production company with 55% exports in 45 countries, stated that “in my opinion, this model will express its potentiality and usefulness for our export managers at the utmost, when it will be applied not only to a country’s economy *tout court* but to a specific good or service market within a country” (interviewed on January 16, 2024). This market age profiling offers a fresh perspective that enhances strategic decision-making, informs policy directions and provides a comprehensive framework for international comparisons and collaborations. These profiles reflect conditions observed in 2021–2022 and should be interpreted as indicative rather than permanent characterizations. By transforming the traditional approach to market analysis, this study equips stakeholders with a useful decision-support framework to navigate the complexities of global markets with greater clarity and empathy. Nicola Petronio, Senior Export Manager at Basaltina srl, an Italian leader company in the production and processing of basalt stone, having 60% of export in 70 countries, said that “evaluating markets using the Market Pareidolia method was very accurate both regarding senior markets (e.g. UK), as well as for markets in the transition between adult and senior such as Poland. When comparing my knowledge of the latter market with the Market Pareidolia model, there is a strong correspondence with what the method itself suggests: a market that is making its own transition from Adult to Senior” (interviewed on January 15, 2024).

The framework provides an accessible and adaptable tool that simplifies heterogeneous country indicators into intuitive market-age categories. It supports managers, SMEs and policymakers in navigating complex international environments by offering a communicable structure for preliminary screening and strategic alignment, enabling more coherent and empathetic engagement with unfamiliar markets. Continuing the interview with Nicola Petronio, stated that “in general, the method was also accurate for other markets of my knowledge such as Lebanon, Malaysia, Singapore and Brazil (as well as the UK and Poland previously mentioned)” (personal communication, January 15, 2024):

Q1. How does Market Pareidolia benefit international business?

The framework is particularly relevant for three groups of internationally active decision-makers. First, export managers and international business development teams can use market-age profiles to prioritize foreign countries, compare market maturity, calibrate entry timing and align entry-mode assumptions with country-level conditions. Second, SMEs with limited analytical resources can employ the framework as a structured preliminary screening tool before investing in more detailed market research, partner due diligence or formal country-risk analysis. Third, multinational enterprises can use Market Pareidolia as a shared language across headquarters, subsidiaries and functional teams when discussing market sequencing, governance choices, resource allocation and risk exposure. In all cases, the value of the framework lies not in producing a final market-entry decision, but in improving the quality, coherence and communicability of the IMS process.

Furthermore, transnational companies, with their centralized strategic decision-making capability, enjoy a structural cohesion that other actors (labor, nation-states, suppliers) often lack (Ietto-Gillies, 2023); consequently, expanding into new markets becomes a strategic inevitability. Within this context, IMS requires both analytical rigor and communicability. Market Pareidolia complements IMS by providing a front-end screening heuristic and a shared language that managers can use to prioritize countries, align entry modes and resource commitments with market maturity and secure cross-functional buy-in before applying more

technical IMS tools. By analogizing markets to human development, firms gain an empathetic lens for interpreting foreign-market idiosyncrasies. Consider a market characterized as “adolescent”: vibrant, evolving and risk-embracing. Such a profile helps decision-makers anticipate consumer psychology that mirrors the boldness of youth. MNCs and SMEs can then time the introduction of innovative products or services to tap this adventurous spirit, while shaping governance, partner selection and financing structures consistent with the market’s maturity. The result is not only better IMS discipline but also clearer internal communication about the rationale for sequencing, resourcing and risk calibration. As Marcella Uttaro, Senior Manager for International Trade at Andersen (with a presence in over 170 countries and more than 425 offices), observed, international markets are “hard to categorize, and each company has a unique path. Behind a deal are people who decide to establish a relationship of trust that entices them to share their experiences toward a common end. There are so many factors that come into play, not just statistical but intuitional, also often driven by emotions and personal ambitions. They are worth exploring further” (interviewed on January 24, 2025). Market Pareidolia honors that intuition while structuring it for IMS: it converts complex indicators into a cognitively natural metaphor that sharpens early-stage choices and improves organizational alignment for internationalization strategy.

