

Knowledge Management as a Determinant of Social Well-being: A Cognitive-based composite Indicator

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Abstract: Knowledge management is a central element in contemporary processes of transformation across organizations, territories, and societies. Understanding its relationship with residents' quality of life can contribute to progress toward models of sustainable human development. At the organizational level, knowledge management plays a pivotal role in enhancing the work environment by fostering autonomy, motivation, and creativity, as well as by promoting the development of employees' skills and capabilities. These factors are strongly associated with key indicators of work-related and social quality of life. From a social perspective, knowledge management promotes more equitable access to educational, health, and labour opportunities, thereby reducing structural inequalities and strengthening civic participation, with positive effects on social well-being. Moreover, the consolidation of knowledge-based social ecosystems enhances collective resilience to complex challenges such as demographic ageing, climate change, and territorial inequalities, by improving communities' adaptive and responsive capacities. In this study, we develop a methodological approach to measure individuals' levels of knowledge using Likert-scale data obtained from a survey of Spanish citizens, which yielded a total of 4,147 validated responses. Specifically, we propose an individual knowledge indicator constructed using Item Response Theory (IRT) models and defined through three dimensions related to applied cognitive capacities: structural knowledge derived from formal education; digital competencies as an expression of applied knowledge; and access to and use of information as a measure of autonomy and informational capacity. Moreover, we examine the relationship between knowledge management and quality of life, measured from a subjective perspective. The main results highlight the importance of individual knowledge as a determinant of well-being and reveal that the quality of life dimensions most strongly influenced by individual knowledge are the work environment, educational opportunities, and economic situation.

Keywords: Knowledge management, Quality of life, Item response theory, Digital competencies, Cognitive indicators

1. Introduction

In the field of knowledge management (KM), the measurement of individual knowledge constitutes a key methodological challenge, especially when this knowledge is conceived of as a multidimensional construct that incorporates both formal and applied components. Digital competencies assume a central role in this framework, as they represent the most visible operational manifestation of applied knowledge in a society increasingly mediated by technology. These competencies—ranging from the use of basic devices to the autonomous management of complex information—are key to understanding how individuals' access, process, and transform information in contemporary environments. Furthermore, it is important to highlight that KM is not limited to processes of information creation and transfer; it also encompasses elements of human resource management, particularly the training and capacity-building required to develop digital competencies. Consequently, incorporating digital competencies into the definition of individual knowledge not only strengthens the conceptual coherence of the construct, but also aligns with current approaches that treat digital training as an essential factor for personal autonomy, employability, and quality of life.

Our proposed methodology enables the operationalization of the individual knowledge construct within the KM framework, providing a robust, replicable metric. Also, we examine the relationship between KM and quality of life, measured from a subjective perspective. In addition, we identify the quality of life factors that are most strongly influenced by access to knowledge, through elements such as education, skills development, and digital literacy.

Finally, we discuss the implications of the model for public policy design aimed at reducing cognitive inequalities and strengthening individual capabilities, emphasizing that adequate access to information enables more informed, efficient, and evidence-based decision-making.

2. Literature Review

KM and Human Resource Management (HRM) are closely interconnected, as HRM provides the human capabilities, competencies, and training required for knowledge to be effectively created, shared, and applied within an organization. In this sense, training and capacity-building, particularly digital training, constitute a fundamental component of HRM and act as a key mechanism for sustaining KM. Indeed, recent evidence shows that digital competence is strongly associated with learner autonomy, digital self-efficacy, and problem-solving abilities in technology-mediated contexts (Rizza, 2023), as well as with more effective use of digital tools and meaningful learning (Blanc et al., 2025). At a broader level, digital competence is essential not only for learning and digital citizenship but also for participation in ever more complex educational environments.

Regarding quality of life, this multidimensional construct is increasingly being influenced by people's ability to participate fully in digital environments. Recent scientific evidence indicates that digital skills promote social inclusion, personal autonomy and employability, three fundamental pillars of contemporary well-being. Along these lines, various studies focused on higher education confirm that the acquisition of digital skills contributes to greater access to opportunities, more active participation in academic and professional environments, and a better psychological adjustment to modern-day technological challenges (Kosklin et al., 2023). On the contrary, a lack of or deficiency in such skills can adversely affect people's social participation, access to information, and economic opportunities, which can in turn exacerbate inequalities and hamper people's general ability to function in digital environments. Mejías Acosta et al. (2024) show that difficulties in aspects such as information management, digital security or problem-solving pose obstacles to learning and have a negative impact on academic and personal well-being. Likewise, research on digital autonomy in higher education shows that greater mastery of digital skills is related to higher levels of autonomy, a decisive factor for subjective well-being and personal development in ICT-mediated educational contexts.

3. Methodology

The database used to construct the individual knowledge indicator comes from a multidimensional questionnaire administered to the Spanish population between May and September 2025. A total of 4,147 validated responses were obtained anonymously of Spanish citizens over the age of 18. The survey has a margin of error of 1.52% with a 95% confidence level. The questionnaire includes a set of Likert scale variables that assess the quality of life of Spanish citizens from a multidimensional perspective. Furthermore, it incorporates socioeconomic classification variables and variables related to digital competencies, also measured on a Likert scale. These variables (Figure 1), which are key for the construction of the indicator, capture aspects related to structural knowledge; digital competencies; and the access to and use of information.

These digital competencies variables, together with the education level, will be used to construct the proposed indicator. To that end, we draw on Item Response Theory (IRT), specifically employing Samejima's Graded Response Model (GRM) (Samejima, 1970). Unlike classical summative scores, IRT provides sample-independent scaling and separates item discrimination from ordered threshold parameters, ensuring measurement properties aligned with the latent construct.