The framework also supports policy formulation by helping align trade and investment strategies with differing market conditions. More stable, “adult” or “senior” markets may call for long-term, predictable policies, whereas “adolescent” markets may require more flexible and adaptive approaches. By distilling complex indicators into clear market-age profiles, Market Pareidolia reduces informational overload and enables firms and policymakers to design strategies that are better tailored to the structural characteristics of each market.

Market Pareidolia supports risk management by helping firms anticipate the distinct challenges associated with different market ages and adjust strategies accordingly. More volatile “adolescent” markets may require flexible and adaptive approaches, while more stable markets allow longer-term planning. Overall, the framework offers a human-centered tool that simplifies complex indicators and enhances strategic clarity, assisting MNCs, SMEs and policymakers in more coherent and context-sensitive internationalization decisions.

[The graphical representation of the country classification is provided in Supplementary Figure 1, while the complete list of countries and their corresponding human-age categories is reported in Supplementary Table 7.]

Limitations and future research

The study operates under the presumption that human developmental stages can be directly mapped onto market characteristics; this core assumption remains unexamined across varied economic contexts and cultural frameworks, suggesting a need for expanded research to assess the universal applicability of the Market Pareidolia concept. A second important limitation concerns the exclusive reliance on data from 2021 to 2022. While this period provided the most complete and harmonized set of international indicators, it necessarily represents a static snapshot of market conditions. As a result, the current classification cannot capture cyclical fluctuations, structural transitions or longer-term developmental trajectories. Markets undergoing rapid transformation, whether due to political reform, economic crises or post-pandemic adjustments, may therefore be partially misrepresented by a two-year cross-section. Consequently, the present findings should not be interpreted as permanent labels, but as temporally bounded profiles reflecting conditions at a specific moment in time, constituting an initial conceptual model requiring further empirical validation. Market Pareidolia offers a platform for interdisciplinary research linking cognitive psychology and

international business. Future studies can examine how managers perceive and respond to different market ages, investigate potential cognitive biases and test whether the framework improves the quality of internationalization decisions. Furthermore, Market Pareidolia could spearhead a more nuanced exploration of market segmentation, leading to the identification of unique market niches that traditional analyses might overlook. A further limitation concerns sample coverage. Because inclusion required the availability of at least 9 of the 18 indicators, 20 countries, primarily micro-states and data-poor economies, were excluded from the analysis. Consequently, the results may slightly underrepresent the most institutionally constrained or least statistically documented markets. Future research should explore alternative imputation strategies or specialized regional data sets to incorporate these cases. Finally, the framework intentionally avoids claiming that markets “develop” in a psychological sense; rather, it uses human age as a metaphorical device to cluster and communicate structural features of economies. The model therefore complements, but does not replace, institutional and historical analyses of national development. Future research can also leverage longitudinal data to test the temporal stability of market “age” characteristics, providing insights into how markets evolve over time and the factors driving this evolution. Incorporating qualitative research methods, such as case studies or ethnographic approaches, could enrich the understanding of how cultural contexts shape the development of markets. This can provide a more textured understanding of market dynamics, offering firms and policymakers a stronger comprehensive toolkit for engaging with international markets. Finally, Market Pareidolia could be instrumental in developing a new genre of market indices that are more reflective of humanistic and societal dimensions, thus contributing to more ethical and sustainable international business practices. As globalization continues to intertwine markets across the world, Market Pareidolia can become a potentially valuable heuristic in the navigation of the global economic landscape.

Importantly, the Market Pareidolia framework is inherently compatible with longitudinal extension. Because the model relies on standardized, regularly updated international indices, the same procedure can be replicated across multiple years to generate dynamic “age trajectories for each country. Future studies could therefore apply the methodology to time-series data (e.g. 5–10-year windows) to observe whether countries exhibit stable profiles, gradual maturation, or abrupt transitions. Such analyses would enable testing of the temporal robustness of the factors, the sensitivity of country rankings to macroeconomic shocks and the predictive relevance of market age for internationalization outcomes. The present paper should thus be understood as the first step toward a dynamic research agenda rather than as a definitive temporal assessment.

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Appendix 1.**Human–market mapping: markers, corresponding indexes and motivations****Adolescence***LOD – levels of democracy*

The desire for independence and autonomy is a defining trait of adolescence. In markets, this can be reflected in the level of democracy within a country, as the term “democracy” itself originates from the Greek words “demos,” meaning people and “Kratos,” meaning power, essentially, power to the people. The democracy index, therefore, serves as a logical proxy for this marker, capturing the extent to which a market values and enables independence and autonomy. Data for this index is sourced from the Economist Intelligence Unit (EIU, 2023) and is measured on a scale of 0–10, providing an empirical representation of this adolescent trait in market dynamics.

EFI – economic freedom index

Another significant marker of adolescence is the aspiration to develop or maintain an individual identity. Adolescents typically begin to make choices that shape their personal and professional lives, and this creation of identity parallels the concept of economic freedom within markets. The Heritage Foundation’s Index of Economic Freedom (Kim *et al.*, 2023) defines economic freedom as the ability of individuals to control their labor and property. This resonates strongly with the adolescent need for self-definition, making the economic freedom index an appropriate analogy for this marker. The scale of this index ranges from 0 to 100, quantifying the degree to which markets empower individuals to assert their economic identities.

IAU – number of people using internet

The preference for association with peers is another hallmark of adolescence, and in the context of markets, this can be aligned with internet access usage. Adolescents today commonly view social media as a tool that strengthens friendships and networks (Anderson *et al.*, 2023). Extending this concept to markets, the percentage of internet users in each country can be seen as a reflection of the extent to which individuals within that market engage in peer associations through digital platforms. The internet usage index, with data sourced from Statista (2023), measures this engagement on a scale from 0% to 100%, providing a direct correlation to the adolescent marker of peer association.

GSP – global soft power index

High susceptibility to peer influence is another defining characteristic of adolescence, and in markets, this trait can be captured by the Global Soft Power Index developed by Brand Finance (2023). This index evaluates perceptions of national influence and awareness, highlighting how countries are influenced by and exert influence over their peers. The Global Soft Power Index is measured on a scale of 0–100 and offers a robust representation of the degree to which markets, like adolescents, are shaped by peer influence and external perceptions.

CGD – Central government debt in percentage

Adolescents are also known for their willingness to take risks, a trait that can be mirrored in markets by examining the level of central government debt as a percentage of GDP. High levels of government debt may indicate an economic environment that is willing to take on significant risks, analogous to

the risk-taking behavior often observed during adolescence. Data for this measure is sourced from the [International Monetary Fund \(2022\)](#), providing a quantifiable reflection of this adolescent attribute within economic contexts.

LFA – levels of foreign aid

Finally, adolescence is marked by increasing detachment from parents or guardians, signifying a growing independence from external guidance. In markets, this detachment can be represented by a reduction in reliance on foreign aid. Countries with lower levels of foreign aid demonstrate an increasing ability to function autonomously, reflecting the adolescent trait of seeking independence from parental figures. This marker is captured through data on net official aid received, sourced from [The World Bank \(2023a\)](#). To align with the analogy, the variable is inverted, as higher levels of foreign aid indicate a lesser degree of independence, thereby correlating with a lower “adolescent” age for the market.

Adulthood

Emotional maturity, a cornerstone of adulthood, is characterized by a shift from dependence to autonomy. It involves mitigating feelings of inferiority, curbing egotism, reducing competitiveness, reaching a developmental stage prepared for procreation, described by Saul (1947) as the “genital level.”