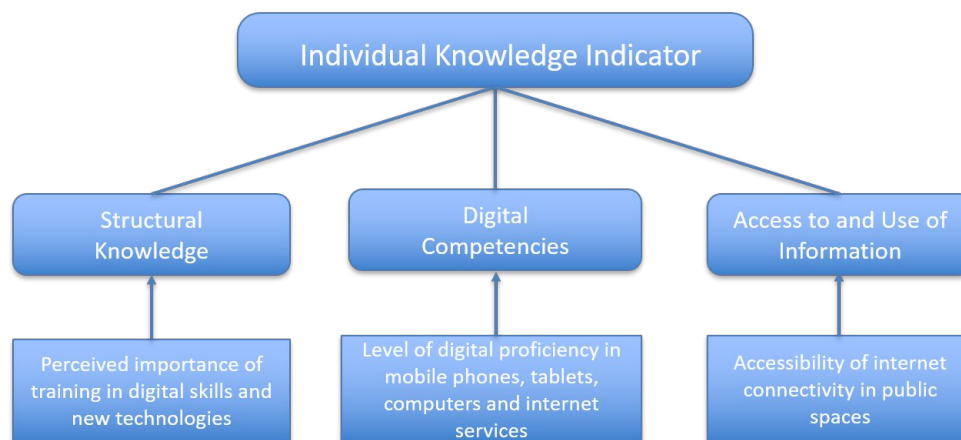


Figure 1: Individual Knowledge Indicator

In the GRM, the probability that the response of person i is in category k or higher for item j is modelled through the cumulative logistic function:

$$P(Y_{ij} \geq k|\theta_i) = \frac{1}{1 + \exp[-a_j(\theta_i - b_{jk})]}$$

where a_j denotes item discrimination, b_{jk} the ordered category thresholds, and θ_i the latent trait level. The probability of responding in category k is obtained from adjacent cumulative curves:

$$P(Y_{ij} = k|\theta_i) = P(Y_{ij} \geq k|\theta_i) - P(Y_{ij} \geq k + 1|\theta_i)$$

Recent research supports the applicability of IRT to applied knowledge domains. Vuorikari et al. (2025) validate IRT-based instruments for digital competence measurement, while Barroqueiro et al. (2024) apply IRT to human intellectual capital assessment. Accordingly, GRM provides a robust foundation for constructing a multidimensional indicator of individual knowledge. All estimations are performed using the *mirt* package in R (Chalmers, 2012), which by default estimates a unidimensional GRM with freely estimated discrimination and threshold parameters, no guessing or upper asymptote terms, EM optimization, and a standard normal latent trait distribution.

4. Results

The results of the mean individual knowledge indicator standardized show significant differences across sociodemographic variables (Table 1).

Table 1: Indicator mean value for sociodemographic variables

Sociodemographic variable	Category	Mean	Sociodemographic variable	Category	Mean
Marital Status	Single	0.1234	Annual Income	<€12,500	-0.1156
	Married	-0.0162		€12,500-€25,000	-0.1715
	Divorced	-0.0903		€25,001-€42,000	0.1323
	Widowed	-0.7362		> €42,000	0.3654
Gender	Male	0.0613	Education Level	No formal education	-1.5675
	Female	-0.0532		Compulsory education	-0.7201
	Non-binary	0.0833		Upper secondary education	-0.2842
Age	Up to 19 years	0.0689		Vocational training	-0.2162
	20-29 years	0.3677		University studies	0.1460
	30-39 years	0.2222		Postgraduate and doctoral studies	0.4922
	40-49 years	0.0543			
	50-59 years	-0.0098			
	60-69 years	-0.2615			
	Over 70 years	-0.5516			

The indicator is also significantly associated, using the Pearson correlation coefficient, with three key quality of life measures: life satisfaction (0.168), final happiness (0.320), and the multidimensional quality of life index (0.271). Among the specific dimensions of quality of life, the most strongly influenced by individual knowledge are the work environment (0.313), educational opportunities (0.289), and economic situation (0.210).

These findings highlight the importance of individual knowledge as a determinant of well-being and reveal systematic cognitive inequalities across population groups. The implications for public policy design are substantial: strengthening information access, promoting educational opportunities across life stages, and reducing sector-based knowledge disparities can support more informed, efficient, and evidence-based

decision-making at the individual level. Enhancing these capabilities contributes to reducing cognitive asymmetries and fostering more equitable conditions for personal development and social participation.

5. Conclusions

This study demonstrates that individual knowledge, captured through a multidimensional IRT based indicator, is a relevant determinant of social well-being. By operationalizing applied cognitive capabilities through structural knowledge, digital competence, and informational autonomy, the analysis shows that higher levels of individual knowledge are consistently associated with improved quality of life outcomes.

The proposed indicator provides a more accurate measurement of the latent capabilities underpinning knowledge creation, transfer, and application in digital environments. In this sense, digital competencies should be understood as a key enabler of knowledge flows and organizational learning. Additionally, the results reveal systematic inequalities across groups, pointing to asymmetries in knowledge use and management. Thus, the study extends KM research by integrating the measurement of individual knowledge in digital contexts and offering a robust tool for its empirical assessment. The results underscore the need for policies that enhance access to information, strengthen digital and educational capacities, and reduce cognitive inequalities, thereby fostering more equitable opportunities for informed decision making and sustainable human development.

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AI Declaration: We did not use an AI tool in the development of this paper.

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