PGR – population growth rate

While emotional maturity equips individuals for parenthood, the decision to have children does not necessarily equate to emotional maturity. In some cases, pursuing numerous offspring may stem from motives misaligned with self-reliance and autonomy, indicating a lack of emotional maturity. At a societal level, emotional maturity can be represented by the population growth rate (PGR), which reflects changes in population through births, deaths and migration. This marker, sourced from the United Nations Department of Economic and Social Affairs, inversely correlates population growth with emotional maturity; a balanced growth rate suggests societal emotional maturity, while excessive growth may signal collective immaturity and developmental challenges within a market.

AYS – average years of schooling

Educational maturity, another key marker, corresponds to a nation’s average years of schooling, an indicator of societal progression in education. Longer average schooling duration reflects a higher degree of educational attainment, which translates to broader societal development. This marker aligns with data from the UNDP Human Development Index Report, where educational maturity is measured on a scale of 0% to 100%. The higher the average years of schooling, the more advanced the educational maturity of a market, highlighting its potential for skilled labor, innovation and growth.

EAF – easiness to attract finance

Financial maturity is an essential attribute of adulthood, defined by an individual’s ability to achieve financial independence, accumulate savings and secure financing to meet personal and professional needs. Similarly, at a national level, a market’s financial maturity can be gauged by its ability to attract international financing, a quality captured by Moody’s country rating. This rating evaluates the creditworthiness of countries, reflecting their financial stability and ability to manage resources effectively. The scale ranges from C to AAA, with higher ratings indicating stronger financial maturity. Financially mature markets are better positioned to secure investments and maintain economic resilience.

SPI – social progress index

Social maturity reflects an individual's capacity to navigate interpersonal relationships and manage social situations effectively. As [Goleman \(2006\)](#) described, social intelligence is critical to understanding and interacting within complex societal landscapes. In the context of markets, social maturity is mirrored by the Social Progress Index (SPI), introduced by the [Social Progress Imperative \(2023\)](#). This comprehensive metric evaluates 53 indicators across social and environmental dimensions, offering insights into a society's progress and overall well-being. Measured on a scale from 0 to 100, higher SPI scores denote markets with greater social maturity, where respect, equality and societal cohesion are prioritized.

RLI – rule of law index

Legal emancipation is another marker of adulthood, signifying an individual's transition to legal accountability and independence. Defined by H. Clark (1968) as the legal process through which minors are freed from parental authority, emancipation typically occurs at the age of 18 or 21, depending on jurisdiction. In markets, this concept aligns with the Rule of Law Index (RLI), which assesses the legal and institutional framework within a country. Developed by the World Justice Project, this index measures governmental power constraints, transparency, corruption absence and both civil and criminal justice systems, among other factors. Scored on a scale from 0 to 1, higher RLI values indicate markets with stronger legal structures and adherence to the rule of law, mirroring the societal maturity associated with legal independence.

RFE – foreign exchange reserves

Economic independence, the final marker of adulthood, represents the ability to maintain self-sufficiency and stability in the global economic landscape. At the national level, this is captured by a country's reserves of foreign exchange (RFE), with larger reserves indicating stronger economic independence. This data, sourced from the CIA Fact Book ([CIA, 2023](#)), provides insight into a market's financial security, resilience to external shocks and overall stability. Markets with substantial foreign exchange reserves are better equipped to navigate economic uncertainties, demonstrating maturity akin to that of financially independent adults.

Seniority*CPI – transparency international corruption index (CPI)*

One of the defining markers for seniors is integrity, which reflects moral uprightness and honesty. In markets, integrity can be represented by the Corruption Perception Index (CPI) developed by Transparency International. This index evaluates the perceived transparency and ethical standards of a country's institutions and public sector. Just as personal integrity underpins the trustworthiness of individuals, institutional integrity strengthens the trust between markets and their stakeholders. The CPI, measured on a scale of 0–100, provides an empirical measure of this crucial aspect, with higher scores indicating greater transparency and reduced corruption. For markets, this alignment with integrity mirrors the emphasis placed by seniors on maintaining moral principles and trustworthiness.

URI – unemployment rate index

Coping with physical decline is another significant marker for senior adults. Aging often brings physical challenges that impact an individual's ability to perform tasks or re-enter the workforce after retirement. In economic terms, this marker is paralleled by the Unemployment Rate Index (URI), which captures the proportion of a population that is unemployed. Markets with lower unemployment rates exhibit greater resilience and adaptability, reflecting an ability to "cope" with the economic

equivalent of physical decline. To align with this marker, the URI is inverted, as higher unemployment rates indicate weaker resilience. Data from [The World Bank \(2023b\)](#) offers a comprehensive view of this index, enabling an assessment of markets' economic well-being and their capacity to maintain functionality in challenging conditions.

EDB – ease of doing business

The confirmation or loss of professional status also features prominently in senior identity. In later years, individuals often grapple with questions about their professional identity and its relevance. This marker corresponds to the Ease of Doing Business (EDB) index, which measures how conducive a country's regulatory environment is to operating a business. Countries ranked higher on the EDB index provide a stable and supportive environment for business operations, reinforcing their economic prominence. In contrast, lower rankings may signify declining professional opportunities, paralleling the challenges seniors face in maintaining their professional relevance. [The World Bank \(2023c\)](#) compiles this ranking, making it an effective metric for assessing markets' ability to sustain and foster economic activity.

GDS – gross domestic savings divided by GDP

Commitment levels to life's roles and obligations represent another key marker of senior adulthood. With the accumulation of life responsibilities, seniors often bear the financial and emotional weight of supporting their families, particularly adult children who may still require assistance. Markets parallel this dynamic through the gross domestic savings (GDS) metric, which measures savings as a percentage of GDP. Higher savings rates indicate a market's ability to meet long-term obligations and invest in future growth. The GDS, sourced from [The World Bank \(2023d, 2023e\)](#), provides insight into a market's financial preparedness and capacity to fulfill its societal and economic responsibilities, mirroring the senior marker of commitment to life's obligations.

QOL – quality of life

Quality of life is another critical factor that seniors prioritize, encompassing economic stability, access to healthcare and a secure living environment. The World Health Organization (WHO, 2023) defines quality of life as an individual's perception of their position within the broader context of their culture, values, goals and expectations. Similarly, markets can be assessed using the Quality-of-Life Index (QOL) developed by World Data, which measures factors such as economic security, public services and political stability. Markets with high QOL scores reflect environments that support well-being and security, aligning with the aspirations of senior adults for a stable and fulfilling life.

WHR – World Happiness Report

Finally, life's achievements hold special significance for seniors as they reflect on their accomplishments and overall satisfaction. This marker aligns with the World Happiness Report (WHR), which ranks countries based on collective well-being and the fulfillment of citizens' aspirations. WHR, measured on a scale from 0 to 10, captures the essence of a society's happiness, providing insights into the emotional and psychological dimensions of market maturity. Markets with high WHR rankings exhibit a sense of satisfaction and accomplishment, echoing the reflections of senior adults on their personal achievements.

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Appendix 2

Table A1. Excluded countries and missing variables

Country	Variables missing
Andorra	15
Antigua and Barbuda	10
Grenada	10
Holy see	17
Kiribati	10
Liechtenstein	14
Marshall islands	13
Micronesia	13
Monaco	14
Nauru	16
North Korea	13
Palau	12
Palestine state	16
Saint Kitts and Nevis	12
San Marino	10
Somalia	9
South Sudan	10
Tonga	9
Tuvalu	14
Yemen	9

Note(s): Regions follow United Nations geographic classifications. All exclusions derive solely from missing data in the original international sources and do not reflect any conceptual incompatibility with the Market Pareidolia framework

The application of the minimum data-completeness threshold (availability of at least nine out of eighteen indicators) resulted in the exclusion of 20 countries from the initial United Nations list of 195. Table B1 provides a full list of these countries, together with the number of available indicators for each case. The table confirms that exclusions are primarily concentrated among micro-states and small island economies, where international statistical coverage is often incomplete. This annex is provided to ensure full methodological transparency and to allow readers to assess potential scope limitations.

Supplementary material

The supplementary material for this article can be found online.

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